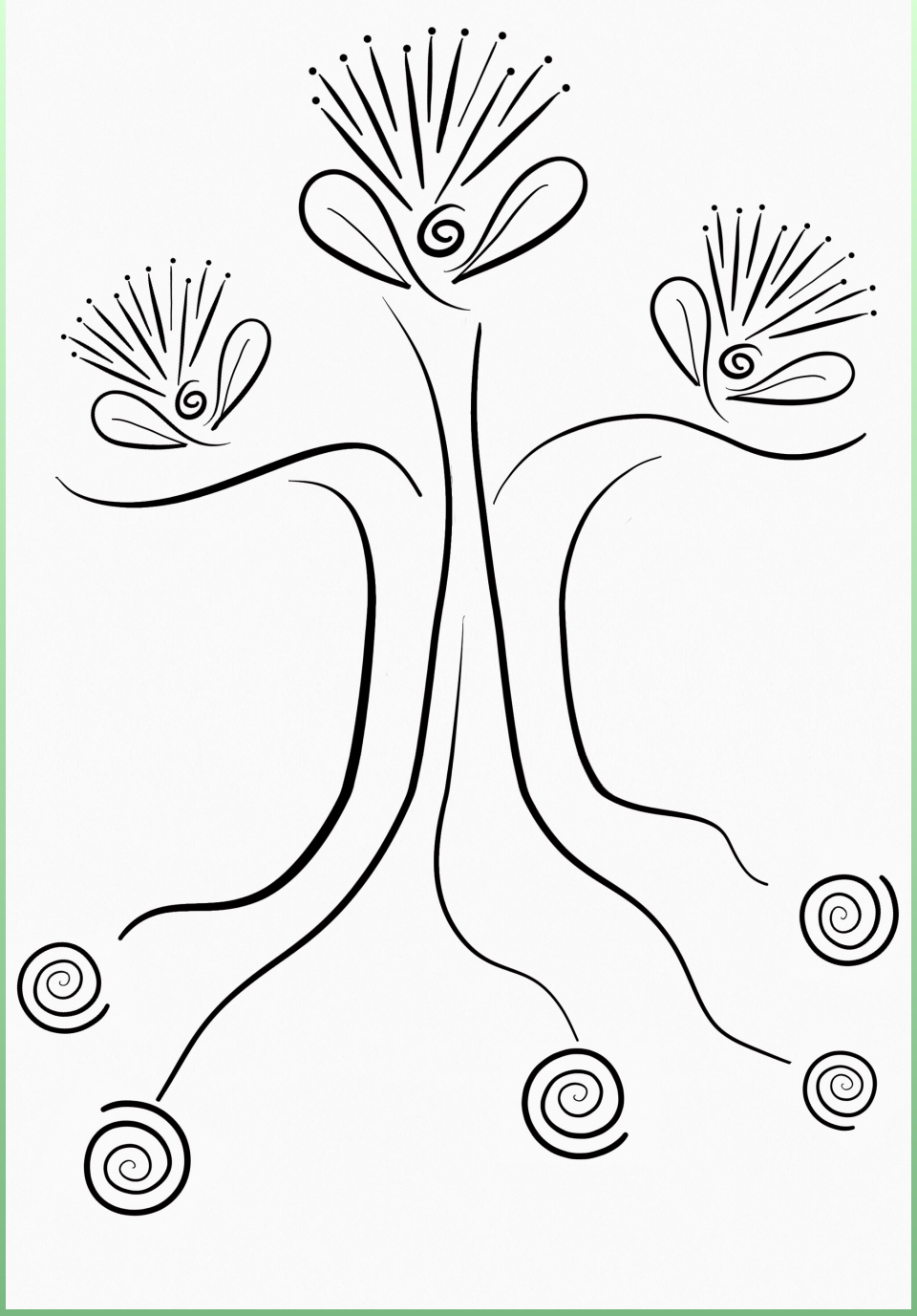

ULU KA LĀLĀ I KE KUMU

From a Strong Foundation Grows an Abundant Future

Abstract Book

25th Annual Hawai'i Conservation Conference
July 24th 2018 - July 26th 2018
Hawai'i Convention Center

TABLE OF CONTENTS

TUESDAY, JULY 24TH, 2018

CONCURRENT SESSION 1

Forum 292: Nurturing people and networks across the Pacific: Lessons from 25 years of the Pacific Internship Programs for Exploring Science (PIPES)

Time: 13:00 - 15:00
Date: 24th July 2018
Location: 311

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292 - Nurturing people and networks across the Pacific: Lessons from 25 years of the Pacific Internship Programs for Exploring Science (PIPES)

Sharon Ziegler-Chong[1], Ulu Ching[2]
[1]UH-Hilo, Hilo, Hawaii. [2]Conservaton International, Hilo, Hawaii

Track

II. Building the Future

Abstract

Through a quarter century of programming the Pacific Internship Programs for Exploring Science (PIPES) has facilitated almost 700 undergraduate internships with host agencies across Hawaii and the Pacific. More than just a summer internship program, PIPES has evolved into a transformative experience built on four pillars: mentorship; networks, kuleana and `āina mōmona. Participation in the program allows individuals, cohorts of current interns and alumni, and mentors to explore, discuss, and facilitate the bringing together of knowledge from science, communities and culture to influence the future of our islands. The program has a strong alumni network of researchers, educators, managers, and community facilitators at many levels, who weave their work around these pillars. This forum will describe the PIPES program models, explore how the program has impacted participants and partners, share why those who have been linked to the program over this quarter century are so passionate about this program, and provide opportunity for discussions of how these lessons can be applied in everyone‘s work in the broader `āina-focused community. A panel of PIPES alumni in different positions will talk about their experience in the PIPES network and how it has influenced their journey. Small group discussions will discuss how the programs pillars are important to their

own work and ways in which we as individuals and as groups can apply those ideas into other groups and settings.

Forum 200: Land conservation – past, present, future

Time: 13:00 - 14:00
Date: 24th July 2018
Location: 316BC

200 - Land conservation – past, present, future

Lea Hong[1], Kawika Burgess[2], William "Butch" Haase[3], Doug Cole[4]
[1]The Trust for Public Land, Honolulu, Hawai'i. [2]Hawaiian Islands Land Trust, Honolulu, HI.
[3]Molokai Land Trust, Kaunakakai, HI. [4]North Shore Community Land Trust, Haleiwa, HI

Track

II. Building the Future

Abstract

Track 2 (Building the Future), Forum - Land conservation – past, present, future

He ali'i nō ka 'āina, ke kauwā wale ke kanaka

"The land is the chief, the people merely servants"

Forum presenters/facilitators will include Lea Hong of The Trust for Public Land, Kāwika Burgess of the Hawaiian Islands Land Trust, Doug Cole of the North Shore Community Land Trust, and Butch Haase of the Moloka'i Land Trust. Agenda will include:
(1) Past and present of land conservation in Hawai'i: Progress made, successes achieved, and the challenges encountered;
(2) Stewardship of conserved lands: Community engagement in stewarding and restoring conserved lands, developing 'āina based educational opportunities, increasing support for conservation funding at local, state and national levels, halting the spread of invasive species, preserving our unique natural resources, and re-establishing indigenous cultural links to the land.
(3) The future of land conservation: Attendees will be asked to participate in a quick 3-5 minute brainstorm using meeting sift technology regarding the opportunities and challenges for

the future of land conservation in Hawai'i. Each presenter will select a breakout topic from the brainstorm list; attendees will be asked to self-select into the break out groups; panelists will facilitate discussion on the topic; panelists will report back top takeaways from the dicussion.

General Session: Rare Native Species

Time: 13:00 - 14:00
Date: 24th July 2018
Location: 316A

137 - Investigating Roosting Behaviors of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) on Hawai'i Island

Sean Moura[1], Kristina Montoya-Aiona[2], Frank Bonaccorso[2]
[1]Hawaiian Electric Company, Honolulu, HI. [2]U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawaii Volcano National Park, Hawaii

Track

II. Building the Future

Abstract

The Hawaiian hoary bat (*Lasiurus cinereus semotus*), a federally and state listed endangered subspecies, is the only extant native terrestrial mammal in the Hawaiian archipelago. It is an insectivorous, solitary and foliage-roosting species that generally roosts alone or in mother-pup family groups. We observed roosting behavior of five solitary adults using thermal imagery and surveillance video from May 24th to September 14th of 2017. We recorded a total of 56 hours of video at three separate day roost trees. We characterized behavior of bats at day roost sites and quantified time spent sleeping, grooming and other arousal events. Additionally, we collected body temperature (fur/skin temperature) data and surrounding foliage ambient temperature data at well shaded roost sites. Hawaiian hoary bats typically enter shallow torpor during the day while maintaining a mean differential above ambient temperature of 6.0 ± 1.28 ˚C. Spikes in body temperature can be associated with arousal from sleep and activity such as urination or grooming. This study represents a novel approach to studying the roosting

behavior of *L. c. semotus* and in the future we hope to study mothers with pups during the critical maternity season.

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139 - Six Years of Snail Enclosure Managementfor *Achatinella mustelina* and Other Rare Native Snail Species at Pu'u Hāpapa on O'ahu

Vincent Costello[1], David Sischo[2,3]
[1]O'ahu Army Natural Resources Program, Honolulu, HI. [2]Department of Land and Natural Resources, Honolulu, HI. [3]Snail Extinction Prevention Program, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

Endemic terrestrial land snails are experiencing severe levels of local extirpation and extinction across the islands. The endangered O'ahu tree snail *Achatinella mustelina* is a focal species for the O'ahu Army Natural Resources Program (OANRP) in the Wai'anae Mountains, while other species in the vicinity such as *Amastra cylindrica*, *Laminella sanguinea,* and *Amastra spirizona*, are also a priority for the Department of Land and Natural Resources (DLNR) – Snail Extinction Prevention Program (SEPP). Both programs participate in ongoing multidisciplinary efforts including intensive long-term habitat management, and removal and control of direct threats posed by invasive plants and snail predators. In 2010, 202 *Achatinella mustelina* were collected at Pu'u Hāpapa and raised in a lab at the University of Hawai'i, while a predator-proof snail enclosure was constructed. When completed, 340 snails were released from the lab into the enclosure. Over the next six years an additional 1,576 *Achatinella mustelina* were translocated from neighboring areas and added to the enclosure, as well as individuals of *Amastra cylindrica*, *Laminella sanguinea* and *Amastra spirizona*. Depredation by the predatory snail *Euglandina rosea* has been the main driver of native snail decline at Pu'u Hāpapa. Over a span of nine years, 2,783 *Euglandina rosea* have been removed from the vicinity of the enclosure, a testament to the extreme predation pressure present here. Fortunately, it seems that our efforts are finally paying off. Results from six years of rare and endangered snail and predator control monitoring efforts will be discussed.

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221 - An Assessment of Wēkiu Bug Populations on Cinder Cones of the Maunakea Volcano, Hawai‘i Informs Habitat Restoration and Conservation Efforts

Jessica Kirkpatrick, Jesse Eiben, Fritz Klasner
University of Hawai'i at Hilo, Hilo, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The endemic Hawaiian wēkiu bug (*Nysius wekiuicola)* is a carnivorous scavenger that only inhabits volcanic cinder cones above ~3,500m elevation on Maunakea, Hawai‘i. As a species of conservation concern threatened by invasive species, climate change, and habitat alteration, a greater understanding of wēkiu bug populations and habitat use through time is needed to inform habitat restoration efforts and conservation management decisions. In this study, locations on a high elevation and a lower elevation cinder cone were sampled using attractant traps in a buffered random design six times from June 2016-2017 to examine wēkiu bug distribution patterns within cinder cone habitats and across seasons. A generalized linear mixed model (GLMM) was used to explore the relative importance of cinder cone characteristics (topographic aspect, surficial minerals, and elevation) hypothesized to influence wēkiu bug distributions. Results indicate that wēkiu bugs had a highly aggregated distribution, with up to 40 times higher bug densities at the higher elevation cinder cone, and the density of bugs changed within and between cinder cones throughout the year. Our GLMM indicated that sample month, topographic aspect, and elevation on a cinder cone influences wēkiu bug distributions with abundance increasing with elevation within a cinder cone, and the highest captures are predicted to be on the northeast aspects of the higher elevation cinder cone year-round. We recommend preserving contiguous cinder cone habitats for the persistence of the wēkiu bug and monitoring populations in a random sample design in known or restored habitats to effectively monitor wēkiu bug densities.

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210 - Kāhuli: Uncovering Indigenous Ecological Knowledge to Conserve Endangered Hawaiian Land Snails

Aimee Sato
University of Hawai‘i at Mānoa, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Indigenous knowledge is a multi-layered knowledge system that can inform contemporary management in both natural observations and cultural value. Centuries old observations preserved within song, chant, and story has been globally recognized as a resource to integrate with conservation efforts for endangered species. In the case of the endemic land snails, kāhuli, of the Hawaiian archipelago, there is a prominent cultural presence preserved in oral and written records. In this study we conducted a literature review of written nineteenth and early twentieth century's records, along with semi-structured interviews with cultural practitioners. This presentation will report on indigenous knowledge that informs about the cultural significance of kāhuli and how this knowledge can contribute to conservation efforts of rare and endangered species.

Furthermore, indigenous knowledge also engages the social drivers of conservation, placing value on a species and enhancing understanding of why they matter. As we witness the dramatic decimation of one of the greatest models of species radiation, the unveiling of the repositories of indigenous knowledge is crucial for conservation of kāhuli. This year's theme for the Hawai'i Conservation Conference is "Ulu ka lālā i ke kumu: From a strong foundation grows an abundant future," which highlights the importance of biocultural stewardship and integration of multiple knowledge systems.

General Session: Troublemakers

Time: 13:00 - 15:00
Date: 24th July 2018
Location: 315

149 - Productivity Response by Endangered Hawaiian Petrels to Ecosystem-level Predator Control on the Island of Lāna'i

Rachel Sprague[1], Tyler Bogardus[2], Andre Raine[3]
[1]Pūlama Lāna'i Department of Natural Resources, Lāna'i City, Hawaii. [2]Grey Boar Wildlife Services, Honolulu, Hawaii. [3]Kauai Endangered Seabird Recovery Project, Hanapepe, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

The island of Lānaʻi is home to one of the largest nesting concentrations of endangered Hawaiian petrels (*Pterodroma sandwichensis*). However, Lānaʻi has experienced severe habitat degradation due to human impacts and non-native species, and predation by non-native rats and feral cats is a substantial source of mortality for petrel adults, chicks, and eggs. In 2016, nearly 80% of nests failed, mostly due to predation. For the 2017 breeding season, control efforts were increased by expanding cat trap coverage and installing control grids of automatic rat traps. Rat control consisted of a 100x50m network of Goodnature A24s covering >35ha of the core known petrel colonies, plus coverage of secondary colony areas, with traps spaced <50x50m. Use of new Automatic Lure Pumps (ALPs) from GoodNature provided greater personnel efficiency, allowing deployment of more traps than would have been possible with the traditional bait, which requires rebaiting every 3-6 weeks. The majority of traps with ALPs were continuing to function properly even after 4-6 months. While predator control efforts can always be improved upon, results from the 2017 petrel breeding season indicate an increase in reproductive success from 32.3% to 79.3% in the area with the most concentrated predator control, and an increase from 20.0% to 68.8% in the secondary areas with moderate predator control. The number of known depredations declined dramatically, as did predator interactions at burrows monitored by cameras. Future analyses will look at the interactions between predator control effort, predator activity in and around the colonies, and capture rate.

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192 - Protecting Endangered Oʻahu ʻElepaioUsing Rodenticide within Schofield Barracks

Tyler Bogardus[1], Aaron Shiels[2]
[1]Pacific International Center For High Technology Research, Honolulu, HI. [2]USDA National Wildlife Research Center, Ft. Collins, CO

Track

III. Invasive Species & Biosecurity

Abstract

In an effort to protect threatened and endangered species, the Army's Oʻahu Natural Resources Program has been engaged in rodent control since 1995. Various techniques used have included: snap traps, automatic traps, rodenticide applied in bait stations and physical barriers. Relying solely on traps has not yet been effective in keeping populations below the targeted 10% tracking in monitoring tunnels, particularly during the period of peak rat abundance (Fall/Winter). In an attempt to combat this problem in Hawaiian habitats, the Army, in cooperation with the USDA National Wildlife Research Center, conducted a trial to determine

the effectiveness of a “one-time” two-application aerial-broadcast (approximately 5-7 days apart) of rodenticide bait (Diphacinone-50) during a period of high rat abundance within Lihue Management Unit. Although rats threaten many natural resources at the site, Lihue has one of the largest breeding colonies of the endangered elepaio, and this rodenticide application is testing whether these birds will receive adequate protection from rats through the nesting season (ca. Dec-June). Monitoring was conducted to determine: 1) the bait distribution and density on the ground, and the animals consuming bait (using trail cameras), 2) rodent activity (via tracking tunnels) before, during, and after the rodenticide application, and 3) evidence of diphacinone residues in target and non-target species, and through stream water sampling. This presentation will discuss results of this trial, highlight some successes and obstacles, and provide insight into the uses of this technique to suppress invasive rodents on a landscape-scale in Hawaii and other islands.

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54 - A Real-Time Avian Malaria Warning System for Targeted Management Response

Lucas Fortini[1], Lauren Kaiser[2], Dennis LaPointe[3]
[1]USGS PIERC, Honolulu, HI. [2]HCSU, Honolulu, HI. [3]USGS PIERC, Hawaii National Park, HI

Track

II. Building the Future

Abstract

Many studies have recently detailed how both ongoing and projected warming allows avian malaria and its mosquito vector to spread at higher elevation areas where most remaining native Hawaiian forest bird species persist. Various vector control options are increasingly being considered to safeguard forest birds in their natural habitats from the spread of disease. However, vector control options require localized deployment that is not logistically nor economically viable ‘everywhere and all the time’. Based on known environmental tolerances of *Plasmodium relictum* and *Culex quinquefasciatus*, we developed a real-time avian malaria warning system that assists managers in identifying conditions when and where vector control is most needed. This tool is not only relevant for targeting conventional vector control methods such as source reduction or insecticides, but also useful to explore novel vector control techniques, like sterilization and mass rearing, in terms of deployment and monitoring prioritization. This tool will aid ongoing discussions on optimization of vector control strategies while yielding a clear example of applying modeling methods to meet operational conservation

needs. The warning system considers three high value conservation sites: Alaka'i Wilderness Preserve on Kaua'i, Nakula Natural Area Reserve System (NARS) on Maui, and Hakalau Forest National Wildlife Refuge on Hawai'i. With this information, local managers may focus vector control efforts to periods preceding when the life cycle of both vector and parasite are possible locally. This project shows how managers can incorporate climate into current decision making without having to consider the uncertainties of long-term climatic and ecological projections.

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55 - Evaluation of Local Control of Mosquito Larvae in Forest Bird Habitat on the Alaka'i Plateau, Kaua'i

Dennis LaPointe[1], Lisa Crampton[2,3], Michael Riney[1], Theodore Black[1], Justin HIte[2,3]
[1]US Geological Survey, Pacific Island Ecosystems Research Center, Hawaii National Park, Hawaii. [2]Kauai Forest Bird Recovery Project, Division of Forestry and Wildlife, State of Hawaii, Hanapepe, Hawaii. [3]Pacific Cooperative Studies Unit, University of Hawaii at Manoa, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Avian malaria is likely responsible for the collapse of the native bird community on Kaua'i. Landscape level control of mosquitoes on the Alaka'i Plateau will require innovative approaches now in development and regulatory hurdles yet to be cleared. Meanwhile, critical breeding populations of endangered 'Akeke'e (*Loxops caeruleirostris*) and 'Akikiki (*Oreomystis bairdi*) are exposed to disease. To protect these populations from further decline, resource managers need local solutions to mosquito control. We tested the efficacy of the biopesticide VectoMax™ FG against *Culex quinquefasciatus* larvae inhabiting pools along the upper Kawaikōī Stream. We found mosquito larvae scarce with a patchy distribution but were able to locate and treat six pools with mosquito larvae. We observed a 94% reduction of larvae at 48 hours post treatment in all pools tested and a 100% reduction of larvae at 48 hours post treatment in perched stream pools. Control of larvae extended out to two weeks post treatment in at least one treated pool. We found no evidence of an impact on native water strider *Microvelia vagans* and native damselfly *Megalagrion* sp. naiads co-inhabiting VectoMax™ FG treated pools. Our findings indicate that VectoMax™ FG is an effective and safe biopesticide for the local control of *Culex quinquefasciatus* larvae in critical forest bird habitat in the Alaka`i. Our research also suggests that the patchy nature of temporal and spatial distributions of *Culex quinquefasciatus* may be the greatest challenge to local and landscape level control.

278 - A Framework to Propose Invasive Plants to be Restricted from Importation, Distribution, and Sale in Hawai‘i

Shahin Ansari
H. T. Harvey & Associates Ecological Consultants, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

Of those plants that have become invasive in Hawai‘i’s natural areas, the majority (>80%) were intentionally introduced. In 2008, the Hawaii Department of Agriculture gained the statutory authority to restrict the importation and sale of invasive plants, however, administrative rules for how invasive plants should be added to the state’s restricted plant list have yet to be developed. In the meantime, deliberate introductions of invasive plants continue to pose a high risk to Hawai‘i’s environment. I developed a science-based approach to identify and document invasive plants that can be proposed for restriction from importation, propagation, and distribution in Hawai‘i. I compiled a list of 1,280 taxa from various weed lists, including the Global Invasive Species Database. I modified the New Zealand Pest Plant Accord system and used the following criteria in an additive manner to screen these 1,280 taxa: documented to occur in trade, not known to occur in Hawai‘i, not known to occur in the continental United States, and a rating of “high” when screened using the Hawai‘i Pacific Weed Risk Assessment tool. This screening method resulted in 39 taxa (0.03% of 1,280) that could potentially be restricted from importation to Hawai‘i. This objective approach, which relies on documented data regarding the occurrence of a species in trade, combined with its potential to be invasive in Hawai‘i, could serve as a basic framework to develop the state’s restricted plant list, thereby better managing the pathway of deliberate plant introductions and strengthening Hawai‘i’s biosecurity.

101 - Seed Limitation and Competition With Invasive Grasses as Barriers to Mid-elevation Forest Restoration on Hawai’i Island

Evan Rehm[1], Stephanie Yelenik[2], Eben Paxton[2], Carla D'Antonio[1]
[1]UC Santa Barbara, Santa Barbara, CA. [2]USGS, Volcano, HI

Track

III. Invasive Species & Biosecurity

Abstract

In Hakalau Forest National Wildlife Refuge managers have planted over 400,000 koa (*Acacia koa*) trees to facilitate forest regeneration in abandoned pastures on the eastern slopes of Mauna Kea. It was hoped that restoring canopy trees would facilitate native understory recruitment by increasing bird-mediated seedrain and decreasing competitive effects of exotic grasses. However, recruitment of native understory has not happened or is occurring at a very slow rate.

We assessed potential barriers to native plant regeneration in these koa corridors by evaluating thresholds of seedrain and grass competition and how they interact to influence woody plant establishment. Under individual koa and ʼōhiʼa (*Metrosideros polymorpha*) trees we implemented a factorial experiment that varied grass biomass (100, 50 or 0% removal) and seedrain (0, 10, 20, 50, 100, or 200 seeds/m^2) for two native understory species (Pilo - *Coprosma spp*, ʼŌlapa – *Cheirodendron trigynum*). Seedling establishment was monitored every two weeks and seedling survival tracked through time.

Pilo seedling recruitment increased in 50% and 100% grass removal treatments relative to 0% grass removal suggesting that grasses suppress native seedling recruitment. However, even when grass was not removed, we observed seedling establishment in the high seed density plots suggesting that seed dispersal may also limit seedling recruitment. These seedrain levels, however, are an order of magnitude greater than measured bird mediated seedrain. Our work therefore suggests that thresholds to natural understory regeneration exist that are holding koa forest with exotic grass understory in a relatively stable state, making restoration difficult.

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29 - Comparing *Sus scrofa* Population Demographics in a Montane vs. Lowland Forest on Kauaʻi

Nicolai Barca, Lucas Behnke
The Nature Conservancy, Lihue, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

The Nature Conservancy has completed two large watershed protection projects on Kaua‘i, within the lowland (1200-2500 ft) wet forest of Wainiha Valley (WAI) and on the adjacent portion of the native dominated montane (4400-5224 ft) wet forest and bogs on the Alaka‘i Plateau (AK). Both areas were rarely accessed by hunters due to remoteness and the resident pig populations were presumably at, or near, their natural carrying capacity. Fences were constructed and animal control began in 2010 (AK) and 2014 (WAI). A simple set of data was collected for each pig captured, including gender, age, weight, color, and whether pregnant or lactating. Population structure was reconstructed by back-calculating known ages of captured pigs using a tooth eruption schedule. Vegetation conditions were monitored along plots and transects in each unit to gain a baseline and document any changes in vegetation resulting from animal removal. The results show two very different pig populations- respectively, AK and WAI had 16 and 94 pigs/sq. mile and annual recruitment rates were 18-43% & 69-74%. Ground disturbance by ungulates was measured at 1% & 16% and vegetation conditions have now been recorded for 7 & 4 years and surveys will continue biannually. We present the findings on the two pig populations, compare reproduction and recruitment rates in the two habitats, vegetation conditions, and short-term results of their removal on vegetation. We then discuss practical application elsewhere for managing or controlling ungulates and implications for balancing watershed conservation with game management objectives.

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18 - Turning a new leaf: Implementing a policy to restrict invasive plant imports in Hawai‘i

Chelsea Arnott[1], James Leary, PhD[2], Linda Cox, PhD[1], Christy Martin[3], M'Randa Sandlin, PhD[4], Shahin Ansari[5], Kathryn Stanaway[3]
[1]University of Hawai‘i, College of Tropical Agriculture and Human Resources, Honolulu, HI. [2]University of Hawai‘i, College of Tropical Agriculture and Human Resources, Kula, HI. [3]University of Hawai‘i, Pacific Cooperative Studies Unit, Coordinating Group on alien Pest Species, Honolulu, HI. [4]University of Hawai‘i College of Tropical Agriculture and Human Resources, Honolulu, HI. [5]HT Harvey and Associates, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

The intentional introduction of non-native plants has served as a major pathway for plant invasions worldwide. In the Hawaiian Islands, the number of naturalized plants has more than doubled in the last 300 years with human-assisted introductions, 200 of which are damaging native ecosystems and threatening natural resources. Prevention is proven to be the

cost-effective means of addressing invasive species issues, but federal and state authorities that oversee plant imports into Hawai‘i regulate less than one percent of the world’s flora, thus, perpetuating a major pathway for invasive plant introductions. To address this issue, we present a policy mechanism that creates a list of plant species restricted from importation into the state through the Hawai‘i Revised Statute 150-A. This statute requires rule-making on what criteria qualifies a species to be listed which provides an opportunity to address gaps in current regulation. Here we present the early phases of the process that emphasize stakeholder engagement and highlight future steps necessary for final implementation of the policy. The framework used can serve as a model for addressing future regulatory needs regarding invasive species issues and achieving goals outlined in the 2017-2027 Hawai‘i Interagency Biosecurity Plan that was released in January 2017.

Symposium 12: From Research to Regulation: An Evolving Blueprint to Manage Aquatic Invasive Species in Hawai‘i

Time: 13:00 - 14:45
Date: 24th July 2018
Location: 314

12 - From Research to Regulation: An Evolving Blueprint to Manage Aquatic Invasive Species in Hawai‘i

43 - The Theory of Resistance to Marine Bioinvasions in Tropical Systems: Is Hawai‘i an exception?

Scott Godwin
DLNR-DAR AIS Team, HONOLULU, HI

Track

III. Invasive Species & Biosecurity

Abstract

There are latitudinal patterns of alien species establishment that suggest fewer successful marine invasions in the tropics, relative to temperate regions. It has been hypothesized that biotic resistance to bioinvasion is greater in high diversity tropical marine habitats; such as coral atolls; due to stronger and more specialized interactions between species. These

interactions are predicted to decrease success in the establishment of alien species. The coral reef habitats of the Hawaiian Archipelago; compared to other areas of the tropical Pacific; are characterized by lower diversity and high endemism. This lower diversity is exhibited in the paucity of native epifaunal growth on natural and man-made substrates. This creates a situation in which any predicted biotic resistance would be minimized in these epifaunal communities, especially for novel species. Preliminary species inventories for epifaunal marine alien invertebrates in the Northwestern Hawaiian Islands (NWHI) at Midway Atoll recorded over 40 established species. The majority of these marine aliens at Midway Atoll are solitary tunicates, which are a poorly represented group in the native fauna of coral reefs in Hawai'i. In the Papahānaumokuākea Marine National Monument (PMNM), which encompasses the NWHI, the coral atoll environments are more susceptible to invasion for this reason and a marine biosecurity plan is in place to limit alien species exposure. A review of the biosecurity plan for PMNM and hypothesized importance of predation influences, niche habitats, and propagule pressure in relation to the establishment of novel species in a low diversity coral atoll will be presented.

70 - Bloom and Bust: The Proliferation and Decline of Invasive Macroalgae in Kāne'ohe Bay, Hawai'i

Brian Neilson[1], Mary Donovan[2], Morgan Winston[3], Justin Goggins[1]
[1]Hawaii Division of Aquatic Resources, Honolulu, Hawaii. [2]Hawai'i Coral Reef Initiative, University of Hawai'i at Manoa, Honolulu, Hawaii. [3]Ecosystem Sciences Division, NOAA, Pacific Islands Fisheries Science Center, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Invasive macroalgae species *Eucheuma* sp. and *Kappaphycus* spp. (*E/K*) became a dominant benthic feature in Kāne'ohe Bay throughout the past four decades. At its peak, *E/K* occurred on up to 74 hectares of reef area and grew up to three meters thick at some locations, prompting intensive management action, including physical removal and outplanting of herbivorous sea urchins. In 2013, *E/K* began to naturally decline in the Bay at unmanaged sites, raising questions as to what the causes of the decline were. *E/K* continued to decline into 2017, and remains sparse in the bay today. The aim of this study was to evaluate 1) the extent and timing of the *E/K cover* decline in the Bay, and 2) evaluate the possible drivers including environmental, ecological, and management factors. We considered a wide range of variables in a generalized additive mixed model and used model selection to determine the best model and most important predictors of macroalgae cover over time. Results confirm a significant decline in *E/K* in the bay beginning in August 2013, and cover remained below 6 % after 2016. The major drivers of *E/K* percent cover decline over time were

herbivore biomass, and stream discharge flow rates. We investigated these patterns to further understand the timing of *E/K* decline, and the mechanisms that may help explain the overall relationships with herbivore biomass and stream discharge. This study emphasizes the importance of herbivory and watershed management in relation to invasive algae blooms.

102 - New Methods for Detecting the Invasive Water Fern Giant Salvinia (*Salvinia molesta*) Using Environmental DNA (eDNA)

Daniel Lager[1], Brett Olds[2], Mark Renshaw[3], Glenn Higashi[1], Brian Neilson[1]
[1]State of Hawaii Division of Aquatic Resources, Honolulu, Hawaii. [2]Oceanic Institute of Hawaii Pacific Univeristy, Waimanalo, Hawaii. [3]Oceanic Institute of Hawaii Pacific University, Waimanalo, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Salvinia molesta is a freshwater fern originating from Brazil that was brought to Hawai'i in the ornamental horticulture trade. The initial infestation in Hawaiian waterways occurred in 1999, and is currently listed as a Federal Noxious Weed. *S. molesta* alters aquatic ecosystems by blocking sunlight and reducing dissolved oxygen concentrations. It became a major nuisance on Lake Wilson in 2002, covering 264 acers (80%) of its surface and costing approximately one million dollars to eradicate. In 2017, community members noticed an increase in the *S. molesta* population on the Kilauea River, Kauai. A working group of community members, conservation groups, researchers, and government agencies have come together to develop a control plan for *S. molesta* on Kaua'i. To create a well-informed management strategy for *S*. *molesta*, it is crucial to understand its distribution throughout windward Kaua'i. In the current study, surveys for *S. molesta* utilized environmental DNA (eDNA) for detecting species presence or absence. Water samples were collected and filtered from 24 perennial streams on the windward side of Kaua'i. DNA extracted from the filters was analyzed using a species-specific genetic marker for *S. molesta* to determine the presence or absence at or above each sample point on the stream. The results were used to map the distribution of *S. molesta* within Kaua'i watersheds and help focus control efforts in specific areas and prevent its further spread. The eDNA monitoring approach proved to be an effective and highly efficient tool to monitor the presence of a species of interest.

148 - Evaluating Aquatic Invasive Species Risk for Hawai'i- Which Tool is Best?

Kimberly Fuller, Brian Neilson

Department of Land and Natural Resources: Division of Aquatic Resources, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Risk assessments are a commonly used process to assess the potential risks of taking a particular action by using a systematic process of evaluation. Risk assessments are especially useful in invasive species management to help make decisions about whether to restrict purposeful importation of organisms that are considered desirable by some persons or industries. Several Risk Assessment Tools have been developed for aquatic species. The aim of this study was to evaluate different risk screening tools for use in Hawai'i by assessing aquatic species with varying levels of invasiveness within the state. We used four different Risk Assessment Tools for the analysis: The Hawai'i Marine Invasive Species Risk Assessment (MIRA) Tool, the Fish Invasive Scoring Kit v2 (FISKv2), the Aquatic Species Invasiveness Screening Kit (AS-ISK), and the Canadian Marine Invasive Screening Tool (CMIST). Each species was evaluated for: 1) the likelihood of invasion, referring to the likelihood of establishment and 2) the impact of the invasion, referring to potential negative impacts caused by the establishment of the species. Time and required expertise were also considered as factors for usefulness to managers. Preliminary results indicate that all four tools produced similar results for predicting risk of invasiveness and took a similar amount of time to complete (4-8 hrs/species). The MIRA tool is the only tool that provides suggested management action, but also sometimes produced higher scores for risk of invasiveness. A thorough literature review or existing expertise was necessary for all four of the Risk Assessment Tools evaluated.

182 - Estuaries (Muliwai) in Hawai'i Are Highly Invaded by Non-native Fishes

Kimberly Peyton[1], Troy Shimoda[2], Skippy Hau[3], Troy Sakihara[2]
[1]DLNR-DAR, Honolulu, Hawaii. [2]DLNR-DAR, Hilo, Hawaii. [3]DLNR-DAR, Wailuku, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Estuaries consist of a complex mixture of habitat types, which are characterized by physical, chemical and biological gradients. These highly productive systems attract juvenile fishes

that use estuaries as nurseries. In assessing the importance of estuaries for juvenile fish in Hawai‘i eleven estuarine sites were sampled quarterly for three consecutive years. Research sites were located on Kauai, Maui, Oahu and Hawai‘i Island and included three types of estuaries: riverine estuaries, lagoons and embayments. Remarkably, after sampling over 8,000 fish per year in diverse estuarine habitats our pooled results revealed that almost half of fish captured (relative abundance) were not native to Hawaiian waters. Invasive species also contributed a similarly high proportion of the relative biomass sampled. Additionally, because of inherent bias in sampling fish we used two methods, visual and probability of encounter, and both methods yielded similar results.

At the species level, while a number of invasive fishes occur in estuaries, including tilapias *Oreochromis mossambicus* and *Sarotherodon melanotheron*, Goldspot sardine *Herklotsichthys quadrimaculatus*, and to‘au *Lutjanus fulvus*, it was the Kanda mullet *Osteomugil engeli* that dominated our samples. At the individual site level the extent of invasion varied greatly. For example, juvenile fish assemblages in remote estuaries sampled on Maui were composed mostly of native species. In contrast, in one estuary on Oahu 70% fish captured were introduced species. Although juvenile fish assemblages differed temporally throughout the study, the high proportion of invasive fish captured was consistent.

185 - Marine Alien Species Distribution and Management in the Papahānaumokuākea Marine National Monument

Scott Godwin[1], Brian Hauk[2], Holly Bolick[3], Randall Kosaki[4]
[1]Division of Aquatic Resources, Honolulu, Hawaii. [2]Joint Institute for Marine and Atmospheric Research, Honolulu, Hawaii. [3]Bishop Museum, Honolulu, Hawaii. [4]Papahānaumokuākea Marine National Monument, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

The Papahānaumokuākea Marine National Monument (PMNM) is a marine protected area encompassing over 1.5 million square kilometers of areas surrounding the Northwestern Hawaiian Islands (NWHI). As of 2008, out of the more than 400 species of marine alien species recorded in the main Hawaiian Islands, only 13 species were considered established in the PMNM: one macro-algae, nine marine invertebrates and three fishes. The nine established alien marine invertebrates were mostly recorded from Midway Atoll and French Frigate Shoals. Despite the higher number of established alien invertebrates, less information concerning their abundance and distribution existed in the Monument than

alien algae or fishes. In order to fill this information gap and update the current status of marine alien species in the Monument, the authors have focused on marine invertebrate surveys during the annual Reef Assessment and Monitoring Programs (RAMP) expeditions and other dedicated ship-based and land-based missions since 2010. RAMP surveys collected quantitative data on primarily fish and corals, but also algae and invertebrates, and they covered all islands and atolls in the Monument. Our study found that there are currently 41 established alien species, 10 cryptogenic species and two aliens that are found but not established. PMNM will continue opportunistically monitoring alien species during future RAMP expeditions. PMNM also has a permitting and inspection program to help prevent further introductions of alien species into or among different islands/atolls of the NWHI and hopes to eliminate new anthropogenic rooted introductions in the future.

117 - In-Water Cleaning of Vessel Biofouling: Developing Solutions to Regulatory Challenges through Research and Technology

Andrew Porter
Coordinating Group on Alien Pest Species, Honolulu, Hawaii. Hawaii Division of Aquatic Resources, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

The unmanaged accumulation of biological material on vessel hulls, also known as biofouling, can lead to the introduction of aquatic invasive species (AIS), the release of biocides into the water column, and increased carbon dioxide emissions from ships due to decreased hydrodynamic efficiency. However, managing biofouling requires regular in-water cleaning of the vessel's hull which also poses a serious threat of AIS and biocide release into the water column if not properly executed. This presentation looks at the challenges facing regulators in managing vessel biofouling through the regulation of in-water cleaning and recent solutions that have evolved through research and technology.

Poster 227: Keeping up with the coast: quantifying shoreline change on Hawai‘i Island

Time: 13:00 - 13:30

Date: 24th July 2018
Location: Machine 1

227 - Keeping up with the coast: quantifying shoreline change on Hawai‘i Island

Rose Hart[1], Ryan Perroy[1], Charles Fletcher[2], Steven Colbert[1], Bethany Morrison[3]
[1]University of Hawai‘i at Hilo, Hilo, HI. [2]University of Hawai‘i at Mānoa, Honolulu, HI. [3]Hawai‘i County Planning Department, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Hawai‘i Island, bounded by nearly 430 km of diverse and dynamic coastline under various levels of zoning and development, has never had a comprehensive assessment of coastal vulnerabilities or any systematic monitoring of long-term shoreline change rates to enforce sustainable coastal development. Consequently, Hawai‘i Island's coastal communities are in a weak position for adapting to the potential impacts of sea-level rise (SLR), coastal erosion, and subsidence. To better predict and manage coastal vulnerabilities, this project quantifies shoreline change rates from the present and recent past for three different geomorphic coastal settings on Hawai‘i Island. We use shoreline records from historic aerial photographs and three-dimensional datasets systematically collected from small unmanned aerial systems (sUAS) and other survey platforms, to quantify shoreline change at a calcareous beach (Hāpuna State Beach Park), a sea cliff (Honoli‘i Beach Park), and subsiding coastal lava field (Kapoho Tide Pools). These data are merged with SLR and subsidence projections using GIS to estimate and visualize impacts at our three sites. Results from this study can provide insights to the chronic, seasonal, and episodic coastal processes that threaten adjacent communities and resources along Hawai‘i Island's coast and help Hawai‘i County planners develop necessary adaptations to coastal management strategies.

Poster 144: Instantaneous Sampling: an Approach to Estimating Population Size with Imagery of Unmarked Animals

Time: 13:00 - 13:30
Date: 24th July 2018
Location: Machine 2

144 - Instantaneous Sampling: an Approach to Estimating Population Size with Imagery of Unmarked Animals

B.J. Adams[1], Kanalu Sproat[2], Randy Larsen[1], Brock McMillan[1]
[1]Brigham Young University, Provo, Utah. [2]Division of Forestry and Wildlife, Kamuela, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Effective management of wildlife benefits from accurate and unbiased estimates of population size. Remote cameras are becoming increasingly popular as a flexible option for estimating population size through methods like photographic capture-recapture (CR). Because most ungulates do not have individual pelage patterns, CR is not possible without first capturing and marking animals for future photo identification. To address this limitation, our objective was to estimate population size utilizing imagery of unmarked animals. More specifically, we sampled population density at multiple moments in time, otherwise known as instantaneous sampling (IS). In addition, we will estimate population size through traditional CR and compare the results to test the viability of IS. During June through October 2017, we randomly deployed 95 remote cameras to detect sheep (*Ovis aries* and *O. gmelini musimon*) found throughout the Pu'u Wa'awa'a and Pu'u Anahulu game management areas on the island of Hawai'i. We programmed cameras to trigger every 15 minutes. Images taken in this manner act as a sample of population density within each camera's viewable area. We also programmed cameras to trigger with infrared and motion sensors to provide a comparison CR dataset. Utilizing two weeks of imagery from June to July of 2017, we generated a preliminary estimate of 1654 sheep (95% CI ± 395). Imagery from the same time period was not sufficient to generate CR estimates. In the event that CR and IS estimates have overlapping confidence intervals, we would propose that IS be considered as a less-invasive approach to estimating population size.

Poster 118: Managing Invasive Macroalgae in Paikō Lagoon State Wildlife Sanctuary: a Partnership with the State of Hawai'i and the Maunalua Community

Time: 13:00 - 13:30

Date: 24th July 2018
Location: Machine 3

118 - Managing Invasive Macroalgae in Paikō Lagoon State Wildlife Sanctuary: a Partnership with the State of Hawai‘i and the Maunalua Community

Courtney Payne
Division of Forestry and Wildlife, Honolulu, Hawai'i. University of Hawai'i at Mānoa, Honolulu, Hawai'i

Track

III. Invasive Species & Biosecurity

Abstract

Invasive species cost the United States an estimated $120 billion per year and 42% of species listed under the Endangered Species Act are primarily at risk due to invasive species. Invasive macroalgae negatively affect marine areas by monopolizing space, altering geochemistry, and changing food webs. Hawai‘i’s Division of Forestry and Wildlife (DOFAW) seeks to establish an official protocol for managing invasive macroalgae in Paikō Lagoon State Wildlife Sanctuary as part of their broader efforts to manage sites throughout O‘ahu.. I developed adaptive removal and monitoring protocols based on current understanding of macroalgae biology, lessons learned from past efforts, removal practices outlined in available literature, and observations of other groups. Final protocols define transects and subsections in which groups of four volunteers use quadrats, five-gallon buckets, and hand nets to remove only invasive macroalgae and return native macroalgae to the environment. A pilot, ten-month monitoring period revealed a significant average percent cover decline in invasive macroalgae, 45% (95%CI [±11.30]) to 18%(95% CI [±6.28]). However, native macroalgae also declined, 21% (95% CI [±6.37]) to 1%(95%CI[±.75]); possibly due to recolonization outside the monitoring area after returning native macroalgae to the environment or seasonal temperature variations. This project successfully created adaptive removal and monitoring protocols and decreased invasive macroalgae cover, however more data is needed to determine the cause of native macroalgae decline. The adaptive monitoring protocols suggest a need to change management focus to increasing native macroalgae rather than decreasing invasive macroalgae.

Poster 109: Assessment of Disturbance to Hawaiian Monk Seals and Birds in the Northwestern Hawaiian Islands by a Hexacopter UAS

Time: 13:00 - 13:30
Date: 24th July 2018
Location: Machine 4

109 - Assessment of Disturbance to Hawaiian Monk Seals and Birds in the Northwestern Hawaiian Islands by a Hexacopter UAS

Anne Harshbarger[1,2], Jessica Bohlander[1], Stacie Robinson[1], Charles Littnan[1]
[1]NOAA, Honolulu, Hawaii. [2]Duke University, Durham, NC

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Unmanned Aerial Systems (UAS) have great potential for Hawaiian monk seal (*Neomonachus schauinslandi)* conservation research by allowing scientists to survey monk seals with less man power and at difficult to reach locations. UAS may also have drawbacks, including disturbance to target and non-target species. The objective of this study was to determine if an APH-22 hexacopter would disturb seals or birds, causing harmful stress and preclude successful research objectives. Seal behavior was recorded before, during, and after APH-22 flights at altitudes of 50m, 30m, and 10m. Bird behavior was recorded before, during, and after each flight. Results showed that disturbance to seals was minimal. At 50m, 10% of seals responded to the APH-22 with a raised head. At 30m, 10% of the seals responded; the most extreme response being a glance towards the APH-22. At 10m, 50% of the seals responded with most reactions being a raised head, and one seal moved away. Disturbance to birds varied by species. Birds that were most often disturbed were noddies and boobies which, on some flights flushed from the beach, but generally returned within minutes. Several species of boobies and terns appeared interested in the APH-22, but no birds made contact. This study observed minimal wildlife disturbance from the APH-22, suggesting that this tool can be used safely for Hawaiian monk seal conservation research. Future studies will continue to assess the impact that UAS have on target and non-target species.

Poster 103: Evaluating the Seed Dispersal Efficacy of Hawai‘i’s Last Functionally Extant Frugivore

Time: 13:30 - 14:00
Date: 24th July 2018
Location: Machine 1

103 - Evaluating the Seed Dispersal Efficacy of Hawai‘i’s Last Functionally Extant Frugivore

Koa Matsuoka
University of Hawai‘i at Hilo, Hilo, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

On islands worldwide, mass avian extinctions related to anthropogenic activity have allowed exotic generalist to fill ecological niches left vacant by larger native specialist. Consequently, ensuring the survival of the *‘ōma‘o* (*Myadestes obscurus*) or Hawaiian thrush, Hawai‘i’s last functionally extant native frugivore, may be integral in preserving seed dispersal function in Hawaiian forests. In lieu of settling on exotic birds as proxies for native seed dispersers, recent management strategies have proposed utilizing *‘ōma‘o* reintroductions to refill empty niches caused by localized *‘ōma‘o* extinctions. Previous studies suggests that *‘ōma‘o* consume a greater diversity of native fruiting plants than exotic frugivores and therefore, have different effects on seed dispersal. In light of this, this study compared diet and germination success of Hawaiian fruiting plants dispersed by exotic and native birds in a naturally fragmented forest on Hawai‘i Island. To compare seed dispersal proficiency between native and exotic birds, seeds were collected from the fecal samples of *‘ōma‘o* and Japanese white-eye (*Zosterops japonicus*) to answer the following questions: 1. How does seed germination success vary by gut-passge through *‘ōma‘o* and Japanese white-eye? 2. What fruiting plant species benefit from the presence of *‘ōma‘o*? Preliminary diet results show that *‘ōma‘o* have greater diet diversity and abundance of fruiting plant seeds compared to the Japanese white-eye. These results may substantiate the use of *‘ōma‘o* reintroductions as a strategy to promote regeneration of Hawaiian forests while giving insight into potential changes in the native plant community composition should *‘ōma‘o* go extinct and replaced by exotic frugivores.

Poster 217: E Kukui ke Kukui: Statewide Mapping of Kukui Sheds Light on Past and Potential Futureof Traditional Agroforestry across Hawai‘i

Time: 13:30 - 14:00
Date: 24th July 2018
Location: Machine 2

217 - E Kukui ke Kukui: Statewide Kukui Mapping Shed Light on Past & Potential Future of Traditional Agroforestry across Hawai´i

Kalisi Fa'anunu Mausio, Noa Kekuewa Lincoln, Matthew Lucas, Tanya Torres, Blaire Langston
University of Hawaii at Manoa, Honolulu, Hawaii

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Kukui (*Aleurites molucannus*), also known as candlenut, is the state tree of Hawaii. It obtained this prestigious designation, in 1959, because "…of its uses to the ancient Hawaiians for light, fuel, medicine, dye and ornament and its continued value to the people of modern Hawai´i, as well as the distinctive beauty of its light green foliage which embellishes many of the slopes of our beloved mountains …". Despite past and current reverence for this culturally iconic tree, detailed knowledge of its statewide distribution does not exist. Unlike intensive lo´i or māla cultivation, traditional arboriculture systems do not leave physical infrastructure; meaning techniques such as botanical distribution are the most informative way to understand traditional agroforestry extents. To better understand the current and historic importance of kukui and potential remnant agroforestry, we performed high-resolution mapping of kukui statewide using multi-spectral WorldView® II data and object-based remote sensing. In addtion to achiving accurately of >90%, maps of kukui begin to reveal the tree's current distribution, and, as we discuss, may also serve as a widespread indicator of the potential extents of traditional Hawaiian agroforestry. Given that these traditional agroforestry systems have been shown to have multiple societal and ecological benefits, including substantially contributing to traditional food supply and bio-cultural conservation. It is our hope that a better understanding of traditional land management strategies for resource and food production will influence more informed land use decisions that bolster the revitalization of traditional agroforestry in the present day.

Poster 127: Land-based Pollutants in Hawaiian Reef Fishes

Time: 13:30 - 14:00
Date: 24th July 2018
Location: Machine 3

127 - Land-based Pollutants in Hawaiian Reef Fishes

Eileen Nalley, Julie Zill, Megan Donahue
University of Hawai‘i at Mānoa, Hawai‘i Institute of Marine Biology, Kāne‘ohe, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

In Hawai‘i subsistence and recreational fishing are culturally and economically important, yet little is known of how anthropogenic impacts on shore may be affecting the quality of resource reef fishes. In areas that have experienced significant industrialization, urbanization, and militarization contaminants can leave a legacy that too often goes undetected. In addition, leaching from intensive agriculture and landfills along the coast contributes to the transfer of terrestrial pollutants to the nearshore environment. Sediment in terrestrial runoff can cause direct ecological problems on Hawaiian reefs, but it can also affect reef organisms indirectly by carrying land-based pollutants that can be transferred to fishes that eat turf algae, the epilithic algal matrix, and detritus. To better understand this process, this multi-year study examines land-based pollutants in fishes spanning several trophic groups from sites that experience a range of pollution types and intensities on O‘ahu and Kaua‘i. The first year focuses on identifying sites that are heavily impacted, and the second year will include testing for contamination in sediment, water, algae, and invertebrates at those heavily impacted sites to better understand how pollutants are moving through the nearshore ecosystem. Our focus is on species that are regularly targeted by fishermen, so the results of this study are directly applicable to Hawaiian communities and resource managers.

Poster 84: Survey for Ceratocystis fimbriata on Syngonium

Time: 13:30 - 14:00

Date: 24th July 2018
Location: Machine 4

84 - Survey for *Ceratocystis fimbriata* on *Syngonium*

Upasana Dhakal[1], Chris Kadooka[1], Janice Uchida[2]
[1]University of Hawaii at Manoa, Department of plant and environmental protection sciences, Honolulu, Hawaii. [2]Assoc Plant Pathologist, University of Hawaii at Manoa, Department of plant and environmental protection science, Honolulu, Hawaii

Track

II. Building the Future

Abstract

Ohia (*Metrosideros polymorpha* Gaud.), one of the foundation plants of the of Hawaiian rainforest ecosystem have been rapidly dying, due to a disease caused by a fungus, *Ceratocystis fimbriata*. *Ceratocystis fimbriata* was earlier reported on *Syngonium* from Hawaii. It is vital to determine if this pathogen is on other islands on diseased *Syngonium* and test its host range. A survey of the island of Oahu was conducted. Samples were washed, dissected into smaller pieces, surface sterilized with 10% Clorox and plated on water agar. Single hyphal tips of the mycelium growing out from the infected samples were cut and transferred to vegetable juice agar for growth and spore formation. Nineteen different locations in Oahu were surveyed and all samples from these places were free of *C. fimbriata*. Most common symptom was the rotting of the aerial root tips and many different fungi were isolated from these symptoms at every location. *Fusarium* species was the most commonly isolated fungus. Other fungi were also recovered less frequent. However, *F. equiseti* was consistently isolated from at very high frequency (67% of total isolations) from samples collected from one location. Out of three nurseries surveyed in Big island, samples from two of them were found to be infected with *C. fimbriata*. Symptoms were darkening and black rotting of the nodes and bases of the petiole and basal rotting of the plants. Pathogenicity and host range of the isolates collected will be tested in near future.

Forum 300: Innovative Technology Applications to Support Conservation Best Management Practices

Time: 14:00 - 15:00

Date: 24th July 2018
Location: 316BC

300 - Innovative Technology Applications to Support Conservation Best Management Practices

Michelle Gorham[1], Mark Phillipson[2], Stephanie Mock[3], James McCay[4], Sam Aruch[5]
[1]West Oahu Soil and Water Conservation District, Kunia, Hawaii. [2]Smart Yields, Honolulu, Hawaii. [3]Oahu Resource Conservation and Development Council, Kunia, HI. [4]Ameresco, Honolulu, Hawaii. [5]Natural Resource Data Solutions, Kahului, Maui

Track

II. Building the Future

Abstract

Technology plays an increasingly large role in our lives and the field of conservation is no exception. How that technology is applied to advance an organizational mission varies. In this forum we encourage participants to think outside the box with a panel of technology leaders from Smart Yields, Ameresco, Oahu Resource Conservation & Development Council, and Natural Resource Data Solutions. Each presenter will share local and national stories of technology-based conservation strategies that advance conservation through production, reduced costs, increased efficiency, and more. Technology and conservation can work hand in hand and need to for creation of a strong foundation to grow an abundant future. Participants will be invited to explore innovative and rogue practices, ask questions, and share mana'o.

General Session: Native Birds 1

Time: 14:00 - 15:00
Date: 24th July 2018
Location: 316A

87 - Genomic diversity in the "critically-endangered" 'alalā, (Hawaiian Crow; *Corvus hawaiiensis*)

Geneviève Blanchet[1], M. Renee Bellinger[1], Anna Kearns[2], Nandadevi Cortes-Rodriguez[2,3], Michael Campana[2], Christian Rutz[4], Robert Fleischer[2], Jolene Sutton[1]

[1]University of Hawai'i at Hilo, Hilo, HI. [2]Smithsonian Conservation Biology Institute (SCBI), Washington, DC. [3]Ithaca College, Ithaca, NY. [4]University of St Andrews, St Andrews, United Kingdom

Track

II. Building the Future

Abstract

Genetic diversity is often reduced in bottlenecked populations, which can lead to problems like inbreeding depression and reduced adaptive potential. One example of a bottlenecked species experiencing negative genetic consequences is the ʻalalā (Hawaiian crow; *Corvus hawaiiensis*). The ʻalalā suffered a century-long bottleneck, and became extinct in the wild in 2002. After decades of captive breeding, 11 individuals were successfully released back into the wild in October 2017, representing the first step in a long-term reintroduction effort. To aid this species recovery program, we have begun assessing genome-wide diversity in the ʻalalā. In this study, we used a single nucleotide polymorphism (SNP) capture approach to test for loss of allelic diversity and heterozygosity between two sets of samples: museum and modern. Museum specimens were collected in the early bottleneck period (circa 1890), and modern individuals were sampled during years in which the population reached its smallest size (circa 1990). Preliminary data analysis suggests no loss in overall genetic diversity – measured as the number of SNPs per bird – between groups, but genetic structuring is present between museum and modern samples. If these preliminary findings are confirmed by our on-going, in-depth analyses, this would suggest that the ʻalalā population was relatively small with low genetic diversity prior to the bottleneck event, like some other island populations.

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20 - The Influence of Captivity on the Gut Microbiota of a Critically Endangered Honeycreeper

Maria Costantini[1,2], Floyd Reed[1], Lisa Crampton[1,2]
[1]University of Hawaii at Manoa, Manoa, Hawaii. [2]Kauai Forest Bird Recovery Project, Hanapepe, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The insectivorous honeycreeper, ‘akikiki (*Oreomystis bairdi*), a critically endangered forest bird on the island of Kaua‘i, is subjected to a suite of introduced threats and currently only occupies a small (54km^2) region of its previous range. Captive breeding attempts are currently underway, and agencies are contemplating the potential establishment of translocated “insurance” populations. This project explores an overlooked, but potentially critical factor to the success of translocation attempts by analyzing the effect of captivity and novel environments on host microbiota. Symbiotic microbiomes provide key health benefits to the host through such processes as dietary supplementation, boosts to host immune system, increased pathogen resistance, or tolerance to environmental perturbations. Because gut microbiota are heavily influenced by diet and environmental conditions, differences in the microbiota of captive-raised individuals may hinder their ability to adjust upon reintroduction Fecal samples were collected from wild and captively reared ‘akikiki beginning during the spring of 2017, by mist-netting and collecting directly from the bird while in hand. These samples will be analyzed through Illumina MiSeq metabarcoding techniques of the 16S rRNA gene to determine bacterial community composition and diversity. The results from this analysis will better inform management strategies of this endangered bird, such as by developing an inoculation protocol for captive individuals, as well as will likely be informative for understanding similar species within and outside of Hawai’i.

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36 - Loss of Cultural Diversity in Hawaiian Honeycreepers' Songs Over the Last 40 Years

Kristina Paxton[1], Esther Sebastián-González[2], Lisa Crampton[3], Justin Hite[3], David Kuhn[4], Patrick Hart[1]

[1]University of Hawaii Hilo, Hilo, HI. [2]Miguel Hernández University, Elche, Spain. [3]Kauai Forest Bird Recovery Project, Hanapepe, HI. [4]SoundsHawaiian, Hanapepe, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Many animal behaviors are learned through cultural transmission, and as animal populations decline across the globe, there is great potential for the modification or loss of culturally transmitted behaviors. In Hawaiian honeycreepers, like other oscine Passerines, song is a culturally transmitted trait acquired through social learning. Population-level changes in song accrue through mechanisms analogous to genetic evolution, and are influenced by population size and distribution. In this study, we examined how extreme population declines over a 40-year period may have affected the acoustic characteristics of Kaua‘i honeycreepers. We

hypothesized that the rapid declines in density and distribution of honeycreepers starting in 2000 would result in changes to the acoustic structure of songs. We examined 11 acoustic characteristics of songs recorded during three time periods (1970s; early 2000s; present day) for three species (ʻAkekeʻe, *Loxops cauruleirostris*; ʻAnianiau, *Hemignathus parvus*; Kauaʻi ʻAmakihi, *Chlorodrepanis stejnegeri*). The acoustic characteristics of present day songs of Kauaʻi ʻAmakihi and ʻAnianiau had reduced complexity, a narrower range of frequencies across songs, and reduced diversity compared to songs from the 1970s. While many factors can influence the acoustic characteristics of learned songs, the best explanation for the decreased complexity and diversity of these honeycreeper songs over time is the severe reduction in population size. Because birds learn their songs not only from their parents, but also neighboring individuals, the lower density of individuals within an area results in fewer songs for young birds to learn from and a quieter soundscape from which to build their song repertoire.

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49 - Population Genetics of the Band-rumped Storm Petrel (*Oceanodroma castro)*, an Endangered and Elusive Hawaiian Seabird

Carmen Antaky, Melissa Price
University of Hawaiʻi at Mānoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian Band-rumped Storm Petrel (ʻAkēʻakē; *Oceanodramo castro*), listed in 2016 as federally Endangered, nests in remote locations that are difficult to access and spends most of its life at sea. As such, very little is known about movement among islands and the potential for establishing new breeding colonies in managed areas with predator controls. As a first step in assessing connectivity, in this study we evaluated patterns in genetic diversity between populations on two islands known to host breeding populations. Blood or feather samples were collected from breeding colonies on Kauaʻi and Hawaiʻi Island. Kauaʻi and Hawaiʻi Island represent the northern and southern extent of the Main Hawaiian Islands, and are approximately 300 miles apart. We performed next-generation sequencing on pooled samples from each island. Results indicated moderate genetic differences between populations and higher genetic diversity than expected. Despite their Endangered status and indication of population loss, this study suggests genetics of *O. castro* in the Hawaiian Islands currently do not warrant management concern. Findings from this study may be used to inform seabird conservation efforts in Hawaiʻi. The Hawaiian Band-rumped Storm Petrel, a significant contributor to island nutrient cycling and found in ancient Hawaiian midden sites, is a

foundational species to the Main Hawaiian Islands. This project aims not just at saving a biological species, but also preserving a part of the culture which makes up Hawai‘i.

Poster 3: Mapping the Effects of the Removal of Rhizophora mangle from Alakoko Fish Pond, a Community Restoration Project

Time: 14:00 - 14:30
Date: 24th July 2018
Location: Machine 1

3 - Mapping the Effects of the Removal of *Rhizophora mangle* from Alakoko Fish Pond, a Community Restoration Project

Shale Shore
Kauai Sailing Association, koloa, Hawaii

Track

II. Building the Future

Abstract

The purpose of this project is to involve the community of Kaua`i in the creation of a spatially accurate digital map of Alakoko fish pond, representing biological and physical characteristics before and after mangrove eradication.

Map elements to be included will be; depth, temperature, dissolved oxygen, specific conductivity and salinity at sample sites along a predetermined grid. The map will serve as a visualization tool for biological, physical and botanical surveys conducted in the fish pond. In creating this map Mālama Hulē'ia (the primary organization removing mangroves), and the community of Kaua`i will gain documentation on the effects of many years of mangrove eradication. This map will also serve as a strong foundation for any future conservation efforts in Alakoko.

Local school groups, non-profits and interested families will be given the opportunity to travel via boat to Alakoko fish pond, take part in field sampling, and then enter data collected into an

online map. Through this project the community will experience using a multi probe for water sampling, a Geo 7x Trimble unit, and GIS and Pathfinder software.

This place based learning will engage new audiences and give the next generation the tools they need to preserve what is their backyard.

Poster 134: Plant-Water Interactions: Overview of Ecohydrology Research in Hawai‘i

Time: 14:00 - 14:30
Date: 24th July 2018
Location: Machine 2

134 - Plant-Water Interactions: Overview of Ecohydrology Research in Hawai‘i

Liat Portner
University of Hawaii, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

While plant invasion is a globally recognized threat to biodiversity, the impacts of invasion on ecohydrological processes (e.g. local climate interactions, water use by plants, surface and groundwater storage) is not well understood (Nelson 2005; Brauman 2007). Hawai‘i has a long history of landcover change that has produced landscapes dominated by alien vegetation, many of which are now recognized as invasive species (Woodcock 2003). Quantifying the changes in the hydrologic services of these novel ecosystems, dominated by invasive species, is critical for the effective management of water resources (Brauman et al. 2007). An overview of the literature reveals which species invasive and native species have been examined, and for which component of the water cycle. Few sites have had complete water balance assessments. Through this review, it is evident that the multitude of mechanisms by which plants can influence the movement of water through an ecosystem, and that there is much work to be done towards understanding how invasive plants alter these processes compared to native plant assemblages. Comparisons of studies are made difficult due to differing scopes of the

research and variations in the relative importance's of water balance components with different climates. Finally, the importance of characterizing species level traits, as well as stand-level structural characteristics, to elucidate the mechanism by which novel ecosystems alter hydrologic processes becomes clear. The interactive nature of ecohydrologic processes requires investigation not only across species, community, and land-cover type, but within different climate regimes as well.

Poster 165: Effects of the 2014 coral bleaching event on obligate coral-feeding reef fishes in the Northwestern Hawaiian Islands

Time: 14:00 - 14:30
Date: 24th July 2018
Location: Machine 3

165 - Effects of the 2014 coral bleaching event on obligate coral-feeding reef fishes in the Northwestern Hawaiian Islands

Roseanna Lee
University of Hawai'i at Hilo, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The abundance and distribution of reef fishes is strongly correlated to the availability of live coral resources. Many fish among the coral reefs are important bioindicators of healthy reefs, including obligate corallivores that depend on healthy coral polyps as food. Natural and anthropogenic disturbances such as hurricanes, invasive species, urbanization, and climate change can dramatically alter coral reefs, making them unstable ecosystems. Mass coral bleaching events derived from prolonged temperature stresses can result in coral mortality. In 2014, the Northwestern Hawaiian Islands experienced the largest mass coral bleaching event on record where some shallow water habitats encountered over 90% coral bleached. The effects of mass coral bleaching and mortality on corallivore abundance and distribution in the Hawaiian Islands is currently unknown. This study is the first to explore the effects of the 2014

coral bleaching event on the abundance and diversity of obligate coral-feeding reef fish in the NWHI. We conducted a series of diver-based fish and benthic surveys to assess correlations between bleaching intensity and corallivorous fish abundance and diversity at Lisianski Island, one of the most severely impacted islands from the 2014 coral bleaching event. We found significant variation in both the abundance and the composition of corallivores in relation to coral bleaching. This research presents the first evidence of cascading effects resulting from mass bleaching events in the NWHI and will contribute to future management and conservation efforts within the NWHI and the Hawaiian Archipelago as a whole.

Poster 275: Is Biological Nitrogen Fixation Strategy Tied to Invasive Success for Non-Native Woody Legumes in Hawai‘i?

Time: 14:00 - 14:30
Date: 24th July 2018
Location: Machine 4

275 - Is Biological Nitrogen Fixation Strategy Tied to Invasive Success for Non-Native Woody Legumes in Hawai‘i?

Angalee Kirby
University of Hawaii at Hilo, Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

Hawai‘i has been subject to biological invasion since the first settlers on the island chain. Invasive plant species have been shown to disrupt nutrient cycling and outcompete native flora. Many invasive trees have a nitrogen-fixing symbiosis, allowing them to contribute excess nitrogen to Hawaiian ecosystems that have evolved to survive in nitrogen limited conditions, facilitating further invasion by exotic plants that can utilize the nitrogen surplus. The spectrum of biological nitrogen fixation strategies includes over-regulation, obligate, facultative, and under-regulation. The present study investigates whether nitrogen fixation strategy is tied to the invasiveness of approximately twenty non-native woody legumes (Fabaceae) found in Hawai‘i, using the Hawai‘i/Pacific Weed Risk Assessment system to categorize trees as either high risk or low risk for invasion. In a greenhouse experiment trees are being treated with three levels of isotopically labelled nitrogen fertilizer, whose signature is distinct from atmospheric

nitrogen, in order to calculate the percent of nitrogen derived from fixation. These data and relative growth rate data will explain which strategy each species uses in order to evaluate relationships between strategies and risk assessments. Results of this study will give insight into which plants should be monitored more carefully on the islands and which should have limited or restricted introduction to the islands, as well as contribute to the limited but growing knowledge of nitrogen fixation regulation in several species that have not yet been documented.

Poster 86: Ulu Lehulehu: Inspiring Communities to Protect, Plant, and Restore ʻŌhiʻa

Time: 14:30 - 15:00
Date: 24th July 2018
Location: Machine 1

86 - Ulu Lehulehu: Inspiring Communities to Protect, Plant, and Restore ʻŌhiʻa

Elizabeth Barrido, Alealani Evangelista
Kupu, U.S. Forest Service - Institute of Pacific Islands Forestry, Hilo, Hawaii

Track

II. Building the Future

Abstract

The ʻōhiʻa tree (*Metrosideros polymorpha*) is the most bioculturally important tree species in Hawaiʻi. It is the backbone of Hawaiʻi's native forests and watersheds, it covers more than one million acres statewide, and it is a foundational element in Hawaiian traditional knowledge systems and cultural practices. ʻŌhiʻa has been steadily disappearing from our landscape due to land-use changes (deforestation and development), expansion of invasive species, diseases such as the *Puccinia* rust, and most recently the *Ceratocystis* fungal wilt (Rapid ʻŌhiʻa Death or ROD), which represents a potentially devastating threat to the health of our forests statewide. In the face of ROD and these other threats, the need for public awareness and support of the conservation and protection of our ʻōhiʻa forests is great. Ulu Lehulehu – Million ʻŌhiʻa Initiative bridges science, culture, and community to develop and strengthen people's relationships with and create vibrant landscapes abundant in ʻōhiʻa through four integrative approaches of K-12 classroom and field-based biocultural education,

community outreach, native forest restoration, and urban forestry. By connecting communities with ʻōhiʻa, Ulu Lehulehu seeks to inspire Hawaiʻi's communities to be responsible, engaged, aware, and motivated stewards involved in the conservation and protection of the natural and cultural resources of our island home.

Poster 19: Can Albizia Mulch Applied to Agricultural Land Replace Fertilizer, Improve Agroecosystem Functioning, and Provide Climate Change Mitigation and Resilience?

Time: 14:30 - 15:00
Date: 24th July 2018
Location: Machine 2

19 - Can Albizia Mulch Applied to Agricultural Land Replace Fertilizer, Improve Agroecosystem Functioning, and Provide Climate Change Mitigation and Resilience?

Joanna Norton
UH Hilo, Hilo, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

This project investigates the potential benefits of composted albizia (*Falcataria moluccana*) applied to agricultural land in East Hawai'i. Application of compost to cropland can supply key nutrients, replacing the need for some synthetic fertilizers; this addition of organic matter to the soil can also sequester carbon, modulate the release of other nutrients, and decrease water stress on plants. For these reasons, application of compost is considered a climate-smart ag approach; here, we will quantify those effects in local soils, using local inputs. Albizia is a fast-growing, N-fixing tree that is highly invasive in East Hawai'i, and so this material is in abundant supply and in need of eradication. This experiment uses cassava and corn in a randomized block design of agricultural plots, and will analyze yields, plant and soil nutrients, and soil water holding capacity to assess performance of composted albizia compared to conventional fertilization. This treatment is a traditional subsistence farming practice, a way of dealing with invasive species, and a potential example of climate-smart agriculture.

Poster 276: A mixed-method approach for identifying sources of nitrogen pollution using limu (macroalgae) and water on Kauaʻi

Time: 14:30 - 15:00
Date: 24th July 2018
Location: Machine 3

276 - A mixed-method approach for identifying sources of nitrogen pollution using limu (macroalgae) and water on Kauaʻi

Amy Markel
University of Hawaii at Manoa, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

This research aims to link land-based sources of nitrogen pollution to changes in limu (macroalgae) in Kauaʻi's nearshore environments. Macroalgal species readily uptake nitrogen in the marine environment, and with lack of pressure from herbivore grazing can be strong competitors with corals. On the island of Kauaʻi, there are concerns about outdated waste management systems (cesspools and septic), as well as fertilizer from farms, golf courses, and hotels entering the nearshore environment. Methods for monitoring nutrient inputs can be costly and technical, making it difficult for communities to monitor nutrient inputs and their effects on nearshore ecosystems. I focused three sites on the north eastern shorelines of Kauaʻi: Anini, Kalihiwai, and Moloaʻa. These sites once supported thriving fishing communities and were known for the diversity and health of their limu. I investigated potential sources of nitrogen pollution by collecting samples of ocean water, stream water, and macroalgae, then analyzing them for stable nitrogen isotopes. These results will be compared with land use maps of identified on-site waste disposal systems, farms, golf courses, and rubbish dumps. I will take

percent cover estimates of macroalgae species at each sample location to investigate the current algal community. These will be compared to lists of historically known species for each of the sites based on macroalgal herbarium specimens from Bishop Museum as well as historical newspaper articles and interviews. This project aims to pilot new and less expensive approaches for monitoring land-based sources of pollution which may aid in community-based management.

Poster 113: Engaging Hawaii's Small-Scale Fishers to Promote Collaborative Research and Mitigate Oceanic Whitetip Shark Mortality

Time: 14:30 - 15:00
Date: 24th July 2018
Location: Machine 4

113 - Engaging Hawaii's Small-Scale Fishers to Promote Collaborative Research and Mitigate Oceanic Whitetip Shark Mortality

Mia Iwane[1,2], Kirsten Oleson[1], Kirsten Leong[2], Mehana Vaughan[1], Melanie Hutchinson[2,3]
[1]University of Hawaii at Manoa, Honolulu, HI. [2]Pacific Islands Fisheries Science Center, Honolulu, HI. [3]Hawaii Institute of Marine Biology, Kaneohe, HI

Track

II. Building the Future

Abstract

Many fishing regulations fail to achieve their goals because they are poorly attuned to social-ecological conditions. Fisher knowledge and perspective provides valuable context for the benefit of local fisheries management. We employ the snowball sampling method and semi-structured interview to engage with small-scale fishers on Hawai'i Island. Exploring their relationships with one another, with fisheries management, and with the pelagic sharks they encounter, we seek opportunities to reduce the impact of sharks on fishers, and vice versa. The oceanic whitetip shark's (OWT) recent listing under the Endangered Species Act (ESA) presents a unique opportunity to explore these themes. Within the study's small-scale fisheries scope, research participants identify the charter, commercial handline, and speardiving fisheries as those likely to interact with pelagic sharks. Preliminary results suggest that awareness

campaigns may affect fisher attitudes and OWT handling practices given the infrequency of OWT encounters and recency of its ESA listing. Fishers' preference for passive shark deterrence and willingness to participate in research also highlight opportunities to collaboratively mitigate shark mortality. Finally, fisher frustration with scientists' and managers' disconnect from on-the-water processes reinforce the need for a sustained dialogue between these actors. The nature of this work, which creates space for such a dialogue and engages fishers in solution development, has implications for fostering trust between actors, improving the perceived legitimacy of scientific and management agencies, and informing management strategies that better achieve their social and ecological goals.

CONCURRENT SESSION 2

Forum 289: KĀKOU: Cultivating a Collective Kuleana for Effective Co-management of Hawai'i's Land and Ocean 'Ohana

Time: 15:15 - 17:15
Date: 24th July 2018
Location: 311

289 - KĀKOU: Cultivating a Collective for Effective Co-management of Hawai'i's Land and Ocean 'Ohana

Hoku Cody[1], Shaelene Kamakaala[2], Puanani Burgess[3], Kekuewa Kikiloi[4,5], Davianna McGregor[6], Emmett Aluli[7,8]
[1]Kure Atoll Conservancy, Honolulu, HI. [2]DLNR, Division of Aquatic Resources, Community Based Fisheries Area (CBFA) Program, Honolulu, HI. [3]One-Peace-at-a-Time, Waianae, HI. [4]Papahānaumokuākea Marine National Monument, Native Hawaiian Cultural Working Group, Honolulu, HI. [5]University of Hawai'i at Mānoa, Kamakakūokalani Center for Hawaiian Studies, Honolulu, HI. [6]University of Hawai'i at Mānoa, Department of Ethnic Studies, Honolulu, HI. [7]Molokai General Hospital, Kaunakakai, HI. [8]Protect Kaho'olawe 'Ohana, Kaunakakai, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

While co-management relationships and long-term knowledge systems maintain critical layers of natural resource protections that increase longevity and sustainability, foundational aspects

that cultivate the depths of our collective responsibility are amiss through the process. And yet, kākou—the idea of inclusivity, of a collective—is a central message often championed by those maintaining their long-term knowledge and intimate kinship with Hawai‘i. We examine two of Hawai‘i’s notable co-management models—Papahānaumokuākea and Kaho‘olawe—and how effective partnerships has allowed for more meaningful connections to a place and each other. These models often exhausted communities while taking decades to establish. As the need for community engagement in conservation increases, the process to establish these partnerships may have to address more sustainable, even more expeditious avenues that produce form-fitting results where the place benefits in a more timely and collaborative manner. For integrative resource management models, such as Community Based Subsistence Fishing Areas (CBSFAs), utilizing meaningful, culturally-informed facilitation is being piloted as a key vehicle to provide space for collective trust and team building, while achieving satisfactory outcomes for co-managers, natural resources (our extended ‘ohana), and the general public. This forum shares the lived experiences of scholars, culturally-informed facilitators, and practitioners that built co-management models in Hawai‘i with a focus on diving deeper into highlighting critical components essential for the sustainable continuity of this effort from one generation to the next.

Workshop 136: Media Training: Get Ready for Your 15 Minutes of Fame

Time: 15:15 - 17:15
Date: 24th July 2018
Location: 316BC

136 - Title: Media Training: Get Ready for Your 15 Minutes of Fame

Toni Parras
NOAA NMSF, Honolulu, Hawaii

Track

II. Building the Future

Abstract

More and more, scientists and resource managers are expected to engage with different audiences to share the implications of their research findings and how it is relevant to society.

Oftentimes this happens through mass media (TV, radio, print and Web-based media), and results can be mixed. Unprepared individuals can get harangued by aggressive reporters or tongue-tied when receiving cold calls from the press. This hands-on workshop will focus on preparing for media interviews (whether planned or opportunistic) using demonstrative methods including hands-on practice to improve message crafting and delivery.

Participants will engage in mock interviews with professional reporters (Nathan Eagle with Civil Beat, Diane Ako with KITV, and Catherine Cruz with Hawai‘i Public Radio) while being videotaped, then review their interviews and receive key feedback on what worked and how to improve. The workshop is targeted at individuals who want to share important work or announcements, are often approached by the media for information or interviews, or are likely to be speaking with the media about an upcoming initiative.

Hawai‘i is unique in its biodiversity and ground-breaking leadership, from being the first state to adopt the Paris climate agreement to the Sustainable Hawai‘i Initiative launched at the World Conservation Congress in 2016, and scientists and resource managers have many opportunities to share their research and conservation work with the media locally, nationally and globally.

By the end of the session, participants will gain understanding and hands-on practice in how to better prepare for and communicate effectively with the media.

General Session: Native Birds 2

Time: 15:15 - 17:15
Date: 24th July 2018
Location: 316A

96 - Prevalence and Status of Avian Pox Virus and Implications for ‘Ua‘u Kani (*Ardenna pacifica*) Colonies in Maui Nui

Puakea Mo'okini-Oliveira[1], Fern Duvall[2], Russell Kallstrom[3], Jenni Learned[1], Jay Penniman[1]
[1]Maui Nui Seabird Recovery Project, Makawao, HI. [2]Division of Forestry and Wildlife, Native Ecosystems Protection & Management, Wailuku, HI. [3]The Nature Conservancy, Molokai Program, Kualapu'u, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Distribution of avian pox virus (*Poxvirus avium*) is well documented among diverse bird species across the globe and in Hawai‘i nei. Previous studies have focused on the effects of pox on endemic forest birds and Mōlī (*Phoebastria immutabilis*). Little is known about the dispersal and effect of avian pox in ‘Ua‘u kani (Wedge-tailed shearwaters; *Ardenna pacifica*), a cosmopolitan tropical and sub-tropical seabird species. Since 2006, the Maui Nui Seabird Recovery Project (MNSRP) has tracked the biology of known colonies within Maui Nui (on Lāna‘i, Molokai, and Maui). In this study, we used a long-term record of pox prevalence to report the status of the vector-borne virus at known colony sites. We predicted a positive correlation between mean precipitation rates and incidence of pox for each site over time. Results indicated that one colony had a significantly higher pox incidence rate than all other sites (Molokini islet, $p<0.001$). However, rainfall was not a strong predictor of pox, prompting further discussion relating to colony density, migration patterns of ‘Ua‘u kani among local colonies, soil bacteria as sources of virulence, and other possible vectors such as ants and Hippoboscid flies (*Hippoboscidae spp*.). Seabirds have critical roles in the ecosystems they inhabit, culturally and biologically, and predicted climate changes (e.g., increased rainfall and sea level rise) threaten many island species, including the ‘Ua‘u kani. Thus, continued monitoring of pox distribution within the colonies of Maui Nui will be pertinent to the future management of MNSRP protected sites and habitat restoration projects.

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130 - Laysan Island: A Conservation Success Story

Amanda Boyd[1,2], Daniel Link[1,2]
[1]U.S. Fish and Wildlife Service, Honolulu, Hawaii. [2]Papahānaumokuākea Marine National Monument, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Laysan Island is located in the Hawaiian Islands National Wildlife Refuge and Papahānaumokuākea Marine National Monument (PMNM), it’s approximately 800 miles NW of Oahu. It led a colorful past with guano mining and the introduction of invasive species causing the extinction of several endemic species and the island extirpation of numerous others. The introduction of rabbits in particular caused a near complete loss of vegetation and thus food supply for many Laysan endemics. By the time the Tanager Expedition arrived in 1923, the majority of the island had become desert-like; only four native plant species were documented. Restoration efforts began during that trip and continue today.

The U.S. Fish and Wildlife Service (USFWS) maintained a year-round field camp from 1991 to 2012 to restore Laysan. This effort resulted in success stories including the eradication of *Cenchrus echinatus,* the re-introduction of a number of extirpated plant species and the re-introduction of millerbirds (*Acrocephalus familiaris kingi*) to fill a niche that had been empty for nearly a century. Several crucial lessons in invasive species prevention and control have been learned on Laysan, which have since been applied to other Pacific islands.

In 2017, the success of past conservation efforts was marked with the removal of the last of the USFWS camp facilities from the island. After years of restoration efforts, we now look back on both our accomplishments and lessons learned to guide us forward in determining the future direction of invasive species management and habitat restoration in PMNM.

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176 - Population Level Impacts of Power Line Collisions on the Endangered Newell's Shearwater and Hawaiian Petrels.

Marc Travers[1], André Raine[2], Angela Stemen[1], Matthew McKown[3]
[1]KESRP, Hanapepe, HI. [2]KESRP, Hanepepe, HI. [3]Conservation Metrics, Santa Cruz, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Both the Newell's Shearwater (*Puffinus* newelli) and Hawaiian Petrel (*Pterodroma* sandwichensis) are vulnerable to power line collisions because they make frequent nocturnal flights to and from mountain breeding colonies, often crossing over power lines in the process. To determine collision rates on Kaua'i, we have conducted 5,052 hours of observations from 2012-2017 quantifying seabird power line collisions, flight height, and behavior at power lines. We have also developed a novel monitoring tool - automated acoustic surveys of avian power line collisions - which has dramatically increased the temporal and spatial scale of monitoring (276,879.5 total hours), overcoming many of the biases inherent in traditional bird carcass counts. Based on our observations, we report that 9.3-15.3% of seabird power line collisions result in an immediately grounded bird and use this as a proxy for minimum mortality. Automated acoustic surveys at a sample of sites along the entire power line grid detected a total of 3,482 collisions between 2013-2016. We developed a statistical model to predict collision risks across the island-wide transmission wire grid, and estimated a total of 10,552 collisions per year. We estimate that minimum mortality is between 981-1,614 endangered seabirds killed at power lines annually. We validated our model estimates both statistically and with orthogonal data sets and discuss practical ways to minimize these collisions. These results

show that power lines collisions are the largest documented source of mortality for two declining populations of endangered species and are consistent with recent studies which have shown significant, large-scale population declines on Kaua‘i.

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194 - Hawaii’s Bird Extinctions: Lessons learned or tragedies to be repeated again and again?

Loyal Mehrhoff
Center for Biological Diversity, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The plight of Hawaii’s birds is well known and is one reason that Hawaii is considered the “extinction capital of the United States.” It is also becoming more widely acknowledged that some of these extinctions were due to a lack of resources (e.g. funding). Endangered Species Act protections have significantly benefited both Hawaiian and mainland birds, however, the status and trends of endangered Hawaiian and mainland birds differ in several ways. Endangered Hawaiian birds are less likely to be improving (33 percent versus 84 percent), more likely to be declining (54 percent versus 14 percent), more likely to go extinct (18 percent versus 2 percent), more poorly monitored, and less likely to receive funding than their continental counterparts. Both groups of birds have similar percentages of species listed with very low population numbers (e.g., less than 100 individuals). Notably, all of the low population species on the mainland received at least some conservation action, with most getting extensive conservation action (91 percent). Five (60 percent) of the low population Hawaiian species had no conservation actions and all of those species ultimately went extinct. Analyses of population trends, funding, the timing and implementation of conservation actions, and key threats show that reduced conservation effort has impacted Hawaiian birds, but it also indicates that there may be inherent differences in the conservation of Hawaiian birds. Some lessons learned from these analyses are being implemented, but others are not, which raises concerns about the future of our remaining birds.

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267 - Who hoots where? Insights into the Distribution and Ecology of Hawaiian Short-eared Owl (*Asio flammeus sandwichensis*)

Javier Cotin[1], Afsheen Siddiqi[2], Melissa Price[1]
[1]University of Hawaii, Honolulu, Hawaii. [2]Department of Land and Natural Resources, Division of Forestry and Wildlife, Honolulu, hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Pueo (*Asio flammeus sandwichensis*), once common across the Hawaiian Islands, is now state-listed as Endangered on O‘ahu. Although the Pueo has been recorded in a variety of vegetation types in the Hawaiian archipelago, key habitat selection variables are still unknown. In this study, we optimized a survey methodology to improve population estimates and define vegetation types important to population stability. Pueo were recorded on agricultural lands, wetlands, short grasslands and open native vegetation. Estimated densities range from 0 to 5 pueo per 100 ha across vegetation types. with most detections occurring in open vegetation types such as agricultural lands, grasslands, and wetlands. Pueo were detected, on average, 23 minutes before twilight. Public participation was also engaged through a citizen science online portal. Results from this mode of data collection included more than 70 Pueo sightings, including nests and owlets. Importantly, verified citizen reports indicated that pueo use high elevation native forests on other islands for nesting and foraging, despite a lack of detections in this habitat type on Oahu. This suggests that the survey technique may need further optimization for closed canopy vegetation types, and that additional effort may be necessary in vegetation types with limited visibility.

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10 - A eulogy for Iiwi?

Eben Paxton
USGS Pacific Island Ecosystems Research Center, Volcano, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

I’iwi, the iconic Hawaiian honeycreeper, was recently listed under the Endangered Species Act as a species threatened with extinction. Once one of the most common forest bird species across the Hawaiian Islands from sea level to tree line, the I’iwi is now restricted to remote high elevation forests. What led to the rapid decline of this Hawaii endemic? What are our best predictions for future trends? What can be done to reverse continuing declines? Strategies designed to help I’iwi will benefit all forest birds, and can lay the groundwork for long term persistence of these important Hawaiian animals.

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11 - ʻUaʻu (Hawaiian Petrel, *Pterodroma sandwichensis)*: Nakula Natural Area Reserve and Kahikinui Forest Reserve: Documenting Change Using Automated Acoustic Monitoring

Jay Penniman[1], Jennifer Learned[1], Katsu Che Frausto[1], Matthew McKown[2]
[1]Maui Nui Seabird Recovery Project, Pacific Cooperative Studies Unit, University of Hawai'i, Manoa, HI. [2]Conservation Metrics, Inc., Santa, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Storrs Olsen and Helen James, in their 1982 Prodromus of the Fossil Avifauna of the Hawaiian Islands, stated that *Pterodroma phaeopygia* (Now *P. sandwichensis)* were the most common fossil bones found in lava tubes. Hawaiian petrels were likely the most numerous birds in the islands pre-human arrival. Habitat alteration and alien mammals that predate ground nesting seabirds has resulted in the population being reduced to where US Fish & Wildlife Service has listed the species as endangered. Maui Nui Seabird Recovery Project works to restore seabird populations by protecting habitat and controlling predator populations. We use automated acoustic monitoring to document change over time of seabird populations. This presentation describes work in the Nakula Natural Area Reserve and Kahikinui Forest Reserve, Haleakalā, Maui. 15 monitors were deployed in 2014 when ungulate exclusion fencing was completed around the area. Staff began predator control for small mammals and searches for Hawaiian petrel burrows at the same time. Just 8 burrows were located. The 15 monitors were redeployed in the same locations in 2017 and burrow searching over the three year interval recorded an increase to a total of 32 burrows. During the same time period reproductive success was documented to increase from .14% to .50%. On the ground observations were corroborated by acoustic monitoring that documented an increase of calls per minute at 14 of 15 locations, from a maximum in 2014 of 2.5 to a 2017 maximum of 7.0. Ungulate exclusion, predator control and habitat maintenance can facilitate seabird population recovery.

191 - Evaluating Impacts of Rainfall Intensity and Surface Water Levels on Hawaiian Stilt Nesting Success

Kristen Harmon, Yinphan Tsang, Ayron Strauch, Catherine Chan, Melissa Price
University of Hawaii, Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian Stilt (*Himantopus mexicanus knudseni*), an endangered, native Hawaiian waterbird, inhabits wetlands across the Hawaiian Islands. Flooding and predation of nests have been identified as major threats to Hawaiian Stilt populations. Nesting success of the Hawaiian Stilt is thought to be correlated with surface water levels, as is the case for most wading bird species. Flooding of nests may result from increases in surface water levels, particularly during high intensity rainfall. Additionally, increasing surface water levels may decrease nest predation, as nests become less accessible to land predators. Recent sea level rise has increased groundwater levels, causing rises in surface water levels, particularly during high intensity rainfall. On the island of Oʻahu rainfall intensity varies spatially and temporally, resulting in fluctuating hydrological conditions of wetlands. A better understanding of how changes in surface water levels impact nesting success of the Hawaiian Stilt is necessary for effective conservation of this endangered species. Observational surveys and nest cameras were used to examine nesting success in six wetlands on Oʻahu. Rainfall data was gathered from the National Oceanic and Atmospheric Administration, and surface water data was gathered from wetland staff gauges. Rainfall intensity was positively correlated with surface water levels. Nest failures due to flooding were highest when surface water levels increased during periods of high intensity rainfall. Predation of nests by land predators decreased as surface water levels increased. Our results may be used to inform decisions for managing hydrological conditions of Hawaiian Stilt habitat given future climate predictions.

Symposium 5: Innovations in flight: Airborne conservation tools for an abundant future

Time: 15:15 - 17:15

Date: 24th July 2018
Location: 315

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5 -
Innovations in flight: Airborne conservation tools for an abundant future

22 - A helicopter-borne automated bait delivery system for landscape-scale Brown Treesnake control

Shane Siers[1], William Pitt[2,1], Patrick Barnhart[3,4], Aaron Shiels[5], John Eisemann[5], Larry Clark[5], Craig Clark[6], Robert Gosnell[7], Michael Messaros[8]
[1]USDA National Wildlife Research Center, Hilo, Hawaii. [2]Smithsonian Conservation Biology Institute, Washington, DC. [3]US Geological Survey, Yigo, Guam. [4]USDA National Wildlife Research Center, Barrigada, Guam. [5]USDA National Wildlife Research Center, Fort Collins, Colorado. [6]USDA Wildlife Services, Honolulu, Hawaii. [7]USDA Wildlife Services, Barrigada, Guam. [8]Applied Design Corporation, Boulder, Colorado

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Ground-based control methods appear to have been successful at preventing the spread of Guam's infamous Brown Treesnake invasion to other islands, including Hawai'i. However, the challenge of reducing Brown Treesnake damages on a landscape scale requires mass-production of snake baits and a means of delivering them over large expanses of remote, harsh terrain covered by dense forest. Through a partnership between the USDA National Wildlife Research Center and a private engineering firm (Applied Design Corporation), with funding from the US Department of the Interior, we have developed innovative technologies for the mass-production of bait cartridges containing an acetaminophen tablet adhered to a dead newborn mouse bait, designed to hang in the canopy after being ejected by a helicopter-borne automated dispensing system. We conducted the first evaluation of this system on Guam in July of 2016, and proved the concept to be sound. Our monitoring of the treatment area for one full year after this bait application continued to show reduced snake activity. Operational Brown Treesnake suppression in a 55-ha snakeproof enclosure, implemented by our Guam-based USDA Wildlife Services team and funded by Department of Defense, is planned to begin in the summer of 2018. Broad-scale suppression of Brown Treesnakes on Guam would not be feasible without the use of helicopters or other aerial platforms for bait delivery.

[this abstract is submitted for the "Innovations in Flight: Helicopter..." symposium]

91 - Helicopter Innovation for Efficient Watershed Protection Against Weed Invasions

James Leary[1], Kimberly Burnett[2], Chris Wada[3], Oscar Cacho[4], Adam Radford[5], Adam Knox[5], Brooke Mahnken[5], Jeremy Gooding[6]
[1]University of Hawaii at Manoa, Kula, HI - Hawaii. [2]University of Hawaii at Manoa, Honolulu, HI - Hawaii. [3]University of Hawaii at Manoa, Wailuku, HI - Hawaii. [4]University of New England, Armidale, NSW, AU. [5]Maui Invasive Species Committee, Piiholo, HI - Hawaii. [6]National Park Service, Haleakala, HI - Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Managing invasive weeds in Hawaii is daunted not only by the aggressive biology of the non-native species, but also by the extreme topography severely impeding accessibility and protection of our most important natural areas. Invasive species management requires significant investments in surveillance and treatment with a trade-off dilemma of how to balance these actions in landscape-level management with a limited resource budget. Herbicide Ballistic Technology (HBT) was developed at the University of Hawaii with the capability to surgically deliver lethal aliquots to individual plant targets with long-range precision and accuracy. In collaboration with the Maui Invasive Species Committee (MISC) and the National Park Service Exotic Plant Management Team (EPMT), a breakthrough utility was realized with HBT complementing helicopter surveillance operations with this added capability able to eliminate incipient miconia (*Miconia calvescens*) targets in the most remote locations and extreme topography in the East Maui Watershed (EMW), thus, removing the trade-off dilemma and further encouraging a greater investment in surveillance of critical remote areas. Herein, we'll describe concepts in search theory and bioeconomics that quantifies and valuates search effort and target elimination as conditional probabilities of landscape-level protection concluding with the most cost-effective decisions based on empirical data from over 600 hours of helicopter HBT operations, eliminating over 25K incipient miconia targets, protecting over 20k ha of the EMW.

115 - Helicopter transport of fencing material for protection of natural resources in remote locations

Joby Rohrer
Oahu Army Natural Resource Program, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Fence construction is a mainstay of natural resource conservation efforts in Hawaii. Regardless of the type of fence required, e.g., for exclusion of ungulates, rats, cats or predatory snails, a considerable volume of building materials and equipment must be delivered to work sites, which are typically in remote locations. Helicopters have long been used to deliver construction supplies to remote areas, as ground-based transport is generally impractical or impossible. A diversity of techniques and gear will be covered to illustrate the various strategies in using helicopters to deliver fencing material. A brief overview of the benefits and drawbacks by helicopter type will also be presented.

152 - Mission Critical Components of Island Rodent Eradication Operations Using Aerial Broadcast

Gregg Howald, Tommy Hall, David Will, Mele Khalsa
Island Conservation, Santa Cruz, Ca

Track

III. Invasive Species & Biosecurity

Abstract

Toxicant baits are the most common tool used to eradicate invasive rodents on islands, however ground-based delivery by hand broadcast or bait station is often limited by the size, terrain, or remoteness of an island. By contrast, the delivery of bait by aerial broadcast is scalable and capable of delivering bait over challenging terrain in remote locations, thus making the eradication of invasive rodents possible on islands where ground-based operations are likely not feasible. Aerial broadcast operations often have high fixed costs and more stringent regulatory restrictions compare to ground based operations, requiring meticulous planning and prompting managers to target multiple islands to maximize the investment. Modified fertilizer buckets, GPS navigation systems, and GIS mission planning are critical components of these aerial operations to ensure bait products are applied efficiently, consistently, and accurately. In coordination with our partners, Island Conservation has successfully implemented more than ten aerial island eradication operations worldwide. We discuss the technologies employed during aerial broadcast operations that have made rodent eradications possible on large, precipitous, and remote islands resulting in conservation action to protect some of the world's rarest and most impacted species.

170 - Helicopter Use for Coqui Frog (*Eleutherodactylus coqui*) Control on the Island of Maui, Hawai'i

Adam Radford, Abe Vandenberg, Darrell Aquino, Teya Penniman
Maui Invasive Species Committee (MISC), Makawao, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

A variety of tools have been used to control coqui frogs (*Eleutherodactylus coqui*) in Hawai'i. The most common method involves thoroughly spraying areas inhabited by the pest with a citric acid solution, typically covering refugia from the ground to 15 feet high. Various types of industrial spray equipment have been used to deliver the chemical agent; however, challenging or inaccessible terrain has limited effectiveness in the field. Helicopters have been used to overcome this challenge. Staff from the Maui Invasive Species Committee (MISC) and others have used helicopters with a specialized bucket suspended on a cable to deliver the solution to coqui frog-infested areas inaccessible by foot. With similarities to aerial firefighting, this system involves carefully orchestrated coordination between ground crews mixing and transferring solution to a mobile reservoir tank and the pilot filling the bucket and delivering highly targeted releases in short succession. Limitations, opportunities and considerations with this approach are presented.

187 - Sharing the Skies: Roles of Helicopters and Unmanned Aerial Systems in Conservation

Roberto Rodriguez, James Leary
University of Hawaii at Manoa, Honolulu, HI

Track

II. Building the Future

Abstract

Unmanned aerial systems (UAS) possesses the ability to significantly expand the ability of natural resource managers to obtain remote data critical to fulfilling many mission requirements with reduced risks, cost, and environmental impacts. Following the

introduction of Title 14 of the Code of Federal Regulations §107 by the FAA in 2016, UAS are now more accessible than ever. However, these regulations also place restrictions on operation, such as, maintaining visual line of sight with the aircraft and a maximum operating altitude of 400 feet above ground level. Regulations on agricultural aircraft operations, further restrict the ability of UAS to dispense materials for forest conservation activates. The performance of the aircraft in terms of payload capacity and flight endurance are limited, particularly on multirotor aircraft, when compared to conventional manned aircraft. These technological and regulatory barriers ensure that helicopters will continue to be a necessary part of conservation even as UAS become more heavily utilized.

199 - Helicopters, Slingloads and Ladders: Conservation in Action on Kauai

Michelle Clark[1], Andre Raine[2], Lucas Behnke[3], Lisa "Cali" Crampton[4], Melissa Fisher[3], Trae Menard[3]
[1]Pacific Islands Fish and Wildlife Office, Kapaa, Hawaii. [2]Kauai Endangered Seabird Recovery Project, Hanapepe, Hawaii. [3]The Nature Conservancy, Lihue, Hawaii. [4]Kauai Forest Bird Recovery Project, Hanapepe, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

On Kauai, a wide range of conservation programs including state, federal and private entities, are working hard to conserve and restore native biodiversity and ecological integrity for the benefit of present and future generations through leadership, science-based management, and collaborative partnerships. Kauai, the oldest island of the main Hawaiian Islands, has been called a “treasure trove of biodiversity” and houses the greatest diversity of native plants in the state. It is also home to four endangered forest bird species and three threatened and endangered seabird species, including the largest remaining population of the threatened Newell’s shearwater. One challenge to conserving Kauai’s biodiversity is that the majority of the native species inhabit the remote and rugged mountainous interior of the island which can be extremely challenging, time consuming and in some cases impossible to access by foot. As such the use of helicopters is essential and part of a way of life for conservation biologists on Kauai. Helicopters are used to; transport crews and materials to build remote ungulate exclusion fences and maintain trapping efforts, monitor montane seabird colonies and translocate chicks, deploy acoustic recording devices on precipitous ridges, harvest endangered forest bird eggs from the forest canopy and transport forest birds for reintroduction, survey and treat incipient and invasive species and shuttle crews performing invasive species removal and biological monitoring to remote camp sites. In this presentation we will explore several projects which rely heavily on the use of helicopters to accomplish critical conservation actions.

296 - A primer for planning and implementing aerially broadcast rodenticide operations

Tommy Hall
Island Conservation, Santa Cruz, California

Track

III. Invasive Species & Biosecurity

Abstract

Rodent eradications on islands often occur in remote locations and treacherous terrain, making ground based application of rodenticide risky, cost prohibitive or impossible. Aerial application of rodenticide using a helicopter with an underslung spreader has allowed practitioners to plan for and implement increasingly large and technically challenging projects. Meticulous planning is critical to a successful operation; from preparing the GIS navigation system and bait spreading equipment to external load operations for operational staging. The high costs, strict regulatory environment, and often short time frame for implementation further necessitates the need for thorough planning in advance of the operation. Island Conservation has partnered with conservation groups and government agencies around the globe to successfully plan and implement complex aerial based rodent eradications. We discuss the components of designing an aerial baiting operation for conservation work on remote and challenging locations and identify critical steps to increase efficiency while keeping costs to a minimum and maximizing chances for a successful outcome. Topics covered include: selecting appropriate aircraft and pilot, contracting, critical supplies and equipment, testing and calibration of spreader equipment, designing a bait loading site, operational logistics, the operational team, and putting it all together for bait application.

General Session: Plants

Time: 15:15 - 17:00
Date: 24th July 2018
Location: 314

34 - DNA Barcodes Fail to Accurately Differentiate Species Within Hawaiian Plant Lineages

Jeff Stallman[1], Vicki Funk[2], Jonathan Price[1], Matthew Knope[1]
[1]University of Hawaii Hilo, Hilo, HI. [2]Smithsonian Institution, Washington, DC

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

While DNA barcoding has been largely successful in differentiating animal species for over 15 years, the search for the most effective loci and evaluative methods for plants continues. DNA barcoding could be useful to conservationists in Hawaii, and elsewhere, where overlapping geographic ranges and morphologies of endangered and non-endangered plant species occur, preventing rapid and reliable identification for anyone other than taxonomic experts. Floras of young, oceanic islands are a particularly severe test of the utility of DNA barcoding, because rapid speciation often results in short time periods for diagnostic mutations to occur. Recently, however, methods using molecular characters and geographic range data, rather than genetic distance and monophyly, have shown some success in differentiating plant species in the Canary Islands. Utilizing this approach, in addition to distance and monophyly methods, we used four common DNA barcodes to test 21 lineages of Hawaiian plants at the nuclear *ITS2* locus, nine lineages at each of the plastid loci *trnH-psbA* and *rbcL,* and eight lineages at the plastid locus *matK* using newly generated DNA sequences and sequences downloaded from Genbank. Results show low discrimination success within the same lineage with all methods of analysis. These results highlight the continued importance of taxonomy based on morphology, and point to the need for additional genomic resources if DNA barcodes are to be used to accurately differentiate plant species derived from recent speciation events.

60 - Disturbance and plant community assembly in exotic-dominated landscapes on Hawaii

Stephanie Yelenik[1], Susan Cordell[2]
[1]US Geological Survey, Volcano, HI. [2]US Forest Service, Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

Exotic-dominated landscapes may arise from invasion by highly competitive plant species, or due to disturbance coupled with exotic early-colonizing species. Without knowing site history, it is thus difficult to predict how communities will reassemble after disturbance events. This is important to understand, however, given increasing disturbance levels (e.g., fire, development, grazing) across anthropogenically impacted landscapes. We asked how disturbance affected community assembly in six invaded habitat types common in dryland, grazed landscapes on Hawaii Island. We mechanically disturbed 100m^2 plots using a Bobcat® front end loader in six habitat types dominated by one of four exotic perennial grasses, one native shrub, (*Dodonaea viscosa*), or one native perennial grass, (*Erogrostis atropoides*). We censused vegetation before disturbance and then monitored woody plant colonization and herbaceous cover for 18 months. Some exotic grasses quickly regrew and achieved similar community assemblages within months of disturbance. Slower growing species had a greater amount of bare ground in disturbed plots than undisturbed plots but still retained a similar community composition. Only plots dominated by *Melinis repens* (an invasive grass) changed overall community composition following disturbance. While there were flushes of native shrub seedlings, these did not survive to 18 months in most habitats (except *C. setaceus* and *D. viscosa*), probably due to fast regrowth by exotic grasses. Based on our results, we do not expect disturbance to cause shifts in dominant species in most dryland habitats in Hawaii, and instead predict habitat composition most likely reverts to pre-disturbance community assemblages.

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31 - Mechanisms of the possible host shift of *Teleonemia scrupulosa* between *Lantana camara* and *Myoporum stellatum*

Dominique Zarders[1], Jesse Eiben[1], Jolene Sutton[1], Tracy Johnson[2]
[1]University of Hawaii at Hilo, Hilo, Hawaii. [2]United States Department of Agriculture, Forest Service, Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

Biological control (biocontrol) agents are organisms used to control pest species. Insect biocontrol agents are highly specific, controlling one host species or species closely related to the host. *Teleonemia scrupulosa* was introduced throughout Hawaii as a biocontrol agent for

the invasive plant *Lantana camara* (lantana). *T. scrupulosa* was selected as a suitable biocontrol for lantana based on field observations. Although host-specificity tests were not conducted before the release of the insect, *T. scrupulosa* successfully controlled lantana throughout Hawaii with the aid of other introduced biocontrol agents. Years after the initial introduction, there were observations of *T. scrupulosa* feeding on a Hawaii native plant, *Myoporum stellatum* (Oahu naio), in the absence of the host lantana. Previous research has shown *T. scrupulosa* is able to feed and reproduce on *M. stellatum*. Understanding the causes of non-target attacks by biocontrol agents is essential for improving the predictive power of host-specificity testing for insect biocontrol agents. This project builds on previous research by understanding the rare case of a non-target attack by *T. scrupulosa* on a distantly related plant, *M. stellatum*, by investigating intraspecific genetic variation within mtDNA genes COI and COII of three *T. scrupulosa* populations. Results have shown slight genetic variation within one *T. scrupulosa* population consistent with the existence of multiple introduced populations. This knowledge may aid in the determination of a possible host shift of *T. scrupulosa* in Hawaii due to possible co-adaptive traits developed after introduction or genetic variation allowing certain *T. scrupulosa* populations to utilize other plant species.

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207 - Salinity Tolerance Across Ontogeny in Hawaiian Coastal Plant Species

TIffany Lum, Kasey E. Barton
UH Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Global climate change includes shifts in temperature and precipitation, increases in the frequency and intensity of extreme weather events, and sea level rise, all of which will drastically impact coastal ecosystems. Because plant population persistence depends on successful seedling recruitment, seedling survival to maturity, and reproduction, it is important to consider how increased salinity due to climate change will influence each of these key life history processes. The aim of this study is to quantify salinity tolerance across whole-plant ontogeny and to identify physiological mechanisms underlying tolerance across ontogeny in a widespread and abundant native coastal plant species, *Jacquemontia sandwicensis* (Convolvulaceae). At the seed, seedling, juvenile, and mature ontogenetic stages, plants were exposed to three weeks of salinity watering treatments. Tolerance was assayed as the performance of stressed compared to control plants using multiple fitness metrics.

Potential physiological mechanisms underlying salinity tolerance were measured at each ontogenetic stage.

At high salinity levels germination is significantly reduced, yet a high proportion of seeds remained viable following treatment. High salinity levels led to significant increases in leaf mass per area and water use efficiency, responses that mimic drought-induced plasticity. While no stage is fully tolerant of increasing salinity levels, variations in resource allocation in response to salinity exposure differs significantly across plant developmental stages. Trait plasticity enables the avoidance of salinity stress at early life stages, however, delayed onset of flowering and reduced seed set indicate that salinity exposure at different life stages may threaten species resilience under future climate change.

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40 - Staying Alive: Rare Plant Survival, Microhabitat, and Ex-Situ Rescue in Kīpahulu Valley, Haleakalā National Park

Stacey Torigoe[1,2], Woody Mallinson[2], Patti Welton[2]
[1]University of Hawai‘i at Mānoa Natural Resources and Environmental Management, Honolulu, HI. [2]Haleakalā National Park, Kula, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Scientific research nested in natural resources management, particularly when managers are faced with many crises and few resources, can advance ecosystem protection practices. More than 30% of plant species in Hawai‘i are at risk of extinction, including many species of rare plants in Kīpahulu Valley, a highly biodiverse wet forest valley managed by Haleakalā National Park.

Count-based population viability analysis (PVA) has been used to understand survival of wildlife populations in Hawai‘i but much less so for rare plants, possibly because of a lack of data. PVA uses a drift model of population change over time to understand extinction risk over time. Time-corrected count data for two endangered species (*Cyanea maritae* (CM) and *Cyanea copelandii* ssp*. haleakalensis* (CCH)) were used to project risk of stochastic extinction for seven metapopulations of these species. Two of four examined metapopulations of CCH had lower μ—the mean rate of population change—and thus relatively high risk of extinction at 100 years. In turn, one of three examined populations of CM had 86% risk of extinction within 100 years, compared with 72% and 52%.

A stochastic simulation of population change suggests extremely high risk of extinction for virtually all populations with current population numbers. When outplant augmentation is simulated by rerunning the diffusion model with higher initial numbers of plants, however, extinction risk is substantially reduced. This has direct implications for managers who may be able to alter environmental conditions or implement restoration to effect more positive survival outcomes for high-priority populations.

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203 - Monitoring and Assessing Forest Resources in Hawai‘i and the U.S. Affiliated Pacific Islands

Michelle Lazaro[1], Ashley Lehman[2], Olaf Kuegler[1]
[1]U.S. Forest Service - Pacific Northwest Research Station, Portland, OR. [2]U.S. Forest Service - Pacific Northwest Research Station, Anchorage, AK

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Forest inventory and monitoring programs help provide scientifically sound data to guide effective planning, policies, and land management decision. Assessing long term trends in forest resources is typically done through strategic inventories such as the USDA Forest Service's Forest Inventory and Analysis Program (FIA). The FIA program has periodically measured forests across the U.S. affiliated Pacific Islands, utilizing a nationally consistent protocol, since 2001. The field collected data is summarized through assessment reports and presentations at the local, national, and international level, to provide a comprehensive overview of the status and trends of forest resources in these areas, for policymakers, resource manager, and the general public. FIA data has been used to assess overall forestland area, stand condition, standing wood volume, biomass, and carbon, and the extent of forest disturbances. Active collaboration and partnerships between State forestry agencies, universities and nongovernmental organizations, helped expand the core inventory to include additional measurements of priority issues such as koa moth infestation, agroforestry crops, and understory vegetation. In 2015, FIA plot measurements for Hawai‘i was completed and remeasurement of these plots are set begin in early 2019. This presentation will provide a summary of the statewide inventory information collected in Hawai‘i, discuss how remeasurement information is being utilizing in the U.S. affiliated Pacific Islands, and share where to access the current FIA dataset and resource information.

260 - Investigating Ecosystem Services of Loʻi Kalo

Aka Beebe, Rosanna Alegado, Kiana Frank, Craig Nelson, Ka Papa Loʻi ʻO Kānewai
University of Hawai'i, Mānoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Decline in natural wetlands due to land-use change has diminished ecosystem functions these habitats provide to coastal marine habitats. *Colocasia esculenta* (kalo) cultivation in irrigated flooded agroecosystems is widespread throughout Oceania, with the most extensive systems being in Hawaiʻi. Flooded kalo agroecosystems (loʻi kalo) may provide ecosystem services comparable to wetlands - specifically sediment and nutrient trapping – however, these scenarios have not been investigated previously. To determine the extent to which loʻi kalo could act to trap sediment and nutrients, we measured total suspended sediment (TSS), dissolved nitrogen, ammonium and microbial communities from Kānewai loʻi (an upland loʻi in the Mānoa Stream catchment) from June to July 2015. Nutrient concentrations in stream water that flowed through the loʻi were consistently higher than the stream, though not significantly different. During high flow conditions, the loʻi removed 50% TSS from diverted stream water. The microbial communities from stream and loʻi sediment - as assessed by high-throughput 16S sequencing - were composed of microbes that play key roles in nutrient cycling. Higher microbial diversity was observed in the loʻi system as compared to stream sediment environment. Data from this pilot project support the idea that loʻi kalo utilize nutrient and sediment input from streams to enhance kalo production, thereby decreasing sediment delivery to coastal habitats, however in urbanized environments capture of sediment may also serve a remediation function. Future studies comparing dynamics of additional loʻi systems as well as other managed landscapes may better inform restoration of these agroecosystems and stream stewardship.

Poster 147: Distribution and Abundance of Introduced Fishes on Shallow and Mesophotic Reefs of the Hawaiian Islands

Time: 15:15 - 15:45
Date: 24th July 2018
Location: Machine 1

147 - Distribution and Abundance of Introduced Fishes on Shallow and Mesophotic Reefs of the Hawaiian Islands

Atsuko Fukunaga[1], Randall Kosaki[2], Brian Hauk[1]
[1]Joint Institute for Marine and Atmospheric Research, Honolulu, HI. [2]Papahānaumokuākea Marine National Monument, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

The Bluestriped Snapper (*Lutjanus kasmira*), Blacktail Snapper (*Lutjanus fulvus*) and Peacock Grouper (*Cephalopholis argus*) were introduced to the island of O'ahu in the 1950's to enhance recreational and commercial fishing. We investigated the current distributions and abundances of these introduced fishes on shallow (≤30 m) and mesophotic (>30 m) reefs of the Hawaiian archipelago using fish data collected from 2007 to 2016. On shallow reefs, all three species were recorded at all islands of the Main Hawaiian Islands (MHI), while *C. argus* was present up to French Frigate Shoals and *L. kasmira* up to Kure Atoll in the Northwestern Hawaiian Islands (NWHI). There were no individuals of *L. fulvus* recorded in the NWHI. Overall, *L. kasmira* was the most abundant species among the three fishes, with the mean percent abundance reaching 3.5% at Ni'ihau, while the other two species accounted for ≤1% at all islands. On mesophotic reefs, *C. argus* and *L. fulvus* were rarely observed in the MHI and never recorded in the NWHI. *L. kasmira* was present up to French Frigate Shoals and relatively abundant at Hawai'i and French Frigate Shoals, with the mean percent abundance exceeding 10% at both locations. There was also a single individual of *L. kasmira* recorded at Lisianski Island at an upper mesophotic depth. The present study shows varying degrees of spread of the three introduced fishes. Their limited occurrence on the mesophotic reefs of the NWHI indicates potential effects of physical factors and habitat preference on their vertical and horizontal distributions.

Poster 241: Approaches to Ecological Modelling of Invasive Feral Pig Threats on O'ahu, Hawai'i

Time: 15:15 - 15:45
Date: 24th July 2018
Location: Machine 2

241 - Approaches to Ecological Modelling of Invasive Feral Pig Threats on Oʻahu, Hawaiʻi

Derek Risch, Jeremy Ringma, Melissa R Price
University of Hawaiʻi at Mānoa, Honolulu, Hawaiʻi

Track

III. Invasive Species & Biosecurity

Abstract

Species distribution models play a central role in the prioritization of conservation actions. A common approach is to overlay problematic species distribution with that of the conservation target to identify areas of high conservation value. In Hawaiʻi, feral pigs are considered one of the worst invasive species through their impact on threatened plant communities, erosional rates, and vectors for seed dispersal. To date, there lacks island-wide distribution data for this target species leading to ad-hoc management decisions. For this study, we propose two common methods of obtaining count data using detections from remote camera traps and visual disturbance surveys. These data were then used as inputs into a zero-inflated negative binomial predictive model to identify locations across Oahu where feral pig threats on biodiversity are greatest. Both observed and predicted disturbance data correlated with camera detections implying that both are likely predictors for pig impact. This approach provides a method for mapping predicted impact of an invasive species in Hawaiʻi which may then be applied to other Hawaiian Islands as a tool for systematic conservation planning.

Poster 245: UH Hilo Marine Option Program's Sea Surveying, Training, And Response Squad

Time: 15:15 - 15:45
Date: 24th July 2018
Location: Machine 3

245 - UH Hilo Marine Option Program's Sea Surveying, Training, And Response Squad

Julia Stewart, Roseanna Lee, Matthew Connelly
University of Hawai'i at Hilo, Hilo, HI

Track

II. Building the Future

Abstract

The Sea Surveying, Training, And Response Squad (SeaSTARS) is a group of trained undergraduate science divers in the University of Hawai'i at Hilo's Marine Option Program (MOP). Inspired by the concept of *kuleana*, this survey team was conceived in response to the global mass coral bleaching event of 2015-2017. In Hilo Harbor, a reef that maintains sustenance fishing, more than half the corals surveyed in November and December 2015 had some level of bleaching. Surveys performed in October 2016 and March 2017 revealed a bleaching occurrence of less than 20% across all species. Sea temperature data from the Hilo Bay Water Quality Buoy showed a decrease in temperature in 2016-2017 in comparison to October-November 2015, when thermal stress was at the highest level. Since the fall of 2015, SeaSTARS has performed nearly 200 benthic and fish surveys in Hilo Bay and Hōnaunau. This group hosts surveying calibration events to maintain surveying accuracy, provide undergraduates with the opportunity to record water quality at the survey sites, and to learn survey methods used by resource management agencies. The SeaSTARS has reached out to school groups and the Mokupāpapa Discovery Center to educate the community and future ocean science leaders on current coral bleaching levels. SeaSTARS aims to inspire and provide tools for future science divers to *mālama 'aina*, while sharing their findings with the community.

Poster 32: Manu-o-Kū of Diamond Head: Nest Success, Parental Care and Chick Growth in a Tree-nesting Seabird at Kapiʻolani Community College Campus

Time: 15:15 - 15:45
Date: 24th July 2018
Location: Machine 4

32 - Manu-o-Kū of Diamond Head: Nest Success, Parental Care and Chick Growth in a Tree-nesting Seabird at Kapiʻolani Community College Campus

Katie Gipson, Wendy Kuntz
Kapiolani Community College, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Manu-o-Kū or white tern (*Gygis alba*) is an indigenous seabird, named the official bird of the City and County of Honolulu. The species is listed as threatened by the State of Hawaiʻi and is protected under the Migratory Bird Treaty Act. In Spring 2014, Kapiʻolani Community College (KCC) students initiated a Manu-o-Kū monitoring program on the campus and, starting in January 2016, nests were observed to determine chick fate. Surveys were conducted between 6 and 9 a.m., in order to record tern abundance and behavior during both peak breeding and non-breeding periods. Once located, nest observations were conducted from an unobtrusive location at a minimum distance of 10 m. Protocols were established with the college's Auxiliary Services to protect from tree trimming and for sharing data with a city-wide citizen science project. The research presented documents and quantifies aspects of nest success, chick growth and parental care behavior. Four chicks were photographed from hatching to fledging then reference photos were obtained using a balloon carrying a cm ruler. Using imageJ software, I measured body, bill, wing and tail lengths and calculated growth rates. To characterize parental care behavior, two chicks were recorded until fledging. Video recording analysis of parental behavior is ongoing, but a total of ~95 hours of video has been analyzed of two chicks. Understanding the nesting behavior of the Manu-o-Kū will aid in rehabilitation efforts and protecting this species from threats in urban environments including feral cats, tree trimming, and overfishing.

Poster 188: Evaluating the usefulness of citizen science fish surveys in Hawaiʻi for assessing large-scale shifts in reef fish assemblages

Time: 15:45 - 16:15
Date: 24th July 2018
Location: Machine 1

188 - Evaluating the usefulness of citizen science fish surveys in Hawai‘i for assessing large-scale shifts in reef fish assemblages.

Anna Baker Mikkelsen[1], Timothy B. Grabowski[2,1]
[1]University of Hawaii at Hilo, Hilo, HI. [2]U.S. Geological Survey, Hawaii Cooperative Fishery Research Unit, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Anthropogenic disturbances, such as climate change and fishing pressure, are producing long-term shifts in marine fish assemblages worldwide. It is crucial to understand these changes in order to develop effective conservation strategies. However, spatially- and temporally-limited data, gaps in long-term monitoring, and a lack of a centralized data repository make identifying changes in reef fish assemblages challenging. To accommodate this, a large citizen science database covering the Main Hawaiian Islands from 2000 to 2017 (n=15,039) was compared to data collected by agency biologists. A subset of the citizen science data, collected at South Kohala, Hawai‘i Island, was compared to scientifically collected data from Puakō, Hawai‘i Island. A Pearson’s correlation analysis was run between abundance and years for each species in both datasets, and the direction of change was then compared between datasets. In total 51.2% of species had the same trend in both datasets, where a species was either decreasing, increasing or not significant in both datasets. 48.2% of the species differed in whether a statistical correlation was detected, and only one species had opposite trends between datasets. The citizen science data had the ability to detect more significant correlations, due to a larger sample size and large categorical abundance bins that decrease the variability in the data. In spite of different biases associated with the data collection of citizen science and scientific monitoring, this study suggests that citizen science can complement the limited scientific data available over large spatial and temporal scales, while acknowledging the limitations of the data.

Poster 246: I Ka Wā Ma Mua, Ka Wā Ma Hope: Using Maui's Traditional Hawaiian Land Use To Forge A Way Forward

Time: 15:45 - 16:15
Date: 24th July 2018
Location: Machine 2

246 - I Ka Wā Ma Mua, Ka Wā Ma Hope: Using Maui's Traditional Hawaiian Land Use To Forge A Way Forward

Kawelau Wright
University of Hawaii at Manoa, Honolulu, Hawaii

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

I Ka Wā Ma Mua, Ka Wā Ma Hope is a Hawaiian ʻŌlelo Noʻeau explaining that one must look back to past occurrences to determine the way forward. This is a practice that is particularly useful when there have been drastic changes in landscape and land use, as there have been in Hawaiʻi.

This project examines the traditional landscape of Maui, including land use, agriculture, fisheries and other food production features. Archival documents are used to uncover and promote further information of Maui's history as an ʻĀina Momona. Archival materials including land tenure documents, traditional place names, Hawaiian Language newspapers, and historical maps and photos are used to help contextualize what sustainability and conservation efforts were in place on Maui before the plantation era and tourism development began. Cultural practices associated with fishing methods, agriculture, and aquaculture can be revived using this knowledge.

The information presented in this project can then be utilized to imagine alternatives to the current landscape and inform future restoration efforts, helping us to move toward true sustainability and conservation in Hawaiʻi nei.

Poster 261: Quantifying Top-Down Herbivore Feeding Preference in Open and Closed Marine Managed Areas: Do Species Matter?

Time: 15:45 - 16:15
Date: 24th July 2018

Location: Machine 3

261 - Quantifying Top-Down Herbivore Feeding Preference in Open and Closed Marine Managed Areas: Do Species Matter?

Scott Chulakote, Celia Smith
University of Hawaii at Manoa, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Dominance by invasive algae on coral reefs has detrimentally impacted the health of many reef communities and their abilities to support biodiversity. In Hawai‘i, the ability of herbivorous fish to control reefs dominated by non-native macroalgae has been limited. This study aims to tie herbivore identity with species-specific grazing patterns on known invasive and native algae. Initial feeding experiments conducted in a simulated reef tank suggested invasive macroalgae *Acanthophora spicifera* and *Gracilaria salicornia* were consumed by herbivorous fishes *Zebrasoma veliferum*, *Acanthurus xanthopterus*, and *Kyphosus cinerascens*. These results were corroborated with *in situ* feeding preference tests, using *in situ* video in two marine life conservation districts and areas open to fishing on south shore reefs in O‘ahu and Kāne‘ohe Bay. Grazing experiments quantified grazing pressure and species-specific feeding preferences of herbivorous coral reef fish in reef flat and reef fringe habitats. If feeding preference for invasive macroalgae can be coupled with specific herbivorous fish via protection or stock enhancement of fish species, it could potentially become a management scheme to combat invasive algae. Among many steps leading to healthier reefs, identifying key grazers of invasive algae may provide additional management strategies to control invasive algal-dominated reefs in Hawai‘i.

Poster 236: Comparing the Difference in Plant Diversity and Soil Characteristics Between Native and Non-native Forests

Time: 15:45 - 16:15
Date: 24th July 2018
Location: Machine 4

236 - Comparing the Difference in Plant Diversity and Soil Characteristics Between Native and Non-native Forests

Marion Powell, Cameryn Kahalewai
Molokai High School, Hoohlehua, Hi

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The amount of native forests left on Molokai is only 15% (Sarhangi 2017). We observed that forests with non-native overstory (*Eucalyptus globulosa* or *Cupressa macrocarpa)* seemed to lack a variety of understory plants. However, the native forest (`ōhi`a lehua, *Metrosideros polymorpha*) had numerous ferns, mosses, and native trees. If the non-native forests have a low plant diversity and species richness than there would be fewer habitats for native plants and animals. It would also affect water storage.

We collected plant growth form and species data at each foot along two to four 100-foot transects at four sites: fenced `ōhi`a, unfenced `ōhi`a, *E. robusta,* and *C. macrocarpa.* We also collected soil samples and recorded bird calls in each plot.

The native plots had much greater plant species richness than both non-native plots, and a higher Simpson's Diversity Index (SDI) than *C. macrocarpa.* We also found that native ‘olapa seedlings (*Cheirodendron trigynum*) were common in the understory of the *C. macrocarpa* plot. Nitrogen, pH, Phosphorus, and potash (Potassium) all differed between the plots. We couldn‘t tell the difference between the number or type of bird calls between plots.

Based on our results, it appears that non-native forests on Moloka`i provide less habitat for native plants and animals than native forests. Differences between native and non-native forest could also be affecting water storage. Our results also show hope for passive restoration of native forest.

Poster 230: Relationship Between Morphological Traits, Water Depths, and Foraging Behavior of the Hawaiian Stilt (Himantopus mexicanus knudseni)

Time: 16:15 - 16:45
Date: 24th July 2018
Location: Machine 1

230 - Relationship Between Morphological Traits, Water Depths, and Foraging Behavior of the Hawaiian Stilt (*Himantopus mexicanus knudseni*)

Melissa Elena Jones, Kristen Harmon, Melissa Price
UH Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian Stilt (*Himantopus mexicanus knudseni*), or Aeʻo, is an endangered species that inhabits wetlands throughout the Hawaiian Islands. Hawaiian Stilts frequently move among wetlands in search of food, but are limited by habitat characteristics, such as water depth. The Hawaiian Stilt is threatened by sea level rise, which has led to an increase in flooding events by raising the water table, particularly in coastal communities. Due to this threat, it is important to determine possible impacts of increased water depths on Hawaiian Stilt foraging success. In this study we determined optimal water depths for foraging stilts. Field surveys were conducted in wetlands on the windward side of Oʻahu island, Hawaiʻi, USA. Wetland water levels were found to be negatively correlated with the number of observed foraging stilts. Results may be used to better understand how future water depths may impact the foraging ability of the Hawaiian Stilt, and inform decisions for optimal management of water depth in managed wetlands.

Poster 178: Water Budget and Water Quality Dynamics in Heʻeia fishpond During Restoration Regimes

Time: 16:15 - 16:45
Date: 24th July 2018
Location: Machine 2

178 - Water Budget and Water Quality Dynamics in Heʻeia fishpond During Restoration Regimes

Paula Moehlenkamp[1], Charles Aka Beebe[1], Paepae o He'eia[2], Margaret McManus[1], Rosie Alegado[1]
[1]University of Hawai'i at Mānoa, Honolulu, Hawai'i. [2]Paepae o He'eia, Kane'ohe, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Anthropogenic impacts have changed island ecosystems through history. He‘eia fishpond is an example of a traditional Hawaiian aquaculture system at the terminus of He‘eia watershed (ahupua‘a) on the windward site of O‘ahu and presents an excellent model indicator of the health of the entire ahupua‘a. The fishpond is a natural embayment that is enclosed by a constructed wall (kuapā) with sluice gates (mākāhā), which facilitate water exchange. Mākāhā connect the fishpond to exterior water bodies and are crucial for aeration, nutrient exchange, and thus fish survival. Major restoration efforts at He‘eia resulted in the large scale removal of invasive mangroves, which are known to interfere with water circulation, accumulate sediment and enhance anaerobic water conditions. Furthermore, a 50 m section of the kuapā known as Ocean Break that had burst due to a major flood in 1965, was repaired in 2015, restoring the confined nature the system used to have traditionally. The study objective is to determine the linkage between such restoration efforts and water circulation and quality improvement. The dominant flow paths of water into and out of the fishpond were assessed by measuring water flux through mākāhā with current meters. Water budget and residence time were calculated. Physical data was combined with data from discrete water sampling. Water samples were analyzed for levels of human and bird fecal contamination and linked to fishpond circulation. Together this comprehensive data allows to evaluate how restoration approaches contribute to an ecologically balanced and productive fishpond.

Poster 214: Using Seabirds to Sample Plastic Pollution: Bonin Petrels (Pterodroma hypoleuca) as Bioindicators of Pelagic Plastic in the Northwestern Hawaiian Islands

Time: 16:15 - 16:45

Date: 24th July 2018
Location: Machine 3

214 - Using Seabirds to Sample Plastic Pollution: Bonin Petrels (*Pterodroma hypoleuca*) as Bioindicators of Pelagic Plastic in the Northwestern Hawaiian Islands

Lauren Fraser
Hawaii Pacific University, Kaneohe, HI. Oceanic Institute, Waimanalo, HI

Track

II. Building the Future

Abstract

We live in the Age of Plastic with plastic deeply embedded in our daily lives. The question we must ask ourselves is where does it all go? An estimated 4.8-12.7 million megatons of plastic entered the ocean in 2010 and marine plastic debris (MPD) levels are projected to increase in the next ten years. Quantifying abundance/trends of MPD is challenging due to high patchiness and largely variable localized aggregations in the ocean. The Northwestern Hawaiian Islands (NWHI) are an area of particular concern due to the high amount of plastic associated with the surrounding pelagic environment. Density estimates range by up to five orders of magnitude, 0 – 15,000 pieces km^{-2} making it difficult to assess the trends of plastic. One approach to studying plastic trends involves the use of bioindicators. In general, seabirds are an efficient vehicle to monitor regional variability in marine debris due to their high-level trophic positioning, off-shore foraging, and diverse feeding strategies. One species that is known to ingest plastic pollution is the Bonin Petrel (*Pterodroma hypoleuca*) on Midway Atoll. In addition to their high rates of plastic ingestion, their breeding phenology, stomach anatomy, and foraging ecology make Bonin Petrels potential bioindicators of pelagic plastic trends for the NWHI. This study focuses on Bonin Petrel specimens collected opportunistically from Midway Atoll. Through necropsy and stomach content analysis for plastic, this study is developing criteria useful to use Bonin Petrels as bioindicators of plastic for tracking plastic pollution in the pelagic environment around the NWHI.

Poster 120: Schools and Scientists Working Together to Save Endemic ʻŌhiʻa Forests

Time: 16:15 - 16:45
Date: 24th July 2018

Location: Machine 4

120 - Schools and Scientists Working Together to Save Endemic ʻŌhiʻa Forests

Kenneth Puliafico[1], Kealohanuiopuna Kinney[1], Kalima Cayir[2], Chris Balzotti[3]
[1]US Forest Service - Institute of Pacific Islands Forestry, Hilo, HI. [2]The Volcano School of Arts & Sciences, Volcano, HI. [3]Carnegie Airborne Observatory, Stanford, CA

Track

III. Invasive Species & Biosecurity

Abstract

The Citizen Science program "Hawaiʻi Backyard Beetles" taps into the enthusiasm of our keiki to help address the pressing needs of the community through cooperation with professional research scientists. Here we report on a low cost solution to monitoring ambrosia beetles, addressing one of the most vital questions concerning Hawaiʻi Island's land managers. Hawaiʻi Island is densely populated by ʻŌhiʻa (*Metrosideros polymorpha*) trees but unfortunately many thousands have been infected by *Ceratocystis*, a fungal disease that causes Rapid ʻŌhiʻa Death. Ambrosia beetles may play an important part in the spread of this disease when they feed on ʻŌhiʻa infected with the fungus. Working with students, teachers and parents of the Volcano School of Arts & Sciences (VSAS) public charter school we established an ambrosia beetle trapping network in the backyards of students. VSAS serves an area of 2,500 square miles spanning 5 districts, 6 ecozones and >1000m in elevation gradient. Drawing from similar citizen science projects, local researchers trained teachers and students to make and deploy simple traps and to map and analyze the results. Through an integrated curriculum developed by VSAS teachers and the project team, students increased their understanding of scientific thinking, nature, and the problems that exist in their environment, while allowing them to serve as active participants in the efforts to bring up-to-date information on the diversity and distribution of ambrosia beetles. Cooperative development of this program allows us to serve all of Hawaiʻi with easily adapted lesson plans that help to address this timely scientific question.

Poster 190: Recent improvements and continued challenges for Palila (Loxioides bailleui)

Time: 16:45 - 17:15
Date: 24th July 2018

Location: Machine 1

190 - Recent improvements and continued challenges for Palila (*Loxioides bailleui*)

Eldridge Naboa[1], Kalā Asing[2], Chris Farmer[3], Paul Banko[4], Kevin Brinck[5], Bryce Masuda[6], Jay Nelson[7]
[1]U.S. Fish and Wildlife Service, Hilo, Hawaii. [2]Pacific Cooperative Studies Unit, Hilo, Hawaii. [3]American Bird Conservancy, Hawaii National Park, Hawaii. [4]U.S. Geological Survey, Hawaii National Park, Hawaii. [5]Hawaii Cooperative Studies Unit, Hawaii National Park, Hawaii. [6]Hawaii Endangered Bird Conservation Program, San Diego Zoo Global, Volcano, Hawaii. [7]U.S. Fish and Wildlife Service, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Palila, once found on multiple islands, occupy a small, shrinking subalpine range on the southwestern slope of Mauna Kea. As the last finch-billed honeycreeper in the main islands, they depend on the seeds of māmane trees, fruits of naio trees, and arthropods. The habitat's carrying capacity has decreased due to decades of habitat destruction by introduced ungulates and severe drought during 2000–2013. These factors led to a 67% decline in the species' abundance from 2003 to 2016. The drought has ended, and over 23,000 sheep and goats were removed between 1980–2016 in an effort to achieve the court-mandated eradication. The partners have planted over 143,000 native plants to restore the native forest Palila depend on, including new efforts at treeline to mitigate climate change effects to the dry forest ecosystem. Significant changes in regional land management, including community involvement in the restoration and outreach about protecting Mauna Kea, will also benefit Palila and other native species.

Although māmane-dominated forest is recovering in response to management, naio trees are succumbing to an alien pest and weeds continue to spread across large areas. Palila have slow reproductive rates and may require decades to respond to increasing tree cover and other habitat improvements. Although their decline has slowed, the species continues to decrease, with only approximately 1000 birds remaining. Recovery criteria for Palila include greater protection for the current ("core") population and establishing multiple self-sustaining populations, which potentially will begin with releasing captive-bred Palila on northern Mauna Kea.

Poster 286: Cloudy with a Chance of Seed Balls: A Guam Restoration of Watersheds (GROW) Initiative Study

Time: 16:45 - 17:15
Date: 24th July 2018
Location: Machine 2

286 - Cloudy with a Chance of Seed Balls: A Guam Restoration of Watersheds (GROW) Initiative Study

Lauren Swaddell[1,2], Austin Shelton[1,2], Else Demeulenaere[2]
[1]University of Guam Sea Grant Program, Mangilao, GU. [2]University of Guam Center for Island Sustainability, Mangilao, GU

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Accelerated land erosion and subsequent sedimentation on downstream coral reefs is a major environmental stressor in Guam. More methods for soil stabilization and revegetation are needed to reduce erosion impacts on our reefs. Seed balls are a novel seed broadcast method that can be utilized by stakeholders cheaply and quickly. This study aims to investigate the potential of using seeds of native savanna species in seed balls as a restoration tool for Guam's eroded savanna areas. The experiment will be conducted in natural outdoor conditions in a split-split plot design in eighteen raised plots to compare germination success based on seed preparation, scarification, fertilization, and species. The most effective planting methods and the interactions between each of the factors will be analyzed for statistical differences.

Poster 37: What's the Word on Monk Seals? How Hawai'i's Endangered Seal is Portrayed in the Media

Time: 16:45 - 17:15

Date: 24th July 2018
Location: Machine 3

37 - What's the Word on Monk Seals? How Hawaiʻi's Endangered Seal is Portrayed in the Media

Patrick McKenzie, Kirsten Leong, Stacie Robinson
NOAA Pacific Islands Fisheries Science Center, Honolulu, HI

Track

II. Building the Future

Abstract

The Hawaiian monk seal *(Neomonachus schauinslandi)* is one of only two terrestrial mammals indigenous to Hawaiʻi and one of the most endangered species in the world. After being nearly extirpated from the main Hawaiian Islands after human contact, monk seal sightings have become increasingly common since the 1990s when the local seal population began to increase naturally. While some celebrate and support monk seal conservation, others view monk seals as competition for fish or a symbol of the federal government and conservationists restricting activities. This range of attitudes is reflected in public actions. For example, the monk seal became the state mammal of Hawaiʻi in 2008, yet several monk seal killings made national news headlines in 2013. Most recently, the birth of a monk seal on Waikīkī for the first time in decades resulted in a 24-hour webcam, facebook page, and intense social media interest. Communication scholars have shown repeatedly that the media sets the public agenda, thus how monk seals are portrayed in popular media can have significant effects on conservation efforts. This project reviews public interest in monk seals, reflected in traditional news and social media stories since the 1990s. We used content analysis to identify common themes, language, and attitudes associated with monk seals. Changes in sentiment were tracked against major events like those listed above and changes in monk seal management. Based on these trends, suggestions for communication strategies are presented.

Poster 219: Legacy Land Conservation Program: Helping to Build Future Stewardship Commitments

Time: 16:45 - 17:15
Date: 24th July 2018
Location: Machine 4

219 - Legacy Land Conservation Program: Helping to Build Future Stewardship Commitments

Sidney Stiefel[1], David Penn[2]
[1]KUPU Intern, DLNR, Honolulu, Hawaii. [2]DLNR, Honolulu, Hawaii

Track

II. Building the Future

Abstract

Land conservation is a key foundation to protect valuable resources for public benefit, perpetuate legacies of natural and cultural abundance, and nurture a sustainable future for our communities. Within the Legacy Land Conservation Program (LLCP), the Legacy Land Conservation Commission (LLCC) recommends the award for grant funds after experiencing applicant projects through field visits and engaging in open discussion in public meetings.* If the recommendation is closed, these acquisitions provide perpetual protection through deed restrictions and certain terms of the program's governing authorities. Compelling examples of community benefit the LLCP has helped secure include Ma'o Organic Farm, Mahele Farm, and Ka Iwi Mauka. These three projects are staples to their respective communities where Ma'o addresses issues of food security and youth leadership development in Wai'anae, Mahele Farm teaches the people of Hāna how to raise and harvest native crops, offering bags of fresh produce after community work days, and the Ka Iwi coast is forever sheltered from land conversion in the heavily populated eastern corner of Honolulu. As we face a future where resources are increasingly threatened on multiple fronts—such as climate change, invasive species, and land use conversion—the LLCP demonstrates the value of collaborative work for achieving land conservation and resource protection that cultivates capacity for community action, growth, and stewardship.

*Detailed information about the grant process, from application to acquisition, will be available at the conference.

WEDNESDAY, JULY 25th, 2018

CONCURRENT SESSION 3

Workshop 128: Harnessing the Power of Tacit Knowledge in Connecting Communities and Building Partnerships - Nāhululeihiwakuipapa Workshop

Time: 10:00 - 12:00
Date: 25th July 2018
Location: 311

128 - Harnessing the Power of Tacit Knowledge in Connecting Communities and Building Partnerships - Nāhululeihiwakuipapa Workshop

Kamana Beamer[1], Kūhea Asiu[2], Neil J. Kahoʻokele Hannahs[3], Serena Kaldi[2], Keahi Makaimoku[4], Sean Marrs[5], Sharon Ziegler-Chong[6], Tara Meggett[7], Ulu Ching[8]
[1]Center for Hawaiian Studies, University of Hawaiʻi at Mānoa, Honolulu, Hawaiʻi. [2]Nā Hua Hoʻohuli i ka Pono Internship Program, Kula, Hawaiʻi. [3]Hoʻokele Strategies LLC, Honolulu, Hawaiʻi. [4]Hauʻoli Mau Loa Foundation, Honolulu, Hawaiʻi. [5]The Nature Conservancy, Honolulu, Hawaiʻi. [6]University of Hawaiʻi at Hilo, Hilo, Hawaiʻi. [7]Hawaiʻi Conservation Alliance, Honolulu, Hawaiʻi. [8]Conservation International, Hilo, Hawaiʻi

Track

II. Building the Future

Abstract

While “knowledge, skills and abilities (KSA)” often drive job announcements, it is those who are adept at so-called “soft-skills”, or have “tacit knowledge” that are successful and effective in the conservation field. Tacit knowledge can be described as uncodified and sometimes intangible skills, ideas, and experiences that translate into a skilled understanding of people and places that is key to creating and sustaining successful collaborations and partnerships. Some people seem to be born with that knowledge, but all of us benefit and grow through direct and prolonged engagement with our teachers, mentors, and peers. Often, we seem to be able to recognize these skills in others but struggle to emulate them in our professional work. This workshop is designed to help emerging professionals recognize and identify these types of skills and learn how those skills are best applied in conserving our cultural and natural resources

through collaboration. The workshop will expose participants to the power of tacit knowledge and provide an opportunity to interact with skilled and experienced users of this captured knowledge who have created successful partnerships and brought diverse communities together to promote conservation. Through a dynamic storytelling presentation, panel, and small group exchanges, emerging professionals will get to learn from and interact with a variety of personalities in the conservation community to develop skills that successfully engage novel or unconventional collaborators to build dynamic and innovative solutions for Hawai‘i’s conservation challenges.

General Session: Ridge to Reef

Time: 10:00 - 11:15
Date: 25th July 2018
Location: 316BC

75 - Seascape Models Reveal Places to Focus Coastal Fisheries Management

Kostantinos Stamoulis[1,2], Jade Delevaux[2], Ivor Williams[3], Matthew Poti[4], Joey Lecky[2,3], Bryan Costa[4], Matthew Kendall[4], Simon Pittman[4,5], Mary Donovan[2], Lisa Wedding[6], Alan Friedlander[2,7]
[1]Curtin University, Perth, Australia. [2]University of Hawaii, Honolulu, HI. [3]NOAA Pacific Islands Fisheries Science Center, Honolulu, HI. [4]NOAA National Centers for Coastal Ocean Science, Silver Spring, MD. [5]Plymouth University, Plymouth, UK. [6]Stanford University, Stanford, CA. [7]National Geographic Society, Washington, DC

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

To design effective marine reserves and support fisheries, more information on fishing patterns and impacts for targeted species is needed, as well as better understanding of their key habitats. However, fishing impacts vary in space and are difficult to disentangle from other factors that influence targeted fish distributions. Using GIS, we developed a set of fishing effort and habitat layers to create regional-scale spatial models and predictive maps of biomass and body length of targeted reef fishes for the main Hawaiian Islands. Spatial patterns of fishing effort were highly variable, and the models showed a low threshold beyond which reef fish stocks were severely impacted. Seafloor structure, exposure, depth, and wave power were key

habitat variables which influenced targeted fish distributions and defined productive habitats for reef fisheries. High targeted reef fish biomass and body length were found in areas not easily accessed by humans. When the models were used to simulate the effect of removing fishing pressure, these high values were spread among suitable habitats. By comparing current targeted fish distributions with those predicted when fishing effort was removed, areas with high recovery potential on each island were revealed. Average biomass recovery was 517% and average body length increase was 59% on Oahu, the most heavily fished island. Spatial protection of these areas would aid recovery of nearshore coral reef fisheries.

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189 - Reef conservation off the hook

Jack Kittinger[1,2], Eva Schemmel[1], Shanna Grafeld[3], David Delaney[4], Kirsten Oleson[3], Alan Friedlander[5], Lida Teneva[6]
[1]Conservation International, Honolulu, HI. [2]Arizona State University, Global Institute of Sustainability, Tempe, AZ. [3]University of Hawaii, Dept of Natural Resources and Env Mgmt, Honolulu, HI. [4]Delaney Aquatic Consulting L.L.C., Honolulu, HI. [5]National Geographic, Honolulu, HI. [6]Lindblad Expeditions, Sacramento, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Most conservation interventions focus on protecting the productive capacity and health of ecosystems, but there are tremendous opportunities for impact by aligning market and supply chain dynamics. This talk summarizes the results of a 4-year initiative to better understand the value and supply chains of coral reef fisheries in Hawaii, in which we: (1) estimated the total production (commercial & noncommercial) from coral reef fisheries across the archipelago; (2) assessed the economic value and complex supply chains associated with these fisheries to better understand supply and demand; and (3) identified a suite of promising approaches to align market incentives and management objectives for sustainability. This constitutes the most far-reaching study of its kind in coral reefs and involved partners from across the pae'aina in a collaborative research design.

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215 - The changing models of regulatory compliance and their impact on fisheries management

Adam Ayers
Joint Institute of Marine and Atmospheric Research/NOAA Pacific Islands Fisheries Science Center, Honolulu, Hawai‘i

Track

II. Building the Future

Abstract

Regulatory compliance is a charged term that may trigger images of a leviathan state wielding the force of sanctions or incentives through a strong regulatory bureaucracy to meet societal goals and objectives. These images correspond to the general deterrence model (also referred to as the instrumental or neoclassical model), which is rooted in Economist Gary Becker's influential 1968 paper "The Economics of Crime." Becker theorized that there was an economic gain to breaking the rules, and criminals performed a simple cost-benefit analysis based upon economic gain and the severity of punishment. However, there is an increasing body of evidence that refutes the general deterrence model in general and specifically in fisheries management. This evidence demonstrates the importance of intrinsic motivations or normative commitment to obeying rules, "because it's the right thing to do" and the importance of legitimate, effective rules achieved through a fair process. One method of increasing legitimacy with fisheries rules, co-management, has gained traction globally – and in Hawai‘i – for many reasons, but primarily due to a process of sharing management authority with resource users or communities. Based on an extensive literature review on models of regulatory compliance, I will offer some empirical findings from academic scholarship investigating the utility of appeals to normative motivations. I will also give a general overview of the role of legitimacy in compliance with fisheries regulations, with some insight into recent transitions to co-management of Hawai‘i coral reef fisheries.

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297 - Archaeological Data Provide Important Information for Modern Marine Management: An example from Ka‘ūpūlehu, Hawai‘i Island

Alex Morrison[1], Tim Rieth[1], Jon Tulchin[2]
[1]International Archaeological Institute, Inc., Honolulu, Hawaii. [2]Kamehameha Schools, Honolulu, Hawaii

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Archaeological data is informative for current marine conservation efforts. Kamehameha Schools in collaboration with International Archaeological Research Institute, reanalyzed archaeological assemblages from four sites spanning nearly 700 years at Kaʻūpūlehu, Hawaiʻi Island. The project aim was to utilize the Kaʻūpūlehu archaeological collection to assist the Kaʻūpūlehu Marine Life Advisory Committee's conservation efforts by documenting fish taxa caught by ancient Hawaiians.

Early in the 700-year occupation sequences, fishing was focused largely on Acanthuridae, though other reef taxa were present. Over time, the diversity and number of fish families in the archaeological sites increased while the contribution of large-bodied taxa decreased. Comparison of the archaeological data with modern fisheries information reveals remarkable similarities. The dominance of Acanthuridae in the archaeological assemblages may be explained by relatively large body size, high encounter rate, ease of capture via multiple techniques, and relatively small reproductive size.

Based on the archaeological data the following recommendations should be considered when developing a future management plan after Kaʻūpūlehu's 10-year fishing moratorium is completed. [1] The relative stability in marine prey communities during the 700-year occupational sequence suggests that small-scale subsistence fishing/harvesting may be sustainable in the future if overall levels of fishing pressure are monitored. [2] Dominant taxa such as Acanthuridae may shield other taxa from predation pressure, therefore, it would be prudent to monitor the abundance of key taxa. [3] Future research should continue the integration of archaeological and life-history data and traditional ecological knowledge, through collaboration of archaeologists, fisheries biologists, and *kamaʻāina*.

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255 - Integrating Biophysical and Socioeconomic Data to Improve Ridge to Reef Management in the Manell-Geus Habitat Focus Area in Guam

Marybelle Quinata[1,2], Valerie Brown[3], Adrienne Loerzel[1]
[1]TBG @ NOAA, Tiyan, Guam. [2]University of Guam, Mangilao, Guam. [3]NOAA Fisheries, Tiyan, GU

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Resource managers typically focus on biophysical monitoring efforts to understand how humans may be impacting a particular ecosystem. However, many threats to an ecosystem have corresponding effects on the human communities that depend on them. Further, many management efforts depend on community engagement to be successful. The National Oceanic and Atmospheric Administration (NOAA) included human well-being objectives and socioeconomic monitoring in its planning efforts for the Manell-Geus Habitat Focus Area (HFA) in Guam. As one of ten HFAs included in NOAA's Habitat Blueprint the project seeks to improve habitat conditions for fisheries, improve the resilience of coastal communities, and to provide other economic, cultural, and environmental benefits our society needs and enjoys. In 2016, researchers collected baseline socioeconomic data through household surveys, focus groups, and key informant interviews. This information was integrated with biophysical information to understand human interactions with the environment and identify management opportunities. Data include human perceptions of the environment and their role in these spaces, the threats that affect ecosystems and humans, and their willingness to participate in actions to improve the ecosystem. Managers believe this data will help them avoid impacts to human well-being, and have used it to develop opportunities for residents to get involved in management and restoration activities through citizen science and climate change adaptation programs. The information also helped the project team identify appropriate ways to share data with the community. We'll highlight the challenges of integrated monitoring and how it has been applied in the Manell-Geus HFA.

General Session: Social Sciences

Time: 10:00 - 12:00
Date: 25th July 2018
Location: 316A

151 - Linking High-level Commitments with On-the-ground Actions: A Global Exchange on Biocultural Indicators of Wellbeing

Pua'ala Pascua, Eleanor Sterling
Center for Biodiversity and Conservation - American Museum of Natural History, New York, New York

Track

II. Building the Future

Abstract

Community-based resource management continues to gain recognition in high-level commitments here in Hawai‘i and around the world, especially when communities use monitoring metrics that build from and explicitly incorporate local knowledge, values, and perspectives. However, developing indicators to assess the local outcomes of resource management actions, and scaling them to meet broader national and international conservation policy targets, remains a key challenge. This is problematic because collaboration between local, national, and international indicator initiatives is essential to synergize cross-scale planning and enhance evidence-informed implementation towards sustainability. In April 2018, an action group of international representatives from indigenous and local communities, research institutions, and national and global conservation policy forums met to exchange knowledge on biocultural indicators—reporting metrics that capture paired human and environmental wellbeing. Participants explored case studies, synthesized products, and identified actions to facilitate learning across groups and partners who measure, monitor, and report on biocultural indicators in local, national, and international conservation settings. Through our work and findings, the action group aims to 1) demonstrate that on-the-ground, collaborative, and community-based approaches to research and natural resource management benefit environmental stewardship by enhancing our understanding of the links between biological and cultural diversity and by promoting resilient communities, and 2) inform a suite of policy recommendations for global initiatives and international decision-making arenas like the Convention on Biological Diversity. We present preliminary results from the April 2018 action group meeting in addition to highlights from complementary efforts to assess and evaluate biocultural indicators in the Pacific and beyond.

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169 - Participatory socioeconomic monitoring: Involving local partners and communities when applying social science in conservation

Supin Wongbusarakum[1,2], Cheryl Anderson[3]
[1]University of Hawai'i Joint Institute of Marine and Atmospheric Research, Honolulu, HI. [2]National Oceanic and Atmospheric Administration's Pacific Island Fisheries Science Center, Honolulu, HI. [3]University of Hawai'i Social Science Research Institute, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Since 2008, Socioeconomic Monitoring Guidelines for Coastal Managers in Pacific Island Countries (SEM-Pasifika) have been promoted and implemented among different countries in the Pacific island region. In Micronesia alone, conservation partners have conducted more than 20 assessments that followed the proposed steps or used the guide’s suggested indicators.

Most of these assessments were conducted in conjunction with a socioeconomic monitoring training workshop involving local conservation partners and community members at the assessment sites. These were technically supported by social scientists. This presentation reviews the process and outcomes of these assessments, summarizes indicators commonly selected for the assessments, and explores the extent to which the results have been used to support decision-making in planning or in the management of the coastal and marine resources. The presentation highlights key lessons learned regarding best practices related to carrying out participatory processes, establishing appropriate enabling conditions, and meeting the challenges of collaborative research among scientists, conservation practitioners, and communities for conservation planning and adaptive management. Examples from the socioeconomic monitoring efforts in Micronesia and Hawai'i Community Based Subsistence Fishing Areas will be used to illustrate opportunities for improved natural resource management and conservation from collaborative engagement.

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265 - The Stewardship Mapping & Assessment Project, a Tool to Understand and Support Environmental Stewardship on Hawaiʻi and Oʻahu

Heather McMillen[1,2], Rebekah Ohara Ohara[3], Christian Giardina[4,5], Tamara Ticktin[2], Kuʻulei Keakealani[6], Kainana Francisco[4,5], Elliott Parsons[7], Irene Sprecher[1]
[1]Division of Forestry & Wildlife, Honolulu, HI. [2]University of Hawaiʻi, Honolulu, HI. [3]Akaka Foundation For Tropical Forests, Hilo, HI. [4]Institute for Pacific Islands Forestry, Hilo, HI. [5]USDA Forest Service, Hilo, HI. [6]Hui Aloha Kīholo, Kona, HI. [7]Division of Forestry & Wildlife, Puuwaawaa, HI

Track

II. Building the Future

Abstract

The successful management of natural resources relies on collaborative approaches with environmental stewardship organizations. A strong understanding of who these groups are, how they interact, and where they work can enhance collaboration among stewardship groups and between community and agency efforts. The Stewardship Mapping and Assessment Project (STEW-MAP) is a research program that addresses the questions: Who takes care of Hawaiʻi? Where, why, how, and to what effect? STEW-MAP uses surveys and other methods to identify organizational characteristics, geographic area (enabling spatial analysis), and relationships with other community, private, and governmental organizations (enabling social network analysis). Here we report on findings from Hawaiʻi Island and we share examples of how groups are using Stew-Map to inform their own work on Rapid ʻŌhiʻa Death, fire

management, and conservation. We also describe progress on a newer STEW-MAP project on O‘ahu. Through building on existing tools and resources such as HCA’s Conservation Connections and landcover data, STEW-MAP databases and interactive maps can enable the public, municipal agencies, and nonprofits to visualize where and how environmental stewardship groups are working across the landscape. Custom downloads of STEW-MAP data can be used by agencies and community organizations to support policymaking and natural resource management. Network analyses of these groups can show the connections among groups and identify groups that are key in distributing information and resources within the network. Analysis of where stewardship is or is not taking place highlights opportunities or issues to address in meeting local conservation goals.

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279 - Pilinakai: Biocultural Monitoring as a Pathway to Re-establish Healthy Relationships to Place

Kanoe‘ulalani Morishige[1,2], Pelika Andrade[3], Uakoko Chong[4], Lauren Kapono[2]
[1]University of Hawai‘i at Mānoa, Honolulu, HI. [2]Nā Maka o Papahānaumokuākea, Waimea, HI. [3]UH Sea Grant, Waimea, HI. [4]University of Hawai'i, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

There is a growing collective movement within Hawai’i’s local communities to engage in research partnerships that are meaningful to their vision of thriving oceans and people. In order to build long-term research that supports community-based management and extends into education and policy, there is a need to increase capacity of emerging researchers born and raised in Hawai’i. Since 2010, Pilinakai integrates multiple knowledge systems to monitor resources on a local scale, empower the next generation, and support communities in developing management action that balances health and wellness through ecological and cultural lenses. Pilinakai implements biocultural monitoring in intertidal ecosystems on the foundation of traditional knowledge systems and integrates quantitative monitoring methods. We use Huli ‘ia as a Hawaiian observational process to empower the kilo (observer) within communities to document seasonal changes and shifts across entire landscapes, ma uka to ma kai (mountains to oceans). Huli ‘ia records place-specific natural cycles of growth, presence, reproduction and assists in identifying correlations between these occurrences as indicators of ecosystem health. Quantitative monitoring is used to provide research opportunities for students to examine seasonal reproduction, size of reproductive maturity, population size structure, and other data to inform sustainable harvesting practices. This collective information

creates a platform to engage in conversations about adjusting behaviors to minimize impact on resources. These efforts are part of collaborative community partnerships to serve as a pathway to perpetuate ancestral knowledge systems and re-build the way we support the productivity of ʻāina balancing the health of people and place.

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271 - ʻImi Pono No Ka ʻĀina: Celebrating 20 years of Environmental Education On Hawaiʻi Island

Lahela Camara
ʻImi Pono no ka ʻĀina, Hilo, Hawaii

Track

II. Building the Future

Abstract

ʻImi Pono no ka ʻĀina (ʻImi Pono) is the environmental education program for the Three Mountain Alliance watershed partnership (TMA). Since its creation in 1999, ʻImi Pono has provided immersive and creative opportunities for thousands of students, teachers, and community members to build relationship to place. This year marks our 20th Summer student enrichment program called Kahuapono that invites students in grades 6-12 to take part in summer, spring and fall sessions, to travel to natural areas across the island to engage in activities such as native plant propagation, invasive species control, and reforestation. Students who have participated in the program have continued on to other conservation pipeline programs and some currently hold positions in the conservation field. ʻImi Pono also implements three other projects: the Nā Kiaʻi Kūmokuhāliʻi native forest restoration program, which facilitates volunteer opportunities to rebuild the forest of Keauhou, Kaʻū; the Pilina Kumuʻāina teacher enrichment program, which provides classroom support and resources; and the Hoʻoulu Kaiāulu community outreach program, with its flagship program being the Hawaiʻi Nei art contest featuring native species of Hawaiʻi Island. ʻImi Pono owes its success over these 20 years to the invaluable relationships with the partners of TMA and other local organizations. From office space and vehicles, to expertise and aloha, support and collaboration among partners on many levels has been key in implementing effective programs for our community. The presenter will discuss program accomplishments and evolution of its programs, the successes and challenges, and its future goals.

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222 - Social marketing: What it is (and isn't), who's using it as a conservation tool, and why you should too

Liz Foote[1], Franny Brewer[2]
[1]Project S.E.A.-Link, Wailuku, HI. [2]Big Island Invasive Species Committee, Hilo, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Today, more than ever, solutions to many environmental problems must consider changing human behavior to be successful. Information-based campaigns that intend to change human behavior often fall short because they rely heavily on the assumption that merely providing information will lead people to make the 'logical' choice and in turn, achieve the desired social and environmental outcome. Such campaigns are often ineffective because they don't adequately address motivations that underpin specific behaviors or the barriers to changing behavior at the appropriate scale. Social marketing is a novel approach that aims to influence behavior in support of collective conservation objectives through a well-defined strategic process. Although social marketing is informed by social science research and evaluation methods, it is underutilized and often misunderstood, but has great potential to foster sustainable behavior and effect change. We will share some background on social marketing theory, including why it is misunderstood, using case studies from around the world. We will also share some recent collaborative social marketing efforts within Hawai'i, including: 1) the West Maui Kumuwai Campaign, an ongoing collaborative effort focused on reducing land-based pollution that impacts coral reefs, and 2) the Big Island Invasive Species Committee (BIISC) little fire ant neighborhood control program, which uses strategies from social marketing to encourage neighbors to work together to fight a devastating invasive species.

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79 - Working Towards Incorporating Human Well-Being and Cultural Importance into the West Hawai'i Integrated Ecosystem Assessment

Rebecca Ingram[1,2], Kirsten Leong[2], Supin Wongbusarakum[1], Jamison Gove[2]
[1]Joint Institute for Marine & Atmospheric Research, Honolulu, HI. [2]Pacific Islands Fisheries Science Center, NOAA, Honolulu, HI

Track

II. Building the Future

Abstract

Ecosystem-based management is increasingly recognizing the importance of the reciprocal relationships that exist between humans and ecosystems, and the critical links between human well-being and ecosystem services. These links are not linear, but rather create dynamic, interwoven, and complex networks of social-ecological interactions. The National Oceanic and Atmospheric Administration's West Hawai'i Integrated Ecosystem Assessment (IEA) is a program grounded in ecosystem-based methods and recognizes the importance of place-based human dimensions. Initial IEA work with stakeholders in West Hawai'i revealed detailed social-ecological system dynamics and highlighted both the importance and lack of understanding of the links between ecosystem services and human well-being, particularly services that enhance and maintain cultural connections to a place. Without an understanding of these links, it is almost certain that crucial ecosystem services will be left out of resource management strategies, as has been witnessed in numerous regions globally. Our strategy was to begin deciphering how West Hawai'i communities interact with intangible, non-material ecosystem services (through spiritual, social, and emotional avenues) and learn how people value services differently. This required developing a process for including human dimensions in marine management that is place-based, informed by communities, and addresses social needs. Using a biocultural approach and qualitative research methods, and referring to previous West Hawai'i community-based research endeavors and other projects examining cultural ecosystem services, we created a method for the IEA to begin incorporating human dimensions into the framework. From here, we will develop an index of biocultural indicators using guidance and responses from the community.

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104 - I Ka Wā Ma Mua: The Value of a Historical Ecology Approach to Ecological Restoration

Natalie Kurashima[1], Jason Jeremiah[2], Tamara Ticktin[3]
[1]Kamehameha Schools, Kailua-Kona, HI. [2]Kamehameha Schools, Honolulu, HI. [3]Botany Department, University of Hawaii at Mānoa, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Human activity has altered nearly every landscape on earth, and ecological restoration to repair degraded ecosystems has become a conservation necessity. Hawai'i is a microcosm for intense landscape change, where levels of native biodiversity and threats to it are among the highest in the world, and where Kānaka Maoli, who stewarded these lands for a millennium, currently

face massive inequalities. Consequently, biocultural restoration has emerged as a method to reciprocally restore ecological and cultural integrity and is especially applicable in Hawai‘i’s sizeable invasive-dominated areas. Since Kānaka Maoli are an inseparable part of every land and seascape in Hawai‘i, any ecological restoration project has the potential to use a biocultural restoration approach. However, most restoration approaches are purely ecological, and for many conservation practitioners a sociocultural understanding of the landscape can seem inaccessible. We discuss the value of a historical ecology approach (understanding the interaction between people and landscapes over time) for successful restoration and management of biocultural landscapes in Hawai‘i. We use a case study in Kahalu‘u, Kona, to outline historical ecology methods and available resources, including written documents, maps, imagery, archaeological studies, and interviews, and share applications of this approach on-the-ground. Benefits of employing this approach include expanding knowledge of reference conditions, understanding practices contributing to landscape function over space and time, and building meaningful relationships to engaging community around a site. We argue that a historical ecology approach can serve as the first step in a biocultural restoration process helping to reestablish relationships between resource stewards and place.

Forum 166: Creating a Bridge Between Tradition, Science, & Villages to Foster Sustainable Marine Ecosystems & Thriving Communities

Time: 10:00 - 12:00
Date: 25th July 2018
Location: 315

166 - Creating a Bridge Between Tradition, Science, & Villages to Foster Sustainable Marine Ecosystems & Thriving Communities

Michelle Paddack[1,2], Nicole Crane[1,3], John, Jr Rulmal[1]
[1]One People One Reef, Falalop Ulithi, Yap, FSM. [2]Santa Barbara City College, Santa Barbara, California. [3]Cabrillo College, Santa Cruz, California

Track

II. Building the Future

Abstract

Communities across the Pacific are struggling with declining marine ecosystems and associated challenges to indigenous cultural continuity. Community-based management is increasingly acknowledged and accepted, yet the needs and resources for each community are unique and success varies. In this forum, we will share challenges, success stories and help to craft action plans based on the cultural and decision making/enforcement framework tailored to each community. We will share the methods used in the Outer Islands of Yap, Federated States of Micronesia (FSM), where a combination of traditional and modern techniques have enabled these communities to revitalize their marine ecosystems, strengthen traditional ways, and create deeper connections within and among their communities. Starting with just one island, communities spread across hundreds of miles of ocean are now working together, collecting data, renewing pride in local culture, and making decisions that are helping to foster sustainable reefs and engaged communities. In the process, we have seen youth stepping up in beautiful and powerful ways to reclaim their culture while bringing new ideas forward in order to create thriving natural and human communities. A second theme of the forum will be on this, discussing ways to engage and honor the youth as the bridge to a better future.

General Session: Freshwater

Time: 10:00 - 11:00
Date: 25th July 2018
Location: 314

82 - Integrated Economic-hydrological Modelling of Brown Water Events in Maui

Carlo Fezzi[1,2], Kirsten Oleson[1], Hla Htun[1]
[1]University of Hawaii at Manoa, Honolulu, HI. [2]University Trento, Trento, Italy

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Runoff from land can contain pathogens, sediments, nutrients and toxic chemicals that can significantly influence nearshore ecosystems and restrict the recreational opportunities in affected beaches and coastal areas. The issue of “brown water” events is of particular economic and financial relevance in areas of high touristic value. Furthermore, land use change can amplify runoff, and climate change may intensify rainfall events, leading to more days with

degraded coastal water quality. This study integrated spatially-explicit hydrological and economic models to assess the impact of "brown water" events for the entirety of the island of Maui, Hawaii. We surveyed Maui residents on their recreational behaviors to derive a model of their travel costs, and instantiated the Soil Water Assessment Tool to predict runoff from rainfall events. The economic impact of brown water events for the resident population is significant. For example, we estimate that a brown water event affecting the beaches surrounding Lahaina for two weeks would produce an economic damage of about $1.5 million in recreational value alone. Economic analyses quantifying welfare losses can help justify investment, for instance in watershed management and restoration.

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7 - Overturning aqua nullius: Repositioning Aboriginal water rights and traditional knowledge to inform natural resource management

Dr Virginia Marshall
Australian National University, School of the Evironment & Society and the School of Regulation & Global Governance, Canberra, Australian Capital Territory. Australian National University Fenner School of Science and Society, Canberra, Australian Capital Territory

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

In my recent book 'Overturning Aqua Nullius' I argue for the incorporation of Aboriginal ontologies and water law concepts into water law, policy and governance frameworks and I advance the case for a Reserved Aboriginal Water Rights regime for Australia.

Today, more than ever, harnessing Aboriginal traditional knowledge is crucial to appropriate management of Australia's diverse landscapes and waterscapes and the preservation of the mega-biodiversity that is a legacy of Indigenous land management practices over millennia.

Traditional water knowledge, sharing practices, climate and seasonal weather knowledge, coupled with a deep understanding of ecological relationships need to underpin Indigenous water resource management in Australia and elsewhere. Aboriginal customary water use cannot be decoupled from the relationship with the environment because Aboriginal water concepts are central to community and kinship relationships with 'country'.

Unlike Western legal concepts, water cannot be separated from the land because Aboriginal creation stories provide the foundations for Aboriginal water values. Water landscapes hold

meaning and purpose under Aboriginal laws and those laws are integral to maintaining a healthy environment. Aboriginal language is a conduit for water knowledge and the nuances of Aboriginal language would provide valuable insights to appropriate water resource use and management.

Australia's ongoing marginalisation of Aboriginal water rights not only severely impacts the living standards of Aboriginal communities and compounds intergenerational poverty but threatens the health and integrity of Australia's landscapes and waterscapes. It is essential that Indigenous water rights and traditional knowledge be repositioned as central and integral to natural resource management.

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270 - Exploring ecosystem services and their underlying drivers in He'eia

Casey Ching[1], Leah Bremer[1], Kirsten Oleson[1], Kanekoa Kukea-Shultz[2], Gregory Chun[1]
[1]University of Hawaii, Honolulu, HI. [2]The Nature Conservancy, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Ecosystem services in Hawaii represent uses of the landscape and communal benefits fueled by deep connection to place and knowledge passed down through generations using the landscape. Services, such as cultural practice or food production, that communities gain from natural resources often require specific environmental and social conditions and are difficult to categorize within popular frameworks without compromising their nuanced meanings in local culture. Using participatory research methods, including interviews and community engagement in the landscape, I identified services held by community members that work to restore loʻi kalo (wetland taro) in Heʻeia in collaboration with the non-profit KākoʻoʻŌiwi. I then categorized these services based on a novel Hawaii-based ecosystem service framework developed by P. Pascua, which helped to determine social, cultural, and ecological drivers underpinning the services. The interviews revealed that families working in the loʻi placed greater value on intangible benefits such as social interactions and cultural practice over food production or provisions. Furthermore, the categorization of the services unveiled linkages between cultural services and provisioning, supporting, and regulatory services emphasizing the importance of detailed evaluation of cultural services in Hawaii.

280 - Hoʻi i ke kumu: A Commitment to Honor the Vision and Voices of Community through Stream Restoration in Lahaina, Maui

Kanoelani Steward[1], Skippy Hau[2]
[1]The Nature Conservancy Hawaiʻi, Honolulu, HI. [2]Division of Aquatic Resources, Wailuku, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Freshwater ecosystems are the lifeline of Hawaiʻi's watersheds and native Hawaiian freshwater fauna are key indicators of the health and quality of these systems. With a history of degraded habitat that continues to be threatened by artificial structures, nutrient and sediment runoff, and the introduction of non-native species, water resource management decisions by governing agencies are extremely critical. For over a century, many communities have been fighting the unjust management of water resources to restore water flow and return abundance to Hawaiʻi's streams. This project was an opportunity to contribute purposeful research that stemmed from community concerns. Born and raised in Lahaina, Maui, the relationships I have to my community and place were the foundation of this project that ultimately led to a project partnership with the Division of Aquatic Resources and the State of Hawaiʻi Commission on Water Resource Management (CWRM). Built from the guidance of the community, the goal of this project was to provide CWRM with an updated inventory of the abundance and distribution of native species in four streams in West Maui: Kahoma, Kauaʻula, Olowalu, and Ukumehame. Each stream was surveyed above and below intake diversions using a modified version of the random sampling point count quadrat method. The results were used to support instream flow standards that provide a healthy balance for all instream uses. This research opened a pathway to engage Lahaina community members about the current state of our resources and ways to work toward thriving native ecosystems in Lahaina.

Poster 33: One Year Down, Nine to Go: Progress on Implementing the 2017-2027 Hawai‘i Interagency Biosecurity Plan

Time: 10:00 - 10:30
Date: 25th July 2018
Location: Machine 1

33 - One Year Down, Nine to Go: Progress on Implementing the 2017-2027 Hawaii Interagency Biosecurity Plan

Josh Atwood, Randy Bartlett
Hawaii Invasive Species Council, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

The Hawaii Interagency Biosecurity Plan was released in January 2017 and provides a comprehensive analysis of gaps relating to Hawaii's preborder, border, and postborder biosecurity systems. The Plan describes a broad set of policy, process, and resource actions needed to address those gaps, and places those action items on a 10-year timeline that leads to a 2027 vision of a more biosecure Hawaii. The agencies and partners needed to implement these actions are spread across a network of invasive species and biosecurity experts at HDOA, DLNR, UH, DOH, and other entities. The Hawaii Invasive Species Council is committed to tracking progress on implementation across participating agencies and partnerships over the 10-year life of the plan. As we've passed the one-year mark for implementation, what progress has been made? What biosecurity legislation has passed, and which bills have failed to make traction? Are we keeping pace with implementing the 2027 vision? What gaps remain as opportunities for improvement in future years? Staff from the Hawaii Invasive Species Council intend to provide this progress report as the first of 10 annual presentations at the Hawaii Conservation Conference to ensure that the conservation community remains informed and engaged as implementation progresses.

Poster 88: Inter situ Restoration of the Critically Endangered Plant Cyrtandra kaulantha: A Case Study at Harold Lyon Arboretum

Time: 10:00 - 10:30
Date: 25th July 2018
Location: Machine 2

88 - *Inter situ* Restoration of the Critically Endangered Plant *Cyrtandra kaulantha*: A Case Study at Harold Lyon Arboretum

Pia Ruisi-Besares[1,2], Līloa Dunn[1,2]
[1]Harold L. Lyon Arboretum, Honolulu, Hawai'i. [2]University of Hawai'i - Mānoa, Honolulu, Hawai'i

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Botanical gardens can play a critical role in the conservation of endangered species through the establishment of integrated or *inter situ* restoration sites. *Inter situ* sites provide an easily accessible location to study the preferred growth conditions of rare and little studied plants in semi-wild ecosystems before reintroduction. As a case study, we planted the critically endangered native Hawaiian plant, *Cyrtandra kaulantha* in a riparian mesic site at Harold L. Lyon Arboretum. We chose the experimental site because it had analagous physical conditions and similar canopy cover to the collection site with no historical record of hosting the species. We planted 40 individuals throughout the site and monitored survivorship and plant growth for 12 months. After the first year we found <30% survivorship rate of all individuals and evidence of pest and pathogen infection in surviving individuals. These preliminary data suggest flaws in the current outplanting methodology and point to potential impacts from unobserved abiotic and biotic factors. These data prompted further experiments to test the impact of light, soil type and nutrient availability on survivorship of *Cyrtandra kaulantha.* Understanding condition preferences prior to *in situ* outplanting can make restoration efforts in remote areas more successful and cost effective. Botanical gardens can provide a convenient and relevant environment for researchers and managers to test best practices before implementation.

Poster 25: Ridge to Reef Connections: Effects of Invasive Mangrove Removal on Nearshore Coral Reef Environment

Time: 10:00 - 10:30
Date: 25th July 2018
Location: Machine 3

25 - Ridge to Reef Connections: Effects of Invasive Mangrove Removal on Nearshore Coral Reef Environment

Ashley E. McGowan, Keisha D. Bahr, Robert J. Toonen
Hawai‘i Institute of Marine Biology, University of Hawai‘i at Mānoa, Kāne‘ohe, HI

Track

III. Invasive Species & Biosecurity

Abstract

The He‘eia watershed has been severely impacted by invasive species, such as California grass (*Urochloa mutica*) and red mangroves (*Rhizophora mangle*). Currently, removal of these invasive species and replanting of native riparian plants and lo‘i taro is underway, with expected widespread changes from the terrestrial ecosystem to the tightly linked coastal environment directly downstream. In partnership with Paepae o He‘eia and Kāko‘o ‘Ōiwi, this project integrates traditional ecological knowledge with contemporary research and monitoring strategies to understand the effects of such restoration activities on the adjacent coral reef environment. We established 24 long-term monitoring sites where we assess marine fish populations, sedimentation levels, water quality, and coral reef health before, during, and after restoration to identify watershed or reef management actions that can improve the health of the nearshore coral reef. The marine ecosystem data collected will complement the freshwater, fishpond, and terrestrial components to allow for an ecosystem approach in understanding and managing the entire ahupua‘a while maximizing benefits to both natural and human communities. The He‘eia ahupua‘a may serve as a model for restoration efforts elsewhere in Hawai‘i with strong collaborations between community members, researchers, and resource managers that allow for a ridge to reef approach, and data that can inform the application of traditional land use practices.

Poster 122: Lactation Period as a Proxy for Maternal Condition in Hawaiian Monk Seals: Implications for Understanding Population Trends and Environmental Drivers

Time: 10:00 - 10:30
Date: 25th July 2018
Location: Machine 4

122 - Lactation Period as a Proxy for Maternal Condition in Hawaiian Monk Seals: Implications for Understanding Population Trends and Environmental Drivers

Thea Johanos[1], Stacie Robinson[1], Tracy Wurth[2], Littnan Charles[1]
[1]NOAA/PIFSC, Honolulu, Hawaiii. [2]JIMAR, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Most endangered Hawaiian monk seals reside within the Northwestern Hawaiian Islands (NWHI) where, until recently, subpopulations declined over many decades. There, young seals encounter multiple threats, including starvation, which led to poor recruitment. Meanwhile, a small subpopulation in the main Hawaiian Islands (MHI) has grown over the past two decades. Females fast during the lactation period and typically go from robust to emaciated condition. Because of this, the duration a female nurses her pup can be used as a measure of maternal condition and foraging success prior to pupping. Our study utilizes visual observations collected during 1981-2016 to investigate whether lactation periods of individually identified females differ over time or by region, and how differences might relate to population trends and environmental factors. Pooling years, durations are similar among the 6 most studied NWHI sites where by-site averages ranged from 36-38 d (overall average 38 d, SD 4.66, n=2,072), whereas durations are reliably longer in the MHI (average 44 d, SD 4.83, n=139). Lactation periods at the NWHI generally coincided with population trends: decreasing since the late 1980s/early 1990s when there are corresponding decreases in juvenile survival, but showing recent signs of increase. Meanwhile, lactation durations in the MHI have decreased over the past decade, and are becoming more similar to those in the NWHI, corresponding to a period when population growth in the MHI has slowed. These findings link maternal foraging success with observed population trends, demonstrating the driving force that maternal condition can have on population dynamics.

Poster 47: Two Years Down and Three Releases Later: Predator Control and Monitoring to Support the Reintroduction of the ‘Alalā (Corvus hawaiiensis)

Time: 10:30 - 11:00
Date: 25th July 2018
Location: Machine 1

47 - Two Years Down and Three Releases Later: Predator Control and Monitoring to Support the Reintroduction of the ‘Alalā (*Corvus hawaiiensis*)

L. Ku'ulei Vickery[1], Jacqueline Gaudioso-Levita[1], T. Colleen Cole[2], Alex X. Wang[1], Steven C. Hess[3], Donna Ball[4], Jay Nelson[4]
[1]PCSU, Honolulu, Hawai'i. [2]Three Mountain Alliance, Hawai'i National Park, Hawai'i. [3]U. S. Geological Survey, Hawai'i National Park, Hawai'i. [4]U. S. Fish and Wildlife Service, Honolulu, Hawai'i

Track

III. Invasive Species & Biosecurity

Abstract

Released, conservation-bred ‘Alalā (*Corvus hawaiiensis*) in Pu‘u Maka‘ala Natural Area Reserve, on Hawai‘i Island, benefit from the predator control program of the ‘Alalā Project by limiting predation and transmission of diseases. The predatory mammals present in this reserve include rats (*Rattus rattus, R. norvegicus, and R. exulans*), small Indian mongooses (*Herpestes auropunctatus*), and feral cats (*Felis catus*). Trap types for control of these mammals include conibear kill traps, live cage traps, and self-resetting Goodnature A24 traps which have a custom excluder to prevent non-target captures, including ‘Alalā. Since 2016, 200 rats, 105 mongooses, and 13 cats were removed from the ‘Alalā release area. Rodents were monitored using tracking tunnels with ink cards, and cats were monitored using trail cameras. The first release site showed a 73% decrease (71% to 19%) overall of rodents in the treatment area during one year of monitoring. The second release site has shown ranges between 22% and 58% rat tracking with treatment and a peak of 44% rat tracking with control for one year of monitoring. The third release site has shown a 41% and 36% decrease of rats in treatment and control, respectively, between baseline and first run. Cat detections from trail cameras show a regular use of the landscape with highest activity between 5pm and 9pm. Samples from 31 rats (tissue) and 11 cats (blood) have been taken for molecular diagnostics of *Toxoplasma gondii*.

Predator control and monitoring will continue throughout future ʻAlalā releases to minimize predation and disease threats to the species.

Poster 106: Ultra High Resolution Mapping of Coral Reefs Utilizing Modern Unmanned Aerial System (UAS) Technology

Time: 10:30 - 11:00
Date: 25th July 2018
Location: Machine 2

106 - Ultra High Resolution Mapping of Coral Reefs Utilizing Modern Unmanned Aerial System (UAS) Technology

Robert O'Conner, Matthew Parry
National Oceanic & Atmospheric Administration, Honolulu, Hawaiʻi

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

With the State of Hawaiʻi 's coral reef resources under increasing stress from changes in ocean chemistry, sea level rise, and direct anthropogenic factors, it is more urgent than ever to use applicable emerging technologies to study and monitor these delicate natural resources. Unmanned Aerial Systems (UAS) provide an efficient and relatively low cost method for obtaining ultra high resolution imagery of native coral reef species in the Hawaiian Islands. The availability of hybrid vertical take off and landing (VTOL) aircraft enable the researcher to launch and recover fixed wing aircraft from small landing areas such as a research boat greatly increasing the amount of coral reef ecosystems that can be mapped in a single flight. Incorporating both high resolution optical cameras as well as multispectral sensors can provide insight into coral reef health previously unable to obtain at low altitudes and ultra high resolutions. This study aims to incorporate state of the art VTOL UAS to continually monitor those study sites of importance to the National Oceanic & Atmospheric Administration (NOAA) and the State of Hawaiʻi in Kaneohe Bay. The data collected will ultimately provide a foundation for future conservation efforts in the near shore marine environment.

Poster 235: Ongoing Progress of Biocontrol for Strawberry Guava in Hawai`i

Time: 10:30 - 11:00
Date: 25th July 2018
Location: Machine 3

235 - Ongoing Progress of Biocontrol for Strawberry Guava in Hawai`i

Nancy Chaney, M. Tracy Johnson
Unites States Department of Agriculture Forest Service, Volcano, HI

Track

III. Invasive Species & Biosecurity

Abstract

A biological control agent for strawberry guava (Psidium cattleianum), the Brazilian leaf galling insect *Tectococcus ovatus*, has been released and monitored at demonstration plots and native forest sites across the state of Hawai`i since 2012. Biocontrol populations have established and increased gradually at all sites, on all three common genotypes of strawberry guava. Impacts of the biocontrol on guava growth and reproduction are beginning to be detected at sites treated six years ago, where galling levels have been high for 3-4 years. Wind dispersal of the biocontrol agent has been gradual, on the order of tens of meters per year. Methods for assisting dispersal of the agent to new areas have been refined and recommendations for management are available. Although the ultimate impacts of this biocontrol are not yet fully demonstrated, prospects for slowing invasions of strawberry guava appear good.

Poster 6: Modelling and simulation of sediment budgets under management strategies at the He'eia National Estuarine Research Reserve on Oʻahu, Hawaiʻi

Time: 10:30 - 11:00

Date: 25th July 2018
Location: Machine 4

6 - Modelling and simulation of sediment budgets under management strategies at the He'eia National Estuarine Research Reserve on Oahu, Hawaii

Laura Marin Samper[1], Susan Carstenn[2]
[1]HPU, Kaneohe, Hawaii. [2]HPU, Kanohe, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

One of the main factors impacting nearshore reefs is excessive sediment transport from streams to the ocean. Mangrove dominated coastlines have shown to promote flow reduction and flocculation, resulting in decreased erosion rates and increased sedimentation rates. Mangroves are not native to the Hawaiian Islands, and considered invasive, especially *Rhizophora mangle*.Mangrove removal efforts at He‘eia, in Kāne‘ohe bay on Oahu, Hawai‘i, have increased since *He‘eia* was designated a National Estuarine Research Reserve (NERR). To better understand the potential impact on water quality within the *He‘eia* NERR that may result from mangrove removal, a ‘Systems Thinking, Experimental Learning Laboratory with Animation’ (STELLA) model was constructed and simulated. The Erosion Potential Method (EPM) was embedded into STELLA to devise a model simulation that would focus on the changes in sediment outputs at the stream mouth, and onto the adjacent coral reefs, before and after completion of mangrove removal. Geographic Information Systems (GIS) was used to estimate model parameters and compile existing spatial data. The results show that, the complete mangrove removal from the HeÊ»eia stream mouth will cause an increase of 26% in the amount of sediment outwelling, from 0.084m^3/day to 0.113m^3/day on average. Although oceanic influences were not considered in the model, an increase in the erosion coefficient (z) of 0.1 within the coastal basin, associated with mangrove removal, was also observed. This model will therefore aid future management of the He‘eia NERR stream’s water quality, and thus of the adjacent coral reefs and associated fauna and flora.

Forum 299: Kai Kuleana Kākou - Collective Impact to Secure an Abundant Future

Time: 11:00 - 12:00
Date: 25th July 2018
Location: 314

299 - Kai Kuleana Kākou - Collective Impact to Secure an Abundant Future

Ka'imi Kaupiko[1], Charles Young[2], Malia Kipapa[3], Reggie Lee[4], Hannah Springer[5], Ku'ulei Keakealani[6], Diane Kaneali'i[7]
[1]Pa'a Pono Miloli'i, Miloli'i, HI. [2]KUPU, Ho'okena, HI. [3]Kipapa 'Ohana, Kailua-Kona, HI. [4]Kohanaiki, Kohanaiki, HI. [5]Kaʻūpūlehu Marine Life Advisory Committee, Kaʻūpūlehu, HI. [6]Hui Aloha Kīholo, Kīholo, HI. [7]Honokoa Community Association, Honokoa, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Kinship informs the expression of kuleana in engaged communities in West Hawai'i. While all of us possess the capacity to mālama ʻāina, sustaining multi-generational efforts to care for coastal and marine life requires deep engagement with the kamaʻāina who once cared for or are active in managing those lands today. By truly engaging the people of place, everyone involved benefits. In order to understand changes in places and connections and empower local action, a new generation of researchers is working directly with the people of place to design, implement, and share research. This type of community-driven research goes beyond intellectual curiosity by bridging the gap between understanding and action. Join members of the Kai Kuleana Network and next generation protectors as they share stories of awakenings, insights, and growth that emerged from designing research that engages practitioners and community leaders from start to finish.

Poster 64: Creating Middle School Students Success Through Culturally Relevant Community Stewardship

Time: 11:00 - 11:30
Date: 25th July 2018
Location: Machine 1

64 - Creating Middle School Students Success Through Culturally Relevant Community Stewardship

Brigitte Ululani Russo
Waiʻanae Intermediate, Waiʻanae, HI. University of Hawaiʻi, College of Education, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Culturally responsive pedagogy with community stewardship effectively increased student academic achievement and engagement. A Waiʻane Intermediate teacher created opportunities for student engagement and leadership in multiple places in the community. Stewardship experiences involved place-based site visits and hands on activities such as Keawaʻula, Kaʻala Farms, Makaha, and Pōkaʻi. Through various partnerships students were able to have culturally relevant service learning experience in the Waiʻanae moku. This class incorporated Native Hawaiian values within the curriculum and grew interest for local conservation. Student's socioemotional learning, community stewardship, and interest in natural resource management careers grew. Through a pre and post survey we see students interest in science, Hawaiian culture, language, and sustainability increased.

Poster 98: Phase I: Refining Vegetative Propagation Techniques for Federally Listed Bonamia menziesii (Convolvulaceae) on Kauaʻi

Time: 11:00 - 11:30
Date: 25th July 2018
Location: Machine 2

98 - Phase I: Refining Vegetative Propagation Techniques for Federally Listed *Bonamia menziesii* (Convolvulaceae) on Kauaʻi

Ashly Trask[1], Natalia Tangalin[1], Rebekah Magers[2]
[1]National Tropical Botanical Gardens, Lāwaʻi, HI. [2]Kauai Community College, Līhuʻe, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Bonamia menziesii, is a U.S. Federally listed endangered species of endemic Hawaiian vine. Historically it was found on all major Hawaiian islands, except Niʻihau and Kahoʻolawe. It is now extirpated on Molokaʻi. Populations on Kauaʻi are only loosely defined and it's estimated there are less than a couple hundred individuals in Hawaiʻi. National Tropical Botanical Gardens' Living Collections Department is hoping to expand their *ex situ* population of this woody vine and build a nursery stock for future research and restoration projects. Since being federally listed in 1994, little attention has been paid to *B. menziesii*. There is much room for research in regards to its reproductive biology, pollinators, and vegetative propagation techniques. In the past it was observed that wild cuttings had a significantly smaller rooting percentage than those taken in the nursery and quickly put in the misthouse. In Phase I, cumulative trials were carried out with both nursery and wild collected propagules to refine combinations of hormones with different stem cutting types. Various intervals of callusing, nodule and root formation were observed and recorded. Observation of root growth, even with careful extraction methods, can be disruptive to new root growth. This poster will explain the methodology, successes and challenges for Phase I of refining *B. menziesii* propagation techniques. Phase II of this project, to be completed summer of 2018, will be attempting hand pollination techniques and subsequent seed collection on established *ex situ* collections.

Poster 140: Ehu ka Wai Loa o Kailua | Reemerging Genealogy of Place and Reconnecting the Landscape in Kailua, Koʻolaupoko

Time: 11:00 - 11:30
Date: 25th July 2018
Location: Machine 3

140 - Ehu ka Wai Loa o Kailua | Reemerging Genealogy of Place and Reconnecting the Landscape in Kailua, Koʻolaupoko

Natalie Andreyka[1,2], Mehana Vaughan[1,2]
[1]University of Hawaiʻi at Mānoa, Honolulu, HI. [2]Department of Natural Resources and Environmental Management (NREM), Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

The environment is changing, therein priorities in natural resource management should reflect this pace. This requires interdisciplinary perspectives and approaches, considering the dynamic processes of the environment. The Hawaiian land tenure system was an integrative and highly innovative structure: maximizing productivity in diverse ecosystems, while actively cultivating connections of people and place. Loʻi kalo, exemplified this complexity, utilizing the hydrological regime across a landscape to achieve a range of goals. The purpose of this research is to reemerge the historical loʻi kalo system captured in the native land tenure system of Kailua, through Hawaiian archival research. Moreover, it intends to explore potential restoration within Kailua through a simplified overlay analysis, as an application of the compiled historical knowledge to address the management of an existing landscape. The archival database compilation revealed that overwhelmingly, loʻi kalo was the most claimed resource, reinforcing the documented capacity of the agricultural system in Kailua. Moreover, the resulting simplified overlay analysis identified potential loʻi restoration sites that align with current community restoration, an illustration of congruency between historical knowledge and restoration efforts. Expanding engagement in Hawaiian archival research may act as a foundation for a more complete understanding of the genealogy of land tenure in Kailua and the potential to conceive more holistic and inclusive management perspectives and approaches from this knowledge. These ancestral knowledge systems can elevate the ways in which natural resource management is approached: records of testimony that truly are, a testimony to the very ways in which people and place connect.

Poster 208: Presence of the endangered Hawaiian hoary bat on national wildlife refuges

Time: 11:00 - 11:30
Date: 25th July 2018
Location: Machine 4

208 - Presence of the endangered Hawaiian hoary bat on national wildlife refuges

Bret Wolfe
U.S. Fish and Wildlife Service, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian hoary bat, or ʻōpeʻapeʻa in Hawaiian, is the only endemic terrestrial mammal in Hawai'i. In 1970, the U.S. Fish and Wildlife Service listed the bats as endangered due to increasing threats from habitat loss, invasive predators, and insecticide use. Because of their rarity and cryptic nature, the population status and distribution of the bats is still not well known. Except for anecdotal reports, it is also not known if the nine National Wildlife Refuges (NWR) in Hawai'i play any role in protecting and conserving the species. To determine if and when the bats utilize these refuges, we deployed 22 stationary recorders across the refuge complex from January to December 2017. The recorders document the presence or absence of bats via the ultrasonic calls that they use to navigate and locate prey. We documented nearly nightly bat activity at Hakalau Forest NWR (Hawaii), Kealia Pond NWR (Maui), and Hanalei NWR (Kauai). Bats were also present on 14 nights at the Kakahaia NWR (Molokai), 6 nights at James Campbell NWR (Oahu), and just one night each at the Kalaeloa Unit of the Pearl Harbor NWR and Oahu Forest NWR. Our study confirmed that Hawaii's wildlife refuges are important foraging and possibly breeding areas for the bats. We will be continuing the study to detect changes in bat activity over time and also conduct more targeted monitoring to better understand the bat's habitat preferences and to inform refuge managers regarding target areas for restoration work.

Poster 162: Outreach and Education Supporting ʻAlalā, Corvus hawaiiensis, Reintroduction Efforts: A Model for Reintroduction Programs and Conservation Actions

Time: 11:30 - 12:00
Date: 25th July 2018
Location: Machine 1

162 - Outreach and Education Supporting ʻAlalā, *Corvus hawaiiensis,* Reintroduction Efforts: A Model for Reintroduction Programs and Conservation Actions

Rachel Kingsley[1], Jackie Gaudioso-Levita[2], Dan Dennison[3], T. Colleen Cole[4], Lea Kaʻahaʻaina[4]
[1]Pacific Cooperative Studies Unity, University of Hawaiʻi-Manoa, Honolulu, HI. [2]State of Hawaiʻi Division of Forestry and Wildlife, Hilo, HI. [3]State of Hawaiʻi Department of Land and Natural Resources, Honolulu, HI. [4]Three Mountain Alliance, Hawaiʻi National Park, HI

Track

II. Building the Future

Abstract

The ʻAlalā *(Corvus hawaiiensis)* is a critically endangered corvid species found on Hawaiʻi Island that went extinct in the wild in 2002. Through a partnership of agencies, conservation and reintroduction efforts for this species were developed. A universal foundation for a successful reintroduction is community understanding and support, prior to reintroduction actions. In 2014, The ʻAlalā Project began community outreach and education efforts, two years before ʻAlalā were released. A multifaceted approach was developed to help broaden the reach and scope of the information presented. Multiple modes of communication were integrated, such as in-person presentations (public presentations, school and community organization visits), online presence (website and social media), media, and printed materials (posters, brochures, flyers, and promotional items). Efforts focused on multiple disciplines including art, habitat restoration, ecology, animal behavior, history, and Hawaiian culture, reaching audiences varying in age from keiki to kūpuna. The number of outreach events was summarized and compared over two separate periods to determine audience reach covering each release effort. Our social media output was categorized into video/audio, biological facts, project milestones, event notifications, and interactive posts. Utilizing this analytical information we were able to determine effectiveness, audience reach, and location. This approach to outreach and education has proven to be an important and supportive step to the reintroduction strategy for the ʻAlalā, allowing conservation actions to continue. It is our goal that the people we reach will understand the importance of recovering ʻAlalā, and will help share knowledge in their community as "ʻAlalā Ambassadors".

Poster 4: Supporting Community-based Control of Invasive Ants on the Big Island

Time: 11:30 - 12:00
Date: 25th July 2018
Location: Machine 2

4 - Supporting Community-based Control of Invasive Ants on the Big Island

Franny Brewer[1], Rebecca Niemiec[2], Jade Miyashiro[1], Kawehi Lopez[1]
[1]Big Island Invasive Species Committee, Hilo, HI. [2]Stanford University, Berkeley, CA

Track

III. Invasive Species & Biosecurity

Abstract

We sought to increase rates of treatment of little fire ant (Wasmannia auropunctata) in highly infested residential areas of the Big Island. Residents reported confusion about proper treatment approach, and limited success when working on a small scale due to re-infestation from adjacent properties. To overcome these barriers, we developed a hands-on LFA control training program, free to neighborhoods with a minimum of 6 neighboring properties committed to a year of coordinated treatment. Training took place at residences, with staff leading residents to mix and apply HAL gel bait. Supported by staff, each neighborhood created an individual plan for cost-sharing, labor sharing, and treatment application. BIISC provided monthly support through email and community check-ins at 6 and 12 months. Percentage of infestation (p/a) was collected at those times, as well as qualitative reports from residents about their experiences with LFA. Surveys at pre-program, 7 months, and 13 months, as well as in-depth interviews with a sub-group of participants, were used to gather information on motivation, perception of efficacy, strength of social bonds and other factors that influenced participation, and those were measured against success of treatment. For twenty participating neighborhoods, we report on the elements that most appeared to support a successful neighborhood collaboration, and the benefits and challenges to implementing a labor-intensive program to control one of the highest threat invasive species in Hawaii.

Poster 89: Seeing Between the Sightings: Citizen Science Fills Data Gaps for Hawaiian Monk Seals

Time: 11:30 - 12:00
Date: 25th July 2018
Location: Machine 3

89 - Seeing Between the Sightings: Citizen Science Fills Data Gaps for Hawaiian Monk Seals

Stacie Robinson[1], Tracy Mercer[1], Albert Harting[2], Jason Baker[1], Thea Johanos[1]
[1]NOAA, Honolulu, HI. [2]Harting Biological, Bozeman, MT

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

How can biologists count animals they can't find? This problem challenges Hawaiian monk seal biologists who endeavor to monitor the population of this endangered seal. With only about 1400 seals left, and only about 350 of those in the main islands, every seal counts. Getting accurate data on breeding females and their pups is especially important for calculating reproductive rates and estimating growth potential in the population. While the main islands may have relatively few seals, they are home to many monk seal enthusiasts, many of whom report seal sightings to a hotline or even volunteer to monitor seals. NOAA's Hawaiian Monk Seal Research Program has harnessed this citizen science energy to generate quality data to fill in gaps in monk seal reproductive data. Specifically, we plotted the sighting histories of individual adult females to identify patterns in their nursing and molting dates that indicated unobserved pupping events. This study included 79 female seal sighted as adults from Hawaii Island to Kauai, 1988-2017. The analysis identified 25 likely, and 132 possible, missed pupping events. When these probable, but unobserved pups are added to our tally of observed pups, we are able to refine our estimated reproductive curves for the main islands seal population. After accounting for unobserved pups, reproductive rates were higher in the main Hawaiian Islands than elsewhere in the monk seals' range. Such advances in our understanding of the monk seal population are possible thanks to the participation of Hawaii's many dedicated citizen scientists.

Poster 114: Isolation and Identification of Unknown Pathogenic Fungi in Acacia koa from Hawaiian Islands

Time: 11:30 - 12:00
Date: 25th July 2018
Location: Machine 4

114 - Isolation and Identification of Unknown Pathogenic Fungi in *Acacia koa* from Hawaiian Islands

Yong Hoon Yoo, Janice Uchida
University of Hawai'i at Mānoa, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

Koa (*Acacia koa*) is endemic to the Hawaiian Islands that is one of abundant species in the Hawai'i. Koa provide ecological functions that form habitat of numerous native birds, insects, and other flora as an endemic tree. Also, koa support for the nitrogen content of nitrogen-poor volcanic forest soils. Also, koa represent in Hawaiian culture that considered the most valuable of the common native species. A number of diseases of koa caused by pathogenic fungi have been described. Especially, Koa wilt disease is typically virulent on all developmental stages of the host that showed rapid, irreversible wilting and decline because pathogenic fungi are systemically invaded in to the vascular system and contained within internal tissues. Koa in Hawaiian Islands have been shown to be infected with some species of the vascular fungus such as *Fusarium oxysporum* that is widely present in the soil. Other Fusarium species also isolated from koa such as *F. semitectum , F. subglutinans, F. lateritium, F. graminearum, F. proliferatum, F. equiseti* and *F. solani*. The aim of the present research is to isolate and to identify unknown pathogenic fungi in *Acacia koa* from Hawaiian Islands, and to compare koa seedling that inoculate koa seeds with unknown pathogenic fungal species to monitor the growth rate of koa which species is the most infected to koa.

CONCURRENT SESSION 4

Forum 204: Kūlana Noiʻi: Building and Sustaining Equitable Partnership between Researchers and Community

Time: 13:00 - 14:00
Date: 25th July 2018
Location: 311

204 - Kūlana Noiʻi: Building and Sustaining Equitable Partnership between Researchers and Community

Rosie Alegado[1,2], Brenda Asuncion[3], Katy Hintzen[2], Keli'i Kotubetey[4], Miwa Tamanaha[3]
[1]University of Hawai'i at Manoa, Honolulu, Hawaii. [2]Hawai'i Sea Grant, Honolulu, Hawaii (HI).
[3]Kuaʻāina Ulu ʻAuamo, Kāne'ohe, Hawaii. [4]Paepae o He'eia, Kāne'ohe, Hawaii

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Across the Hawaiian Islands, hundreds of research projects focusing on coastal and marine resources are conducted each year. These resources are integral to the livelihoods and cultural practices of Native Hawaiians. However, too often the communities that care for and utilize natural resources are not involved in research decision making processes. This forum will focus on best practices for building and sustaining long-term relationships between researchers and community with a focus on the perspectives of Native Hawaiian communities. These best practices, called the Kūlana Noiʻi (Research Standards), were developed and piloted over the course of a year-long collaborative project led by Hawaiʻi Sea Grant, Kuaʻāina Ulu ʻAuamo (KUA), and Paepae o Heʻeia. A panel made up of fishpond stewards, researchers, and outreach specialists will discuss their personal experiences and lessons learned from the effort to develop the general best practices outlined in the Kūlana Noiʻi and adapt those practices for place-based implementation at the Heʻeia Fishpond. The panel will be followed by interactive small group discussions to solicit feedback from conference attendees about their own experiences with community-researcher partnership and foster dialogue about how the Hawaiʻi conservation community can support equitable and collaborative partnership between those who study natural resources and the communities that care for and utilize those resources on generational timescales often beyond the lifespan of research projects.

The Kūlana Noiʻi are available online at:
http://seagrant.soest.hawaii.edu/content/kulana-noii

Symposium 13: The current status of Ceratocystis-induced Rapid Ohia Death (ROD): Science, management, and outreach

Time: 13:00 - 14:30
Date: 25th July 2018
Location: 316BC

13 - The current status of Ceratocystis-induced Rapid Ohia Death (ROD): Science, management, and outreach.

9 - Extension and outreach for communities on Rapid ʻŌhiʻa Death

James Friday[1], Corie Yanger[1], Marian Chau[2], Christy Martin[3], Matthew Keir[4]
[1]University of Hawai'i Cooperative Extension Service, HILO, HI. [2]UH Lyon Arboretum, HILO, HI. [3]Hawai'i Coordinating Group on Alien Pest Species, Honolulu, HI. [4]Laukahi Hawai'i Plant Conservation Network, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

The Rapid ʻŌhiʻa Death extension team is working to inform our communities about the effects of rapid ʻōhiʻa death and what they can do about the disease. In 2017, we presented at 77 events, including community talks, workshops, tables conservation events, a symposium in downtown Honolulu, and an ʻŌhiʻa Love Fest that drew 1,500 people. Other efforts also included outreach via the web, printed pamphlets, radio, and social media. Positive results of this effort were documented by a CGAPS survey that found that 92% of people on Hawaiʻi Island had heard of ʻōhiʻa and that same percentage of people had also heard of rapid ʻōhiʻa death. Elsewhere in the state, 43% of Hawaiʻi residents had heard of rapid ʻōhiʻa death, so one way or another some messaging has reached over 670,000 people. The program faces the difficulty that the basic messages are negative: don't move ʻōhiʻa, don't wound ʻōhiʻa, etc. In 2018 we are working to move the messaging in a positive direction and engage more with stakeholders. Last year, people who participated in a series of workshops on seed banking conducted by UH Lyon Arboretum and the Laukahi Hawaii Plant Conservation Network were given proactive steps to take and a way to engage in ʻōhiʻa conservation. In 2018 the extension program will produce a planting list for landowners who want to restore their forests. By directly engaging stakeholders and giving them ideas to take action, we are aiming at transforming short-term awareness to long term commitment and action.

123 - ʻŌhiʻa Dieback on Oahu: A "New" Threat?

Will Weaver
Ko'olau Mountains Watershed Partnership, Pearl City, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

ʻŌhiʻa are the most important native tree species representing more than 50% of all forests in Hawaii. ʻŌhiʻa serve as critical habitat for a host of rare native species and perform a vital role in aquifer recharge in the state's watersheds. During August 2016, Ko'olau Mountains Watershed Partnership (KMWP) staff observed an alarming amount of dying ʻōhiʻa in the Northern Poamoho management unit. In November and December 2016, KMWP staff noted further ʻōhiʻa canopy defoliation. ʻŌhiʻa samples were collected and returned with negative results for Rapid Ohia Death (ROD). An aerial survey was conducted in February 2017 and

defoliating ohia were observed at an upper elevation band across much of the central Ko'olau range. Dr. Janice Uchida at the University of Hawai'i at Mānoa has confirmed the presence of 'ōhi'a rust (*Austropuccina psidii)* on leaf samples from Northern Poamoho and with the help of State of Hawaii and U.S. Forest Service Foresters we have determined that this is likely the cause of the massive defoliation. 'Ōhi'a rust has been in Hawaii since 2005, yet has has not shown this type of severe impact on 'ōhi'a. Two seasons of above average local rainfall during the summer months in 2015 and 2016 may have lead to this outbreak. Ongoing monitoring and investigations are underway to determine if we are dealing with a new strain of 'ōhi'a rust and if it is the sole cause of defoliation. 'Ōhi'a are showing resilience with refoliation in some areas.

157 - ROD – Related 'Ōhi'a Mortality Impacts on Avifauna in Lower Puna, Hawai'i Island

Richard Camp[1], Dennis LaPointe[1], Patrick Hart[2], Carter Atkinson[1], Daniel Sedgwick[3], Michael Riney[1]

[1]US Geological Survey, Pacific island Ecosystems Research Center, Hawaii National Park, Hawaii. [2]Department of Biology, University of Hawaii at Hilo, Hilo, Hawaii. [3]Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hilo, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

In native Hawaiian forests, 'ōhi'a *Metrosideros polymorpha* is the principle tree species making up 88% of the total forest canopy biomass. 'Ōhi'a is a foundation species on which most native forest passerines are dependent. Unfortunately, the emerging disease Rapid 'Ōhi'a Death (ROD) has caused extensive mortality of 'ōhi'a in the Puna District since 2010 and has spread to an estimated 40,500 hectares across Hawaii Island. To determine the possible impact of ROD on the forest bird community, we conducted point counts in lowland 'ōhi'a forest and compared them to counts made in 2003 before the occurrence of ROD. We also estimated the percent of dead ' ōhi'a at each count station. We found an increase in non-native bird diversity and significant decreases in the abundance of the native Hawai'i 'amakihi *Chlorodrepanus virens* and the non-native Japanese white-eye *Zosterops japonicus*. Hawai'i 'amakihi densities declined by 70% from 3.7 birds/hectare (95% CI 2.3–5.5) in 2003 to 1.1 birds/hectare (95% CI 0.7–1.6) in 2016. Japanese white-eye densities also declined between the two periods from 31.3 birds/hectare (95% CI 25.9–35.7) to 20.9 birds/hectare (95% CI 17.8–23.0), a 33% reduction. We also found a significant negative relationship between Hawai'i 'amakihi counts and the extent of 'ōhi'a mortality. These findings suggest that the loss of 'ōhi'a canopy due primarily to ROD may have altered the bird community

and adversely affected populations of Hawai'i 'amakihi and Japanese white–eye, two of the most abundant bird species of lowland Hawaiian forests.

168 - Rapid 'Ōhi'a Death: Two New Species of *Ceratocystis* Associated with the Devastating Epidemic on Hawai'i Island

Lisa Keith[1], Irene Barnes[2], Michael Wingfield[2], Thomas Harrington[3]
[1]USDA ARS, Hilo, HI. [2]FABI, Pretoria, South Africa. [3]Iowa State University, Ames, IA

Track

III. Invasive Species & Biosecurity

Abstract

`Ōhi`a *(Metrosideros polymorpha)* is Hawai`i's most widespread and ecologically important native tree, defining native forest succession and ecosystem function over broad areas, providing critical habitat for rare and endangered native bird and insect species, and exemplifying the strong links between native Hawaiian culture and the islands' environment. Dying trees were first noticed in the Puna district of Hawai`i Island as early as 2010, and the disease has now spread to most districts of the Big Island. Cross sections of diseased trees reveal brown to black discoloration in the xylem of the trunk. In order to to determine the distribution and mechanisms of spread of these invasive fungal species, the isolates associated with ROD were defined using morphology, phylogeny, pathogenicity and genetic diversity. Two previously unknown species of *Ceratocystis* were identified and described. ROD poses a serious threat to Hawaii's flagship native tree species whose loss would be catastrophic for the diversity, structure, and function of Hawaii's remaining native forests and the critical services they provide. Intensive research is underway to develop rapid screening protocols for early pathogen detection and management strategies to prevent pathogen spread to the other islands of Hawai`i.

171 - Monitoring Assessment of Current ROD Management Strategies on Hawai'i Island

Kylle Roy[1], Carolina Granthon[2], Robert Peck[2], Carter Atkinson[1]
[1]USGS-PIERC, Hawaii National Park, Hawaii. [2]HCSU, Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

ROD currently threatens ōhiʻa lehua (*Metrosideros polymorpha*) on Hawaiʻi Island. First identified in Puna in 2014, the disease has now spread island wide. In 2017 a large outbreak was discovered in Hamakua between Ka'awali'i and Laupahoehoe Streams near sensitive forest habitat at Manowaiale`e Forest and Laupahoehoe Natural Area Reserves. This area is easily accessible and an excellent location for monitoring effectiveness of the current ROD management strategy; currently *Ceratocystis* positive and ambrosia beetle infested ōhiʻa trees are felled to reduce airborne spread of potentially infective beetle frass. We placed 23 USGS Passive Frass Traps in a grid that spanned the outbreak and monitored for airborne frass containing *Ceratocystis* spp. A and B. Monitoring began three weeks before management and continued for one month after the last infected trees were cut. Additionally, beetle traps with lures containing a mixture of ethanol/methanol were mounted adjacent to nine frass traps to document wood-boring ambrosia and cerambycid beetle populations during the latter three months of the study. We detected declines in potentially infective frass and wood particles following management activities. However, non-infected frass and wood particle detections dramatically increased with felling activity. Preliminary results from beetle trapping show that the area supports a wide variety of wood-boring beetles, some of which likely attack ōhiʻa and may facilitate the spread of *Ceratocystis*. This study illustrates ongoing cooperative actions between land managers and scientists to design an effective strategy to prevent spread of the disease to unaffected forests and ultimately other Hawaiian Islands.

201 - Mapping the Spatial Progression of Rapid'Ōhi'a Death via cm-resolution Imagery

Ryan Perroy[1], Timo Sullivan[1], David Russell[1,2]
[1]University of Hawaii at Hilo, Hilo, HI. [2]PIPES (Pacific Internship Programs for Exploring Science), Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

Forests on Hawai'i Island are experiencing widespread 'Ōhi'a (*Metrosideros polymorpha*) mortality associated with the fungal pathogens responsible for Rapid 'Ōhi'a Death. We have been using small unmanned aerial systems (sUAS) to map the progression of 'Ōhi'a mortality on an individual tree basis at four sites within the districts of South Hilo, Ka`u, Honoka`a, and Kohala. This has been conducted on a monthly basis, beginning in February, 2016. The four sites each contain thousands of 'Ōhi'a trees and represent different environmental and land

management regimes while ranging in size between 70 - 280 aces. Our sUAS imagery time-series, supplemented by older pictometry imagery and field sampling results, allow us to document the spatial progression of the disease over time as asymptomatic trees first brown and then completely defoliate. We then use these data to construct forest mortality curves for each site, which generally show a rapid initial period of tree mortality, followed by much lower rates. This information can assist stakeholders in better understanding the spatial and temporal dynamics of ʻŌhiʻa forests experiencing Rapid ʻŌhiʻa Death under different management settings.

Symposium 16: From deep data roots to community science branches, strong science informs conservation of Hawaii's protected marine wildlife

Time: 13:00 - 14:00
Date: 25th July 2018
Location: 316A

16 - From deep data roots to community science branches, strong science informs conservation of Hawaii's protected marine wildlife

97 - Feminization of Green Sea Turtle Foraging Aggregations in the Pacific: Establishing Foraging Ground Sex Ratios for Climate Change Research

Camryn D. Allen[1,2], Summer L. Martin[2], Jennifer M. Lynch[3], Tammy M. Summers[4], Jessy Hapdei[5], Marc R. Rice[6], George Balazs[2], Michael P. Jensen[7], T. Todd Jones[2]
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Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Wildlife populations are shaped by the environments in which they live. Obtaining baseline information on how wildlife responds to environmental conditions is critical in identifying physiological or behavioral alterations. Understanding climate impacts is complicated for marine species, such as sea turtles, as temperature directly regulates key physiological and behavioral parameters which, in turn, have significant consequences on population demography, habitat utilization, and human impacts. Sea turtle sex is determined by environmental conditions during incubation (temperature-dependent sex determination); therefore, warming may lead to feminizing sea turtle populations. To elucidate these climate impacts, hormone analysis (male turtles have distinctively higher testosterone concentrations) can determine sex ratios at foraging grounds. Results show a female-bias at six green sea turtle foraging locations across the Pacific with a greater bias towards females in immature turtles. Historic datasets from the early 1980s showed no female bias in turtles from Hawai'i (1.0F:0.96M), whereas current data suggest much greater female biases (3.4F:1M). However, a female-bias was already prevalent in the northern Great Barrier Reef (nGBR), Australia, from 1987 – 1997 (3.2F:1.0M), similar to current levels (3.4F:1M). Sex ratio data for foraging locations provide important information for investigating the potential effects of climate change and consequential feminization of sea turtle populations. Ultimately, due to the continued trend in female biased sex ratios at sea turtle foraging grounds in the Pacific, examination of operational sex ratios is necessary to determine the number of male turtles needed to maintain sea turtle population viability.

108 - Every arrow in the quiver: Using a suite of tools to unravel the mystery of endangered hawksbill turtles in Hawai'i

Alexander Gaos[1], Lauren Kurpita[2], Kelly Peebles[2], Hannah Bernard[3], Luke Sunquist[3], Cheryl King[4], Don McLeish[5], Skippy Hau[6], Joy Browning[7], Irene Kelly[8], Shandell Brunson[9], Camryn Allen[1], Summer Martin[9], Shawn Murakawa[9], Erin LaCasella[10], George Balazs[11], Peter Dutton[10], T. Todd Jones[9]

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Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The hawksbill turtle (*Eretmochelys imbricata*) is an endangered species that is extremely rare in Hawai'i (U.S.A.). Over the past three decades, a consortium of federal, state, and non-governmental partners, collectively referred to here as the Hawaiian hawksbill network, has implemented a diverse suite of research and management tools to better understand the status of hawksbills in Hawaii. These efforts, which include nesting beach monitoring and mitigation, in-water surveys, satellite telemetry, hatchling dispersal modeling, and genetic studies, have led to the discovery of several intriguing findings. Our current knowledge indicates <15 females nest annually around the archipelago. Satellite telemetry and dispersal modeling suggest that nesting females and hatchlings primarily remain in nearshore Hawaiian waters. Results of genetic analyses indicate Hawaiian hawksbills represent a distinct genetic stock that is likely not connected with populations in other parts of the world. Combined, these findings suggest Hawaiian hawksbills represent a distinct management unit, with individuals spending most or all of their lives in relatively close proximity to the archipelago. Conservation of marine turtles often requires the collaboration of government authorities from multiple states or nations over large ocean regions; however, conservation efforts in the state of Hawai'i can protect the entire life cycle of the Hawaiian hawksbill population. The Hawaiian hawksbill network will continue to collaboratively implement innovative research tools to investigate new and emerging questions, including whether additional hawksbill nesting beaches exist around the Hawaiian archipelago, how hatchlings disperse after emergence, and how climate change may impact hatching success and population sex ratios.

158 - The Year of the Monk Seal, A Pup in Waikiki, and Public Engagement in Conservation

Angela Amlin, Aliza Milette-Winfree
NOAA-NMFS, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Education and outreach are critical components of endangered species recovery efforts. Yet finding effective and engaging ways to communicate science and conservation can be challenging. To inspire new and creative ways to engage with the community and local

partners, NOAA Fisheries and agency partners declared 2017 the Year of the Monk Seal (YotMS) and launched a year of activities related to monk seal conservation and ocean stewardship. Little did we know a well-known Waikiki monk seal, Rocky, also got the message. In June 2017, Rocky gave birth on Kaimana Beach. This was the first documented pup born in Waikiki, one of the most populated areas in Hawaii. Managers and scientists were suddenly faced with an unprecedented level of public interest in these animals, which rocketed YotMS efforts to another dimension. In another first, a local news outlet began broadcasting live, round-the-clock webcam footage of the seals via social media. By embracing unique engagement strategies such as "Pupdates," where NOAA Fisheries staff engaged in live-streamed Q&A sessions with viewers, this challenging situation became an opportunity to reach a broad audience, with the series of videos and live streams garnering over 2.3 million views. By tapping into new forms of community engagement, NOAA Fisheries and partners are reaching new demographics and expanding the community of stewards championing monk seal recovery via efforts such as Facebook groups dedicated to monk seals, a coffee table book about Rocky and Kaimana, a PSA about created by girls in an animation camp, and more.

198 - Listening for solutions: Partnering with fishermen to reduce impacts to whales and catch through acoustic monitoring of the fishery

Ali Bayless[1,2], Erin Oleson[1], Sean Martin[3], Jamie Marchetti[4]
[1]Pacific Islands Fisheries Science Center, Honolulu, HI. [2]Joint Institute for Marine and Atmospheric Administration, Honolulu, HI. [3]Hawaii Longline Association, Honolulu, HI. [4]Pacific Islands Regional Office, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

False killer whales (*Pseudorca crassidens*) are top oceanic predators, often foraging for the same fish species targeted by fishermen. They have mastered the art of taking bait and catch from longline fishing hooks to augment their natural hunting. This overlap occasionally results in hooking or entanglement of whales in fishing gear, an outcome that can cause injury or death for the whale, and financial losses for fishermen. In an effort to better understand how whales find fishing gear and how the interaction between whales and fishermen may be mitigated, the Cetacean Research Program at the Pacific Islands Fisheries Science Center has been using passive acoustic monitoring over the past six years to monitor the fishery for the presence of false killer whales near longline fishing gear. This effort has been successful due to partnership with the individual fishermen of the Hawai‘i-based longline fishery, as well as with the Pacific Islands Region Observer Program. Acoustic data are collected using small autonomous recorders that are sent out on a given fishing trip. A

total of 44 fishing trips have been acoustically monitored since 2012 on various vessels across the fleet. Analysis of the acoustic data collected has provided information about the occurrence and timing of false killer whale presence near the gear, as well as how this correlates to depredation rates. The ongoing project has suggested potential acoustic cues for the whales and the possibility of bait depredation by whales, suggesting mitigation strategies may need to target more than just preserving catch.

Symposium 7: ʻAʻohe pau ka ʻike i ka hālau hoʻokahi: Advancing modern science with Hawaiian knowledge

Time: 13:00 - 14:45
Date: 25th July 2018
Location: 315

7 -

ʻAʻohe pau ka ʻike i ka hālau hoʻokahi: Advancing modern science with Hawaiian knowledge

121 - Pele comes to Hilo in 1880-1881

Jim Kauahikaua[1], Ku`ulei Kanahele[2]
[1]USGS Hawaiian Volcano Observatory, Hawaii National Park, HI. [2]Edith Kanaka`ole Foundation, Hilo, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Mauna Loa volcano, Island of Hawaiʻi, erupted for 12-13 months starting November 5, 1880. After a month, it was clear that a lava flow was advancing on the town of Hilo about 30 miles from the vent. The lava flow continued to move slowly for months, burning through the forest surrounding Hilo and finally stalling about a mile from the town in early August, 1881.

It is well known that the eruption and its progress were covered in weekly Honolulu English-language newspapers. We include weekly Hawaiian-language newspaper coverage.

Hawaiian-language authors were quick to point out that Pele was trespassing into the territory set aside for Kamapua‘a (Hilo, Hāmākua, Kohala Districts) and, after the trespass continued, suggested a law suit! Others compared this lava flow to the one from 1855-1856 that stalled more than 5 miles from Hilo, wondering whether the new flow will do the same. Joseph Nāwahī speculated that if the new lava flow were to advance over the recent lava flow, then it would descend quickly. But if it advanced over older terrain, it would move more slowly because it would have to fill gulches and depressions. The flow did not advance over the 1855 lava.

In the final days of activity, the Hawaiian press reported on the arrival and subsequent activities of Princess Luka Ke‘elikōlani who camped near the flow and offered makana and chanted prayers to Pele to go home. The flow had been slowing and, within a few days, it stopped.

23 - Mo‘olelo and Microbes: A cultural framework to understand biogeochemical processes

Kiana Frank
University of Hawaii, Mānoa, Honolulu, HI. Kewalo Marine Laboratory, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Generational assimilation of observational data enabled Native Hawaiians to preserve a holistic understanding of the connectivity, structure and function within their island ecosystems. Their intimate understandings of the geographic and temporal variability in winds, rains, and currents, and how these factors governed the extent and distribution of biodiversity were perpetuated through mo‘olelo (stories), mele (songs), and oli (chants). These oral histories preserve the scientific integrity of traditional phenomenological observations and remain shockingly consistent with contemporary biogeochemical and geophysical observations. While many organizations leverage traditional knowledge to guide restoration, knowledge of the biogeochemical variability and the ecological implications within contemporary ecosystems are unconstrained. Here, I will shed light on the extent to which Hawaiian *‘ike* (1) reflects an understanding of biogeochemical processes along ahupua‘a – from mauka to makai; and (2) guides my research approach to advance the conclusions and “value-add” of modern science in a way that perpetuates place-based knowledge and fosters values and concepts of traditional management. I will share data on the diversity, density, distribution, and metabolic characteristics of microorganisms driving biogeochemical processes within our Hawaiian

watersheds in the context of Kane, Kanaloa, and Haumea. By examining moʻolelo, mele, and oli through scientific lenses, we can begin to decode the insight left to us by our kupuna (ancestors) – bridging cultural and historical knowledge with contemporary knowledge systems – to better understand the relevance of these stories today and perpetuate the restoration, sustainability and resilience of our ecosystems.

71 - Informing future coastal development to promote coral reef resilience through scenario planning with linked land-sea models

Jade Delevaux[1,2], Robert Whittier[3], Kostantinos Stamoulis[4], Leah Bremer[5,6], Stacy Jupiter[7], Alan Friedlander[8,9], Kimberly Burnett[5], Kawika Winter[10], Natalie Kurashima[11], Mehana Blaich-Vaughan[2], Tamara Ticktin[12]
[1]School of Ocean and Earth Science and Technology, University of Hawaiʻi at Mānoa, Honolulu, HI. [2]Department of Natural Resources and Environmental Management, Sea Grant College Program & Hui ʻĀina Momona, University of Hawaiʻi at Mānoa, Honolulu, HI. [3]Hawaiʻi Department of Health, Honolulu, HI. [4]Curtin University, Perth, Western Australia. [5]University of Hawaiʻi Economic Research Organization, Honolulu, HI. [6]University of Hawaiʻi Water Resources Research Center, Honolulu, HI. [7]Wildlife Conservation Society, Suva. [8]National Geography Society, Washington, DC. [9]Fisheries Ecology Research Lab, University of Hawaiʻi, Hono, HI. [10]Limahuli National Tropical Botanical Garden, Hanalei, HI. [11]Kamehameha Schools Natural and Cultural Resources, Kailua-Kona, HI. [12]Department of Botany, University of Hawaiʻi at Mānoa, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Effective ridge-to-reef management requires improved understanding of land-sea linkages and decision-support tools to evaluate the impacts of terrestrial and marine drivers on coral reefs. We developed a linked land-sea modeling framework based on remote sensing and empirical data, which combines groundwater models with coral reef models at fine spatial resolution, to inform sustainable coastal development and promote coral reef resilience. We calibrated this framework in Hāʻena and Kaʻūpūlehu, located at opposite ends of the Hawaiian Archipelago. Both communities have place-based, co-management designations to manage nearshore fisheries. We applied our framework to evaluate the outcomes of the recently enacted marine closures, combined with coral bleaching and coastal development scenarios, on marine indicators of interest to the local communities. Our results indicated that increases in nutrient delivery to coral reefs from projected coastal development and coral mortality from climate-induced bleaching can result in decreases in benthic habitat quality, while community-led marine closures can result in increases in fish biomass. In

general, Kaʻūpūlehu is more vulnerable to land-based nutrients and coral bleaching than Hāʻena due to high coral cover and limited dilution and mixing from low rainfall and wave power. However, the shallow and wave sheltered back-reef areas of Hāʻena, which support high coral cover and act as nursery habitat for fishes, are also vulnerable to these local and global human drivers. By coupling spatially explicit land-sea models with scenario planning, we identified priority areas on land where improved wastewater treatment can promote coral reef resilience in the face of climate change impacts.

125 - ʻEliʻeli Kau Mai: Utilizing Citizen Science

Paige Miki Okamura
Institute of Hawaiian Language Research & Translation, Honolulu, HI. Joint Institute for Marine & Atmospheric Research, Honolu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Accounts of natural disasters and weather occurrences were recorded in great detail during the 19th century by Hawaiians in the Hawaiian language newspaper repository. By delving into this repository, we are able to gather insight and scientific data into Hawaiʻi's climate history; a history that extends farther back than our current English records.

Funded by the Joint Institute for Marine and Atmospheric Research (JIMAR) for Hawaiian language research and translation of weather and natural disaster accounts, my work focuses on both translation of historical weather accounts and database management. This project has produced a database of over 4,000 Hawaiian language articles identified by event category, along with full citations, and a link to the original, digitized article (if available). This database is used to easily and quickly identify and access articles that are related to specific events. Previous projects have focused on historical hurricane events in Hawaiʻi, and led to change in legislation regarding hurricane insurance for Hawaiʻi island residents. The current research focus are articles related to volcanic eruptions, tsunamis, and seismic events.

111 - Kilo Lani: Reconstructing Climate Patterns in Hawaiʻi Using the Hawaiian Language Newspapers

Rosie Alegado[1], Emmanuel Bennett[2,1], Puakea Nogelmeier[3,1]
[1]UH Manoa, Honolulu, HI. [2]Institute of Hawaiian Language and Translation, Honolulu, HI.
[3]Institute of Hawaiian Language Research and Translation, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Understanding the forces shaping inter-annual rainfall variability is crucial to long-range resource planning and management, particularly for island communities. The El Niño Southern Oscillation (ENSO) is a long-term climate pattern that influences regional inter-annual rainfall. However, assessing ENSO impacts in Hawai‘i is hampered by the inherently unpredictable nature of high and low ENSO activity in the Pacific, which derive from limitations in the instrument record. The repository of historical Hawaiian language materials is an invaluable cache of cultural and historical knowledge spanning multiple centuries, yet remains inaccessible to most audiences. We developed “fingerprints” of local climatological parameters correlating with potential pre-1950 ENSO events. Next, we performed targeted queries of the Hawaiian language newspapers to identify additional non-climate indicators of ENSO, specifically fish recruitment. Utilizing the Hawaiian language repository may inform current climate models and also enable a broader understanding of the societal effects climate events may have on Hawaiian society.

41 - ‘Ike Kūpuna And ‘Ike Wai: The Use Of Ancestral Knowledge In The ‘Ike Wai Project

Julie U‘ilani Au
Institute of Hawaiian Language Research and Translation, Honolulu, Hawaii

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

From 1834 to1948 over 125,000 pages of newspapers were printed in the Hawaiian language in more than a hundred different newspapers, documenting everything from news abroad, tales and traditions of old, to intelligent observations of the natural environment made by Kānaka (Citizens) themselves. This archive of indigenous Hawaiian knowledge, ‘ike,

provides a foundation for incorporating traditional understandings of the natural environment, including its history and legacy, into modern scientific research.

The University of Hawai‘i at Mānoa and the National Science Foundation have joined to form ‘Ike Wai, a multidisciplinary research project aiming to address the "grand challenge" of water sustainability in Hawai‘i. By combining geologic, biologic and economic data, we seek to better understand source, transport and connectivity of Hawaiian aquifers. A critical component to the ‘Ike Wai project is the use of Hawaiian language materials from the 19th and 20th centuries to inform this research on water use and sustainability. The Institute of Hawaiian Language Research and Translation (IHLRT) is a collaborative research unit established to provide access and research capacity to the extensive archive of Hawaiian language materials. The IHLRT is working with ‘Ike Wai to provide indigenous knowledge of the selected study sites (O‘ahu and Kona), as well as ‘ike concerning water resources, use, and stewardship. The research utilizing the Hawaiian language archives and the provided translations have supplied ‘Ike Wai with vital cultural knowledge that further stimulates hydrologic hypotheses.

251 - 'A'ohe umu mo'a i ka makani: Implications of Historical Political Ecology on Contemporary Harvesting of Plant Forest Resources throughout Hawaii

Katie Kamelamela
University of Hawaii at Manoa, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Non-timber forest products (NTFPs) provide value to livelihoods, cultural practices, local economies and conservation around the world. NTFPs refer to a diversity of plants and plant parts - from fruit, flowers and leaves to bark, latex, roots, and branches, among other parts, including fungi. NTFPs provide materials for a multitude of uses, including food, medicine, housing, the arts, and ceremony and support subsistence practices as well as make major contributions to cash economies. Hawaii forests continue to provide a wide array of NTFPs for both traditional and modern uses. While some local gathering might impact local resources, little is known about amounts of NTFPs collected or locations where NTFPs are harvested. To understand NTFPs today multiple approaches and methodologies, including analyses of NTFP harvest permits from Hawai‘i state forests, interviews with NTFP gatherers and users, assessments of NTFPs at cultural events, and documentation of NTFPs sold in markets, both in-person and online were conducted. Understanding historical and contemporary Hawai‘i NTFP use and values is critical both to better understand and

document the value of Hawai‘i forests to residents, and to develop management plans that can conserve native plants species and perpetuate cultural traditions, many of which are tied to the resiliency of plant populations. Our data shed light on cultural and economic importance of over 50 NTFPs in Hawaii. Here we clarify the consistent communication and outreach endeavors advocated by community members through governance processes, on the terms of agencies, and their impact on forest plant harvesting policy effectiveness.

Forum 298: The next stepping stones: Emerging leaders at Ka‘ūpūlehu and Kīholo

Time: 13:00 - 15:00
Date: 25th July 2018
Location: 314

298 - The next stepping stones: Emerging leaders at Ka‘ūpūlehu and Kīholo

Hannah Springer[1], Natalie Kurashima[2], Mike Nakachi[3], Kaikea Nakachi[4], David Chai[1], Nicole Tachibana[5], Keoki Carter[6], Wilds Brauner[7], Yvonne Carter[6], Lehua Alapai[7], Kekaulike Tomich[8], Cecile Walsh[9], Kanoe Morishige[10], Kuulei Keakealani[11], Nahenani Keakealani[11]
[1]Ka‘ūpūlehu Marine Life Advisory Committee, Kukuiohiwai, HI. [2]Kamehameha Schools, Keauhou, HI. [3]Moana 'Ohana, Kona, HI. [4]University of Hawaii at Hilo TCBES, Hilo, HI. [5]Four Seasons Hualalai Resort, Ka‘ūpūlehu, HI. [6]Hawaii Forest Industry Association, Ka‘ūpūlehu, HI. [7]Ka‘ūpūlehu Forest, Ka‘ūpūlehu, HI. [8]Ka‘ūpūlehu Fishery, Ka‘ūpūlehu, HI. [9]The Nature Conservancy, Waimea, HI. [10]Na Maka o Papahānaumokuākea, Hilo, HI. [11]Hui Aloha Kīholo, Waimea, HI

Track

II. Building the Future

Abstract

How will our work live on when we are gone? The lava lands of Kekaha wai ‘ole are home to networks of trails that connect people to place and to one another. In places these trails are ancient and well-worn footpaths. In others, where more recent lava flows have covered the trails of the past, smooth stones mark the path above the ancient way across sharp, unsettled ‘a‘ā. Of each generation it is asked that we make the path secure as we train the next generation to do the same so that all may reach their destination, today, tomorrow, and in

the time to come. At Kaʻūpūlehu and Kīholo, lessons learned from generations of living in arid and changing lands inform the actions of today. Through programs, projects, and initiatives, the wisdom of the past is transferred to the next generation emerging to care for lands and waters and the people of Kekaha wai 'ole. Join us as experienced practitioners and kūpuna introduce the next generation of leaders and hear their emerging voices about the actions they are undertaking to set the stones upon the path for those who will follow. Topics will include: loko wai 'ōpae (anchialine pool), intertidal, and marine ecosystem research and monitoring; biocultural research, restoration and management mauka and makai; and ʻāina-based education at Kaʻūpūlehu and Kīholo.

Participant feedback is encouraged and welcomed.

Poster 112: Biosecurity Measures Paired with Habitat Restoration Improves Nesting Habitat for Brown Boobies (Sula leucogaster) on Kure Atoll

Time: 13:00 - 13:30
Date: 25th July 2018
Location: Machine 1

112 - Biosecurity Measures Paired with Habitat Restoration Improves Nesting Habitat for Brown Boobies (*Sula leucogaster*) on Kure Atoll

Ilana Nimz[1], Cynthia Vanderlip[2], Matthew Saunter[2], Naomi Worcester[2]
[1]Hawaiʻi Pacific University, Waimanalo, Hawaiʻi. [2]State of Hawaiʻi Department of Land and Natural Resources, Honolulu, Hawaiʻi

Track

III. Invasive Species & Biosecurity

Abstract

Kure Atoll, within Papahānaumokuākea Marine National Monument, provides critical breeding habitat for 18 species of seabirds. Non-native plant introductions starting in the 1950s decreased the availability of suitable nesting habitat for many of the island's ground-nesting seabirds. Non-native species have been targeted seasonally for eradication by the State of Hawaiʻi since 1993. Strict biosecurity measures were implemented in the 1990s to prevent

further introductions of non-native species. The top priority plant for eradication is *Verbesina encelioides*. This prolific annual covered 64% of the atoll in widespread monotypic stands that caused heat stress and habitat loss in ground-nesting seabirds. Intensive year-round habitat restoration efforts have eliminated the vertical stands of *V. encelioides* from the atoll and spurred a resurgence of low-lying native ground cover. Restoration effort has additionally facilitated thorough monitoring of brown booby (*Sula leucogaster*, BRBO) productivity. Management actions appear to be having desired effects on BRBO. From 2014 to 2017, nesting pairs have dispersed into areas previously dominated by monotypic *V. encelioides* stands, and fledging success has increased by 19%. Continued efforts to eradicate *V. encelioides* will facilitate further improvements in BRBO habitat and encourage recruitment of ground-nesting seabirds into newly accessible breeding areas. Additionally, upholding stringent quarantine measures by following established biosecurity protocols is crucial to maintaining success with habitat restoration by preventing new devastating species introductions in the future.

Poster 150: Combatting the Pine Epidemic on Maui: A collaborative approach to controlling problem pine species on a landscape scale

Time: 13:00 - 13:30
Date: 25th July 2018
Location: Machine 2

150 - Combatting the Pine Epidemic on Maui: A collaborative approach to controlling problem pine species on a landscape scale

Caleb Wittenmyer[1], James Leary[2], Dan Eisenberg[3], Keahi Bustamente[4], Woody Malinson[5]
[1]The Nature Conservancy, Makawao, HI. [2]College of Tropical Agriculture and Human Resources, Kula, HI. [3]East Maui Watershed Partnership, Makawao, HI. [4]Leeward Haleakala Waterhed Partnership, Kula, HI. [5]Haleakala National Park, Kula, HI

Track

III. Invasive Species & Biosecurity

Abstract

Pine species have been naturalizing on East Maui for decades primarily via historical pine plantings at Haleakala National Park and Kula Forest Reserve. A 2007 wildfire stimulated an accelerated invasion into the sub-alpine and alpine zones, causing concern among the three major conservation landowners: Haleakala National Park, The Nature Conservancy, and The Department of Land and Natural Resources (DLNR). Two prominent pine species have spread more rapidly than others: *Pinus radiata* (Monterey pine), and *Pinus patula* (Mexican weeping pine). They now pose a threat to Haleakala's sub-alpine habitat, which is recovering following the removal of ungulates.

Landowners and stakeholders have tried various methods to control pines for the past 20 years. The need to coordinate and combine the knowledge of fellow conservation landowners arose from concern over the extensive spread into otherwise native dominant shrublands. The Maui Pine Working Group was formed in 2014 encompassing several state, non-profit and federal agencies in an effort to combine our knowledge and resources. By working and learning together, we are hastening our effective conservation goals. This forum will offer a glimpse into a collaborative control effort through invited speakers and engage forum attendees to envision solutions to island wide problems that span large spatial scales and overlap with many different landowners. The audience will be encouraged to contribute their perspectives and ideas throughout the forum.

Poster 223: Interactive feedbacks of climate mineralogy and microbiological communities on soil carbon: A deep soil warming experiment

Time: 13:00 - 13:30
Date: 25th July 2018
Location: Machine 3

223 - Interactive feedbacks of climate mineralogy and microbiological communities on soil carbon: A deep soil warming experiment

Casey McGrath[1], Nhu Nguyen[1], Brian Glazer[1], Caitlin Pries[2], Kaelin Sylva[1], Carl Evensen[1], Susan Crow[1]
[1]University of Hawaii, Honolulu, Hawaii. [2]Dartmouth College, Hanover, NH

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Soils with high potential to sequester large reservoirs of carbon (C) from the atmosphere could aid in the preservation of global ecosystems while long term solutions to climate change are enacted, particularly in the volcanically-derived Andisol soil order that is found across the Hawaiian Islands. Andisols possess a high concentration of poorly and non crystalline minerals, which have a unique affinity to stabilize C and may hold a key to utilizing a critical ecosystem process to achieve climate change mitigation goals. This study focuses on how the rapid increase in global temperature from climate change may affect the carbon protection mechanisms within the depth profile of a Hawaiian Andisol, through a quantitative manipulative warming experiment. A small field site of the Tantalus soil series at the Lyon Arboretum is artificially warmed using deep soil heating probes for global temperature increase defined in the IPCC RCP 8.5 scenario for 2100. The field site is monitored using a novel, extensive randomized temperature sensor and gas well network to quantify the effects intensified warming will have on soil temperature and microbial respiration at five different depths. Changes to the microbial community and gas flux will be analyzed for statistical significance using multivariate analysis and spatial mapping to test the capacity for stabilization mechanisms to protect from C loss under warming. Knowledge of the short intensive warming component is critical to predict how Hawaiian andic soils will react as climate change intensifies and if they can be utilized as a C management strategy.

Poster 59: Predator Control Management at Haleakalā National Park

Time: 13:00 - 13:30
Date: 25th July 2018
Location: Machine 4

59 - Predator Control Management at Haleakalā National Park

Raina Kaholoaa, Cathleen Bailey, Erika Kekiwi, Kayla Purdy, Carl Schwarz, Joy Tamayose
Haleakala National Park, Makawao, HI

Track

III. Invasive Species & Biosecurity

Abstract

Haleakalā National Park (HALE) manages populations of endangered ʻuaʻu (Hawaiian Petrel, *Pterodroma sandwichensis*) and nēnē (Hawaiian Goose, *Branta sandvicensis*). Predation by non-native mammals including feral cats (*Felis catus*), mongooses (*Herpestes auropunctatus*), and rats (*Rattus* sp.) has been identified as factors limiting the population growth and survival of these species. Predator control for the protection of ʻuaʻu and nēnē has been ongoing at HALE since the 1970s, and has been effective in maintaining a relatively low rate of mortality from predators. HALE is currently developing a predator control management plan, which will guide managers in developing and implementing predator control trapping strategies to protect ʻuaʻu and nēnē as well as other endangered birds. The goals are to increase predator captures, decrease predator impacts on endangered birds, and increase efficiency of staff time and trapping effort at HALE.

Poster 193: Estimating home range of Hawaiian Stilt (Himantopus mexicanus knudeseni) chicks on Oʻahu and the impact of predators on fledging success

Time: 13:30 - 14:00
Date: 25th July 2018
Location: Machine 1

193 - Estimating home range of Hawaiian Stilt (*Himantopus mexicanus knudeseni*) chicks on Oʻahu and the impact of predators on fledging success.

Dain Christensen, Kristen Harmon, Melissa Price
University of Hawaii, Honolulu, HAWAII

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian Stilt (*Himantopus mexicanus knudeseni),* an endangered subspecies of the Black-necked Stilt, holds both cultural and ecological value. This study identified the home-range prior to fledging of *H. mexicanus knudeseni* chicks on the island of Oʻahu, Hawaiʻi, USA. This study also evaluated the relative impact of invasive and native predators on fledging success. Transmitters were attached to chicks ~10 days after hatching. Chicks were tracked and sighted 3-4 times a week until the first molt. Point location data were used to identify the individual home range for each chick. The impact of predators on the survival rate was analyzed and cause of death was recorded when possible. The study results confirm invasive predators impact chick mortality more than native predators and that the home range of chicks varies widely after fledging. These results suggest that control of invasive predator populations may increase the stability of Hawaiian stilt populations. Future research should identify causes of mortality immediately after hatching, until ten days of age, when newly-hatched chicks with limited mobility are most vulnerable to predation. Studies like these are critical when considering a species eligibility to be listed as endangered or threatened.

Poster 164: Stewardship Mapping and Assessment Project in North Kona and South Kohala: Initial Results

Time: 13:30 - 14:00
Date: 25th July 2018
Location: Machine 2

164 - Stewardship Mapping and Assessment Project in North Kona and South Kohala: Initial Results

Rebekah Ohara[1], Heather McMillen[2], Christian Giardina[3], Kainana Francisco[4], Kuʻulei Keakealani[5], Cody Pacheco[6], Tamara Tickten[7]
[1]Akaka Foundation for Tropical Forests, Hilo, HI. [2]USDA Forest Service Norther Research Station, New York City, New York. [3]USDA Forest Service, Institute of Pacific Islands Forestry, Hilo, HI. [4]USDA Forest Service, Pacific Southwest Research Station, Hilo, Hawaii. [5]Hui Aloha Kīholo, Kailua-Kona, Hawaii. [6]Kamehameha Schools, Hilo, HI. [7]University of Hawaiʻi at Mānoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Stewardship Mapping and Assessment Project (Stew-Map) of North Kona and South Kohala on Hawai‘i Island addresses the questions, “Who takes care of North Kona and South Kohala?” and “Where are there gaps and concentrations of care?”. The project aims to strengthen our understanding of community-based stewardship and to create resources that strengthen community capacity to mālama ‘āina or steward the environment. Participants include local stewardship groups (including families, groups, and organizations), government agencies and private organizations that engage in stewardship (n=129). We used the chain referral method to identify and invite participation in the surveys (conducted from July-October 2017). Here we share preliminary findings from the social network analysis, geospatial analysis, and qualitative analyses of survey data. These analyses are integrated to better understand the organizational characteristics of stewardship groups, how groups collaborate, and where they engage stewardship across the land and seascape. Preliminary results indicate that the network of community-based stewardship is profound and highly collaborative. Our analysis shows an explicit biocultural focus by many groups, and the central role of community groups in the management and care of sites ranging from terrestrial to marine, and public to private areas. Stew-Map will provide a publicly available, online stewardship database and a map of community organizations that work to conserve, manage, monitor, transform, advocate for, and/or educate the public about their local environments. Additional community created outputs from the project seek to strengthen the foundation of local stewardship efforts.

Poster 291: The effect of artificial light on the activity of ‘ōpe‘ape‘a, the Hawaiian hoary bat

Time: 13:30 - 14:00
Date: 25th July 2018
Location: Machine 3

291 - The effect of artificial light on the activity of ‘ōpe‘ape‘a, the Hawaiian hoary bat

Team ‘Ōpe‘ape‘a[1], Kristin Jonasson[2], Brad Yuen[2], Dave Johnston[2,3]
[1]Kamehameha Schools, Makawao, HI. [2]H. T. Harvey & Associates, Honolulu, HI. [3]San Jose State University, San Jose, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Artificial lighting attracts some bat species and repels others. An aversion to light may be a related to avoiding diurnal predators such as hawks. However, artificial lighting with a UV component attracts some moths and other insects which might be eaten by bats. Bats which can successfully forage on these insect aggregations tend to be quick fliers that forage in open habitats, such as the ʻōpeʻapeʻa. We hypothesized that ʻōpeʻapeʻa microhabitat use is influenced by artificial lighting on Kamehameha School Campus, Pukalani, Maui. Bat activity directly below streetlights and in nearby darker spaces was measured by recording bat calls with SongMeter 2 plus (SM2+) bat detectors. Hobo data loggers were used record light intensity. Preliminary results show slightly higher levels of bat activity below artificial lights. Our Team ʻŌpeʻapeʻa Club will present our final results and conclusion after completing our observations.

Poster 38: Introducing the Nalo Meli ʻĀpaʻakuma project: Using Genomic Data to Inform Yellow-faced Bee Managemement and Conservation

Time: 13:30 - 14:00
Date: 25th July 2018
Location: Machine 4

38 - Introducing the Nalo Meli ʻĀpaʻakuma project: Using Genomic Data to Inform Yellow-faced Bee Managemement and Conservation

Jonathan Koch-Uhuad[1], Cynthia King[2], Jolene Sutton[1]
[1]University of Hawai'i, Hilo, Hilo, Hawai'i. [2]Hawai'i Department of Land and Natural Resources, Division of Forestry & Wildlife, Native Ecosystem Protection & Management, Honolulu, Hawai'i

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Wild bees are significant pollinators, playing a key role in maintaining terrestrial ecosystems. However, because bees depend on flowering plants to sustain their diets and rear offspring,

they are vulnerable to habitat degradation, disease, and climate change. In Hawai‘i, seven endemic Yellow-faced bee species (Colletidae: *Hylaeus*) are threatened with displacement and extinction due to tourism development, urbanization, invasive species, and agricultural intensification. In response to these compounding threats, the Hawaii Department of Land and Natural Resources (DLNR) has implemented a recovery action for some *Hylaeus* protected under the U.S. Endangered Species Act. The recovery action includes a strategy to breed populations *in situ*, and translocate species to habitats where they are locally extinct. While these actions are well-informed, there is a critical need to enhance conservation and management decisions through a study of genetic diversity using genomic tools. In the absence of such knowledge, Hawaiian *Hylaeus* conservation will be limited to estimates of population size based on demographic monitoring, rather than a targeted approach that manages genetic diversity to promote sustainable populations. The goals of the nalo meli ‘āpa‘akuma project are to generate a genomic resource and population genomic data to 1) monitor *Hylaeus* populations, 2) characterize genetic diversity, and 3) identify regions of the genome under strong selective pressures due to population decline. The data generated from this project will be useful to the stakeholders when they do draft and execute a recovery plan for the endangered Hawaiian *Hylaeus*.

Forum 167: E Pū Pa'akai Kākou - Collective Impact Initiatives in Wahi Kupuna Stewardship

Time: 14:00 - 15:00
Date: 25th July 2018
Location: 311

167 - E Pū Pa'akai Kākou - Collective Impact Initiatives in Wahi Kupuna Stewardship

Kelley Uyeoka[1], Kekuewa Kikiloi[2,1], Jason Jeremiah[3], Olu Campbell[4]
[1]Huliauapa‘a, Kailua, HI. [2]UH Manoa Hawaiian Studies Department, Honolulu, HI. [3]Kamehameha Schools, Honolulu, HI. [4]Office of Hawaiian Affairs, Honolulu, HI

Track

II. Building the Future

Abstract

The Kaliʻuokapaʻakai Collective is an aloha ʻāina alliance that has come together to activate our kuleana to protect Hawaiʻi's wahi kupuna (ancestral places & resources, both cultural and natural) and ʻike kupuna (ancestral knowledge). The collective is made up of cross-sector advocates in wahi kupuna stewardship including professionals, community members, educators, and cultural practitioners. The primary action items of the collective are to 1) Develop collaborative relationships and alliances pae ʻāina wide, 2) Prioritize indigenous knowledge systems and methods, 3) Advocate for an interdisciplinary systems approach and best practices, and 4) Build community capacity to mālama wahi kupuna through relationships, education, and resources. This forum will showcase the transformational work individual advocates are doing in their specific organizations, wahi, and communities as well as the collective action initiatives that the Kaliʻuokapaʻakai Collective is undertaking to make systematic changes in Hawaiʻi for the benefit of all.

Symposium 14: Sustainability in Hawaiʻi's Nearshore Marine Environment through the Marine 30x30 Initiative

Time: 14:00 - 15:00
Date: 25th July 2018
Location: 316A

14 - Sustainability in Hawaiʻi's Nearshore Marine Environment through the Marine 30x30 Initiative

184 - Setting the Stage for 30x30: The state of Hawaiian coral reef ecosystems facing warming seas and a hungry populace.

Thomas Oliver[1], Ku'ulei Rodgers[2], Alan Friedlander[3], Ivor Williams[1]
[1]NOAA Pacific Island Fisheries Science Center, Honolulu, Hawaii. [2]Hawaii Institute For Marine Biology, Honolulu, HI. [3]University of Hawaii, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Hawaiʻi is dependent on a healthy marine ecosystem that sustains livelihoods, provides food resources, is culturally significant, supports opportunities for ocean recreation and tourism,

and is an integral part of our island way of life. Our coral reefs are both a local and national treasure, providing cultural, economic, and recreational opportunities to our residents and more than eight million visitors annually. The nearshore environment is a driver of our local and tourism economy, generating more than $360 million each year. Recently, concern has been building about the health of our nearshore marine environment. Spurred by extreme ocean temperatures, the Main Hawaiian Islands experienced the most severe mass coral bleaching event to date in 2014-2015, which resulted in substantial coral morality across the state. In addition, there is now abundant evidence of widespread depletion of fishery target species, particularly around human population centers.

This talk will present the current state and trends in the condition of Hawaii's reefs and reef fish populations, grounding the discussions of the 30x30 initiative that follow with the most recent, comprehensive ecological data.

39 - Making the Most of Marine Protected Areas: Spatial Planning and Predictive Modeling

Anne Chung[1,2], Lindsay Veazey[2], Mariska Weijerman[3], Kirsten Oleson[2]
[1]Division of Aquatic Resources, Honolulu, HI. [2]University of Hawai'i at Mānoa, Honolulu, Hawai'i. [3]NOAA, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

A rapid decline of Hawaiian coral reefs and their associated ecosystem services triggered the state's sustainability commitment of "effective management in 30% of Hawai'i's nearshore waters by 2030." The *Roadmap to 30x30* follows an innovative conservation planning process to identify management focus areas and actions. These focal areas result from synthesis of existing data and spatial analysis using Marxan software. We couple this with predictive modeling to better understand the long-term impacts of potential management scenarios on marine ecosystem health, fisheries and fisheries sustainability. Evaluating these impacts prior to implementation can help better account for risk, uncertainty, and complex ecological systems under a range of future conditions. We will discuss next steps to collaboratively develop site-specific actions plans. This conservation planning process is a

core component of the *Roadmap to 30x30*, which will guide DAR in achieving a thriving and sustainable nearshore environment in Hawai'i.

205 - Evaluating and Tracking the Condition of Hawai'i's Nearshore Environment

Mary Donovan, Anne Chung
University of Hawaii, Hawaii Coral Reef Initiative, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Division of Aquatic Resources (DAR) is currently leading the Marine 30x30 Initiative in answer to the sustainability commitment of 'effective management in 30% of Hawai'i's nearshore waters by 2030." To reach this target, DAR s developing a *Roadmap to 30x30* which will identify managment focus areas and actions using an innovative conservation planning process. Within the *Roadmap* will be a critical assessment of the current condition of nearshore marine resources. This was accomplished through the Hawaii Monitoring and Research Collaborative (HIMARC), a council of scientists who are involved in monitoring of Hawai'i's nearshore waters. To date, this dataset includes nearly 8,000 benthic surveys and 10,000 fish surveys that have been conducted from 2000-2016. This dataset is now being applied through a rigorous and transparent analysis of ecological indicators than can be used to measure the status and trends of nearshore ecosystems in Hawai'i. These indicators will be tracked over time to evaluate the state's progress toward its 30x30 goal.

69 - Encouraging Responsible Behavior: compliance and enforcement of Hawai'i's nearshore regulations

Alessandra Shea[1], Kristen Maize[2]
[1]National Coral Fellow, Honolulu, HI. [2]The Nature Conservancy, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

One of the four objectives of the Marine 30x30 Initiative is to encourage responsible behavior through education and enforcement activities. This objective will require a close collaboration between the Division of Conservation and Resources Enforcement (DOCARE) and Division of Aquatic Resources (DAR) as well as education staff to encourage responsible behavior around nearshore marine rules and 30x30 actions. Strategic education tactics will reach a broad and diverse audience to promote responsible ocean use and compliance to state rules. Enforcement actions include pursuing increased marine enforcement units and streamlining the officer training process. Initiating programs that focus on encouraging responsible behavior will help to achieve effective management for productive, sustained, and thriving nearshore environments of Hawai‘i, the ultimate goal of the Marine 30x30 Initiative.

Poster 209: Foraging Behavior of the Black-Crowned Night Heron (Nycticorax nycticorax hoactli) on O‘ahu, Hawai‘i

Time: 14:00 - 14:30
Date: 25th July 2018
Location: Machine 1

209 - Foraging Behavior of the Black-Crowned Night Heron (*Nycticorax nycticorax hoactli*) on O'ahu, Hawai'i

Paul Awo, Kristen Harmon, Javier Cotin, Melissa Price
University of Hawai'i, Mānoa, Honolulu, Hawai'i

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Black-crowned Night Heron (*Nycticorax nycticorax hoactli*), or 'Auku'u, is a subspecies of *Nycticorax nycticorax* that inhabits wetlands throughout the Hawaiian Islands. The 'Auku'u is one of the few native, terrestrial predators remaining in the Hawaiian Islands. The continental population of the Black-crowned Night Heron primarily forages at night, but the little information that exists regarding the foraging behavior of the 'Auku'u in Hawai‘i is contradictory. The Hawai'i state Department of Land and Natural Resources states that they are diurnal, primarily foraging during the day, while the US Fish and Wildlife Service states the

'Auku'u are nocturnal, primarily foraging at night. In this study, we conducted observational surveys to determine the time of day 'Auku'u are most likely to be seen foraging, identified and quantified available and ingested prey, and determined the potential impact on endemic Hawaiian waterbird chicks. 'Auku'u were observed foraging during both the day and night. This may be due to the abundance of prey available in Hawai'i wetlands, and a lack of competitors, compared to continental systems. Results of this study will be used to optimize survey protocols to maximize the likelihood of detection.

Poster 253: The Past, Present, and Future of Conservation on Maunakea

Time: 14:00 - 14:30
Date: 25th July 2018
Location: Machine 2

253 - The Past, Present, and Future of Conservation on Maunakea

Fritz Klasner
Office of Maunakea Management, Hilo, HI

Track

II. Building the Future

Abstract

What is the history of natural resource management in Maunakea's alpine ecosystem? The currently applicable, "Maunakea Comprehensive Management Plan" was approved in 2009, only a miniscule slice in time in the geologic history of Maunakea as well as in its resource management efforts.

What has the Office of Maunakea Management accomplished under the auspices of the 2009 Comprehensive Management Plan? Adaptive plans are meant to be updated, revised, and adapted -- what have we learned about the climate, arthropods, vegetation, hydrology, invasive species, and more?

What is the future likely to bring? Numerous commitments by elected officials and the University have been made in recent years. The Comprehensive Management Plan is due for an update. Learn what decommissioning observatories entails, how you can participate in

these processes, and how you can affect resource management on Maunakea in this unique, tropical, alpine ecosystem.

Poster 95: From Mauka to Makai: Assessing Vulnerabilities and Identifying Climate Adaptation Actions for Terrestrial and Freshwater Resources of the Hawaiian Islands

Time: 14:00 - 14:30
Date: 25th July 2018
Location: Machine 3

95 - From Mauka to Makai: Assessing Vulnerabilities and Identifying Climate Adaptation Actions for Terrestrial and Freshwater Resources of the Hawaiian Islands

Rachel Gregg[1], Jessi Kershner[1], Wendy Miles[2], Jeff Burgett[3]
[1]EcoAdapt, Seattle. [2]University of Hawaii, Honolulu. [3]U.S. Fish and Wildlife Service, Honolulu

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian Islands encompass a dynamic region featuring iconic habitats and species at risk from a number of stressors from mauka to makai. Climate change impacts, coupled with land-use changes, the spread of invasive species, and population growth and development, all have important implications for the ecosystem services upon which over 1.4 million people rely. The Pacific Islands Climate Change Cooperative (PICCC) initiated a multi-year Hawaiian Islands Terrestrial Adaptation Initiative to assist managers in all aspects of confronting the challenges presented by climate change. To place this Initiative on a firm scientific foundation, the PICCC asked EcoAdapt to develop comprehensive, science-based syntheses of current and projected future climate changes and impacts on terrestrial and freshwater biocultural resources within the main Hawaiian Islands. The Hawaiian Islands Climate Synthesis Project convened over 250 of Hawai‘i’s resource managers and conservation planners to discuss challenges, share knowledge, identify needs, and prioritize key actions to reduce the vulnerability of resources to climate change and non-climate factors. Project objectives included synthesizing climate change information; improving understanding of why important resources may be vulnerable

to changing conditions; identifying what adaptation actions can be implemented to reduce vulnerabilities and minimize climate-related losses through management and collaboration; and co-generating products with managers to improve understanding of and capacity to address climate change. This presentation will include the findings of the climate impacts synthesis, vulnerability assessments, and adaptation planning workshops for habitats and ecosystem services, as well as next steps for creating a climate-informed future for the Hawaiian Islands.

Poster 107: What Signs Work? Comparing the Effectiveness of Different Messaging at Encouraging Trail Users to Use a Boot Brush

Time: 14:00 - 14:30
Date: 25th July 2018
Location: Machine 4

107 - What Signs Work? Comparing the Effectiveness of Different Messaging at Encouraging Trail Users to Use a Boot Brush

Kawehi Lopez[1], Franny Brewer[1], Rebecca Niemiec[2]
[1]Big Island Invasive Species Committee, Pacific Cooperative Studies Unit, Hilo, HI. [2]Emmett Interdisciplinary Program in Environment and Resources, Stanford University, Stanford, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Despite the widespread use of signs in parks and on trails to encourage good user behavior, research shows that signage is often ignored or at worst, promotes the opposite behavior. We looked at signage for influencing trail-user behavior in the context of Rapid ʻŌhiʻa Death (ROD), a tree disease that has infected and killed hundreds of thousands of ʻōhiʻa trees on Hawaiʻi Island. We examined the effectiveness of five different trailhead signs aimed towards promoting the use of a boot brush station at Pololū Valley trailhead. We applied various frames discussed in prominent social science research. Five different messages were used to appeal to different motivations of human behavior, including fear, environmental attitudes, and social norms. We tracked engagement of each message through 30 hours of observation of over

1,000 trail users. Our results supported our hypothesis that when an injunctive norm denoting desired behavior was presented to the hikers, they were more likely to engage in using the boot brush than when a standard environmental message was displayed. Future expansion of this project includes observations at different high traffic trailheads in Hawai'i. This study aims to inform these outreach strategies by providing scientific evidence regarding which types of messages might most effectively lead to behavior change among trail users.

Education Incubator Moonshot Lab Hawai'i Rooted Showcase

Time: 14:30 - 15:00
Date: 25th July 2018
Location: 316BC

Poster 213: Pilot study investigating population connectivity of the Hawaiian Flame Wrasse, Cirrhilabrus jordani

Time: 14:30 - 15:00
Date: 25th July 2018
Location: Machine 1

213 - Pilot study investigating population connectivity of the Hawaiian Flame Wrasse, *Cirrhilabrus jordani*

Maya Munstermann[1], Sydney Gamiao[1], Richard Masse[1], Jolene Sutton[2], Maria Haws[1]
[1]Pacific Aquaculture and Coastal Resources Center, Hilo, Hawaii. [2]University of Hawaii at Hilo, Hilo, Hawaii

Track

II. Building the Future

Abstract

Assessments of genetic structure and population connectivity of Hawaiian flame wrasse may provide a model for gene dispersal in Hawaiian reef fishes and potentially be applied to other economically, culturally, and biologically important reef fish species. Combining tools such as genetic analysis with aquaculture techniques is considered a valuable strategy in the

conservation of Hawaiian reef fishes. However, minimal funding and lack of genetics expertise often act as barriers in including genetics in conservation programs. Here, we outline a collaborative initiative among University of Hawai'i at Hilo's Department of Biology undergraduate genetics class, Tropical Conservation Biology and Environmental Science graduate program (TCBES), and Pacific Aquaculture and Coastal Resources Center (PACRC). This initiative aims to generate preliminary genetic data investigating genetic structure in endemic Hawaiian flame wrasse (*Cirrhilabrus jordani)*, by involving undergraduate student coursework. Genetic comparisons of wild populations coupled with larval rearing will indicate the duration of the larval cycle and allow us to determine if this species is a large metapopulation or separate island populations. Undergraduate students are working with flame wrasse samples collected from Oahu, Maui, and Hawai'i Island obtained through the PACRC larval rearing program. During the undergraduate's teaching lab, fish are genotyped to assess cytochrome oxidase I (COI) genetic variation. The COI gene is often used in genetic structure analysis, however future directions include conducting a genome-wide SNP analysis. This project will be used to increase undergraduate involvement in hands-on research with local relevance, as well as increase interdepartmental collaborations at UHH.

Poster 211: Protecting the House of Lobelia: Innovative Monitoring and Ungulate Control in the Halehāhā Management Unit on the Alaka'i Plateau, Kaua'i

Time: 14:30 - 15:00
Date: 25th July 2018
Location: Machine 2

211 - Protecting the House of Lobelia: Innovative Monitoring and Ungulate Control in the Halehāhā Management Unit on the Alaka'i Plateau, Kaua'i

Marcela Brimhall[1], Nicolai Barca[1], Andrea Rey[1,2], Cody Statler[1,2], Lucas Behnke[1]
[1]The Nature Conservancy of Hawaii, Lihue, HI. [2]Kupu Hawaii, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

In April of 2017, a two-year 6.5-mile fence project with a combination of hog-wire and deer mesh was completed, protecting 1,348 acres of native montane forest, valuable watershed and important habitat for some of Hawaii's most imperiled forest birds from invasive ungulates. Monitoring efforts by the Nature Conservancy's Kauai Program informed management activities once the fence was completed and a combination of proven and novel monitoring and animal control techniques led to the rapid removal of pig and goat populations and work now focuses on approaches to removing the small population of black-tailed deer from the remote unit. Trail camera data was used to index activity by month, and found a peak in animal activity corresponding to the end of the projected strawberry guava (*Psidium cattleyanum*) fruiting season. Forward-looking infrared (FLIR) surveys were conducted before fence completion to estimate animal populations in the unit. Baseline data on vegetation composition and condition, as well as ungulate damage was collected annually at the $100m^2$-plot level to measure management action outcomes. Initial monitoring results were used to inform intensive animal removal work, including implementation and closure timing of access gates as well as use of one-way fenceline traps that functionally allowed seven of eleven total trapped animals to exit the unit to the adjacent public hunting area. While effective use of monitoring data led to the rapid and efficient removal of animals, proliferation and improvement of the techniques employed could reduce management timelines and lower costs for similar projects statewide.

Poster 27: PlantCam: A platform to help conservation of extremely rare plants through research and public engagement

Time: 14:30 - 15:00
Date: 25th July 2018
Location: Machine 3

27 - PlantCam: A platform to help conservation of extremely rare plants through research and public engagement

Lucas Fortini[1], Ryan Mudd[2], Susan Ching[3], Lauren Weisenberger[4]
[1]Pacific Island Ecosystems Research Center, Honolulu, HI. [2]University of Hawaii at Manoa, Honolulu, HI. [3]DLNR-DOFAW, Honolulu, HI. [4]U.S. Fish and Wildlife Service, Honolulu, HI

Track

II. Building the Future

Abstract

How can we learn to better manage extremely rare plant species? We have recently developed an autonomous and high precision sensor system to monitor growth of individual native plants along with local environmental conditions at 30 minute intervals. The developed sensor array is unobtrusive, autonomous and when coupled with wireless data loggers can provide real-time data available to managers and the wider public. We are deploying an experimental set of these sensors, integrated with a webcam and a live web portal to showcase how this real time information can be useful to relevant managers while also raising awareness of the challenges of Hawaiian rare plant conservation in general. This plantCam system serves two main purposes: 1) Provide a methodology to help managers better understand the status of the individual/ species and relation to climate and wider environmental variability; and 2) Create a web portal that is essentially a plant version of 'critter cams' that allow people to connect directly with rare native plants. We expect this plantCam approach will result in detailed demographic, phenological, environmental information that help managers understand how rare species are affected by changing growing conditions; all while helping the general public learn more about the science and management of Hawaiian rare plant conservation.

This presentation will describe the plantCam system, its findings (and stories) we have observed since its deployment for monitoring a rare and endangered *Cyanea calycina* in the Waianae range in Oahu.

Poster 81: Conservation Trainings for Tour Guides: Benefits for Both Tourism and Resource Protection

Time: 14:30 - 15:00
Date: 25th July 2018
Location: Machine 4

81 - Conservation Trainings for Tour Guides: Benefits for Both Tourism and Resource Protection

Allison Borrell[1], Laura Berthold[2], Lissa Strohecker[3], Dan Eisenberg[1], Hanna Mounce[2], Adam Radford[3]
[1]East Maui Watershed Partnership - University of Hawaii, Pacific Cooperative Studies Unit, Makawao, HI. [2]Maui Forest Bird Recovery Project - University of Hawaii, Pacific Cooperative

Studies Unit, Makawao, H. [3]Maui Invasive Species Committee - University of Hawaii, Pacific Cooperative Studies Unit, Makawao, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Nature-based tourism is on the rise in Hawai‘i. Awareness of environmental issues is vital for the support of conservation in Hawai‘i. Both conservation and tourism organizations can benefit from increasing the quality of interpretation and the level of awareness of Hawai‘i’s unique natural resources. This can lead to increased early detection of invasive species, elevated awareness of best practices, and support through volunteers and donations. Accurate interpretation requires expertise, but information is not always readily available.

In 2013, through a grant with the Hawai‘i Tourism Authority, the East Maui Watershed Partnership, Maui Forest Bird Recovery Project, and Maui Invasive Species Committee collaborated to develop the Maui Mauka Conservation Awareness Training. These trainings focus on watersheds, native plants, birds, and invasive species. Presentations are simple, educational, and fact-based.

Over five years, 22 trainings were offered, reaching 250 guides from 59 companies. Pre and post training assessments averaged a 31% increase in guide knowledge and 100% of respondents answered that this training was helpful to them. Through this training, guides and conservation groups have established a positive relationship. Using guide feedback and suggestions, these training are evolving with the hope of it becoming a self-sustaining training that could be established on other islands.

CONCURRENT SESSION 5

Forum 42: Wiki Undergraduate Student Presentations

Time: 15:15 - 16:15
Date: 25th July 2018
Location: 311

42 - Wiki Undergraduate Student Presentations

Noelani Puniwai

UH Mānoa, Honolulu, HI

Track

II. Building the Future

Abstract

Wiki Student Presentations allows undergraduate students a format to present the research they have conducted in the Spring or Summer of 2018 in a small, less formal setting. Listen and support our young scientists and managers as they talk about their research and internship experiences. Presentations are limited to 10 minutes each.

General Session: Technology & Innovation

Time: 15:15 - 16:00
Date: 25th July 2018
Location: 316BC

53 - Sky-Truthing Predictive Models: Using Drone Technology to Discover Rare-Plant Populations

Ben Nyberg[1], Kawika Winter, Ph.D.[2]
[1]National Tropical Botanical Garden, Kalaheo, HI. [2]National Tropical Botanical Garden - Limahuli Garden and Preserve, Haena, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The National Tropical Botanical Garden has been collecting rare plant data in Hawai`i for over 40 years. When this information is paired with Geographic Information Systems (GIS) technology, predictive indices can be created. Resulting predictive models indicate that native cliff habitats have a high probability for persisting populations of rare plant species. While this

habitat type has been shown to provide endangered plants with refuge from invasive ungulates, surveying these areas has been difficult and treacherous... until now.

UAS (unmanned aircraft systems, a.k.a. drone technology) have provided a platform for in-depth inventory and monitoring of cliff habitat, while also allowing us to test the effectiveness of the predictive models. Preliminary studies and surveys have proved valuable for locating even plant species with small growth habits, including; *Plantago princeps var. anomala* (Plant Extinction Prevention Program), *Euphorbia eleanoriae* (Plant Extinction Prevention Program), *Wilkesia hobdyi* (Endangered). New discoveries using this technology have led to significant range expansions and increases in known population size and gene-pool diversity. The discoveries have also increased our knowledge of their habitat requirements, which will lead to improved management of the species. Using drone technology to monitor rare-plant populations will help in prioritizing collections efforts with the aim of creating ex situ conservation collections with the broadest genetic range possible, and to ensure that progeny are evolutionarily competitive in the context of 21st century conditions.

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238 - Using Aerial Imagery to Monitor Large Scale Koa Restoration at The Nature Conservancy's Kona Hema Preserve

Theresa Cabrera Menard, Trae Menard, Mel Johansen, Shalan Crysdale, Jason Sumiye
The Nature Conservancy, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Kona Hema Preserve is an 8,000 acre nature preserve owned and managed by The Nature Conservancy (TNC). Situated on the slopes of Mauna Loa on the island of Hawai`i, the property lies in the koa forest belt and was purchased in 3 phases (i.e., Honomalino unit in 1999, Kapua unit in 2002, and Papa unit in 2003). Prior to purchase by TNC, portions were logged for koa, provided range for cattle, and burned in wildfires. Under TNC management, the entire preserve was fenced and made virtually ungulate free by 2006. A number of reforestation trials and activities have resulted in the regeneration of koa, especially in the Papa and Honomalino sections. In particular, regeneration is evident over hundreds of acres where the soil was scarified via a bulldozer between 2003 and 2009. In 2010, TNC obtained high resolution imagery from Resource Mapping Hawai`i. This imagery is being used in conjunction with other imagery products from Ikonos, Pictometry, and Google Earth to display success in forest recovery and assess tree density.

254 - Optimizing Analysis and Decision-Making Using a Practical Geospatial System: Little Fire Ant Control on Maui

Brooke Mahnken, Monte Tudor-Long, Adam Knox
Maui Invasive Species Committee, Makawao, HI

Track

III. Invasive Species & Biosecurity

Abstract

Invasive species control and eradication projects often take years or even decades to complete. Successful, modern efforts are data-driven, efficient, and rely on detailed population mapping. The tools and technology available to guide these projects continues to improve which in turn increases confidence and allows near-real time results. Subsequent analyses help define the benchmarks of success. Utilization of available tools early on in project development saves time, money, and alleviates uncertainties over the course of an eradication effort. Novel methods of analysis developed by the Maui Invasive Species Committee (MISC) for little fire ant (*Wasmannia auropunctata*) control are considered. Little fire ants (LFA) are one of the world's worst invaders, and efforts to control and eliminate the threat on Maui have been led by the MISC, Hawai'i Ant Lab, and Hawai'i Department of Agriculture since 2009. Our example of a technology assemblage utilizing a GPS application called Locus Map Pro™, a tablet to record sampling information in the field, and geographic information systems will be discussed. Discovering, delimiting, treating, and monitoring an invasion is a complicated and iterative process with many variables to consider. Field data are analyzed, processed and transformed into guidance products that inform field operations. This has translated into more efficient field operations, filled gaps in knowledge, and given new insights. The aforementioned technology assemblage and processes have been used to create an optimized workflow which guides efforts to eradicate little fire ant from the island of Maui.

Forum 186: Ala Wai Watershed Collaboration: Public-Private Partnerships for Urban Ahupua'a Management

Time: 15:15 - 17:15

Date: 25th July 2018
Location: 316A

186 - Ala Wai Watershed Collaboration: Public-Private Partnerships for Urban Ahupua'a Management

Mike Hamnett[1], Rick Egged[2], Yvonne Chan[3], Miki Tomita[4], Daniel Nāho'opi'i[5]
[1]UH Social Sciences Research Institute, Honolulu. [2]Waikīkī Improvement Association, Honolulu. [3]'Iolani School, Honolulu. [4]Polynesian Voyaging Society, Honolulu. [5]SMS Research & Marketing, Honolulu

Track

II. Building the Future

Abstract

The Ala Wai Watershed, from the Ko'olau Mountains to Waikīkī Beach, is the most densely populated area on O'ahu, and has become the heart of Hawai'i's tourism economy. The watershed drains into the Ala Wai canal, a waterway known as one of the most polluted water bodies in the state; the canal itself, as well as the many streams and storm drains that feed it, flooded several times in the past century, causing serious damage. Devastation caused by Hurricane Maria in Puerto Rico and recent flooding events on Kaua'i are stark reminders of Hawai'i's vulnerability to natural disasters.

With ongoing urban growth, rising sea levels, and an increase in heavy rain events due to climate change, comprehensive management of this area is imperative for the local economy, as well as health and well-being of residents and visitors. This session will explore how public, private sector, and community partners are working together through the Ala Wai Watershed Collaboration to reduce risk from natural disasters and climate change impacts, clean up the watershed and canal, and build community resilience through place-based efforts. Leaders across sectors will discuss opportunities for Hawai'i to become a model globally for urban ahupua'a management.

Forum 46: Kids Creating Conservation Innovations: Students Share Their Hawaii Youth Sustainability Challenge Projects

Time: 15:15 - 16:15

Date: 25th July 2018
Location: 315

46 - Kids Creating Conservation Innovations: Students Share Their Hawaii Youth Sustainability Challenge Projects

Elia Herman[1], Natalie McKinney[2], Paahana Kincaid[1], Emily Ishikawa[1]
[1]Kupu, Honolulu, HI. [2]Kokua Hawaii Foundation, Haleiwa, HI

Track

II. Building the Future

Abstract

The Hawaʻii Youth Sustainability Challenge (HYSC) helps students develop innovative solutions to the conservation challenges they identify in their schools and communities. In 2017, Kupu and Kōkua Hawaiʻi Foundation (KHF) launched Year 2 of HYSC, providing mini-grants to students in grades 6-12 from across the state. Student projects include sustainable businesses; innovative outreach tools, including an electric car parade; engineering and outreach solutions that promote the use of reusable utensils; restoration projects that include cultural learning; community cleanup, marine debris and recycling programs; garden expansion and aquaponics projects; as well as many others. Each of these projects seeks to achieve real change on a local level, with the goal of successful projects scaling up and expanding in future years. Projects were conducted throughout Spring 2018 with the support of mentors from Kupu and KHF. Five exemplary project teams from Akaʻula School on Molokaʻi, ʻIolani School and Campbell High School on Oʻahu, Kawaikini New Century Public Charter School on Kauaʻi, and Volcano School of Arts and Science on Hawaiʻi Island will join the forum to present their work and engage in a meaningful exchange on the opportunities and challenges that face us as we try to build a more sustainable world. Additional HYSC project teams will be in attendance to join the discussion. The forum also provides an opportunity for intergenerational learning and will highlight sustainability actions happening in our communities at multiple levels.

Workshop 269: Resilient Hawaii Forest through Holographic Epistemology: ʻAʻohe o Kahi Nānā o Luna o ka Pali Iho Mai a Lalo Nei

Time: 15:15 - 17:15
Date: 25th July 2018
Location: 314

269 - Resilient Hawaii Forest through Holographic Epistemology: ‘A‘ohe o Kahi Nānā o Luna o ka Pali Iho Mai a Lalo Nei

Katie Kamelamela
University of Hawaii at Manoa, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

As recorded by Queen Liliuokalani in the "Kumulipo” Hawaiians were born of the land as the younger sibling of the taro plant, a union between sky and the stars. This ko‘ihonua, genealogical chant, was originally uttered in the 7th century and provides a glimpse into Hawaiian world view and practices. Genealogy, or mo‘okuauhau, is critical intellectual mana indicative of an ‘oiwi (Native) decision making process once utilized to grant land and bestow kuleana throughout the islands. Malo describes governance of the Hawaiian body politic from an ‘oiwi perspective illustrating connectivity from the foundational farmers/fisherman, to land managers, priests, chiefs, and at the head the Ruler. At the time of the Mahele of 1848, which privatized all lands, over 250 decentralized Konohiki were in place. These land managers were born and raised in the islands, knew the land they were governing as well as the people, and above all had a genealogy that supported their positions within the community. Today, Federal, State, Non-Profit, and community organizations make up less than 50 positions of top management in a centralized decision-making system. Participants will come prepared to this workshop with a genealogy chart going back 10 generations, or as far back as possible, as well as an origin story from their cultural background or choosing. Attendees will be provided support in exploring what Hawaii Forest Holographic Epistemology means through ethnobotanical interview exercises to strengthen relationships throughout our fields. This session is to build understanding and highlight solutions supportive in reinforcing stewardship relationships.

Poster 287: Ecological Impacts of Introduced Game Birds in Hawaiian Forests

Time: 15:15 - 15:45
Date: 25th July 2018
Location: Machine 1

287 - Ecological Impacts of Introduced Game Birds in Hawaiian Forests

Samuel Case[1], Jinelle Sperry[2], Corey Tarwater[1]
[1]University of Wyoming, Laramie, Wyoming. [2]Engineer Research and Development Center, Champaign, Illinois

Track

III. Invasive Species & Biosecurity

Abstract

In the last century, the Kalij Pheasant (*Lophura leucomelanos*) and Erckel's Francolin (*Pternistis erckelii*) were introduced to the Hawaiian Islands for recreational hunting. Although both species are frugivorous, little is known about their role as seed dispersers in Hawaiian forest ecosystems, where nearly all native seed dispersers are extinct. These game birds might offer conservation benefits by consuming and dispersing native seeds. Alternatively, they may negatively affect native plants by dispersing non-native plants at higher frequencies or acting as seed predators of native plants. In the Wai'anae Range of O'ahu, we collected data on game bird diet, abundance, distribution, morphology, and behavior. To determine extent of frugivory, we conducted behavioral observations, deployed game cameras on fruiting plants, and identified seeds within fecal samples. We measured abundance and distribution of game birds using line transect surveys and collected morphological measurements from common forest bird species. Game birds fed on fruit of both native and non-native plant species, including three federally listed endangered plants, *Cyanea grimesiana*, *Delissea waianaeensis, and Solanum sandwicense*. Fecal samples contained seeds of common non-native invasive plant species (n = 32 fecal samples). Both game bird species were widely distributed across sites. Compared to other bird species in the frugivore assemblage, game birds had the largest body mass and gape width (n = 503 birds measured). We are currently investigating bird movement and seed germination rate after gut passage. Whether the overall impact of game bird introductions is positive or negative for native plants is under investigation.

Poster 67: Citizen Foresters: Building Conservation Capacity Through Technology & Citizen Science

Time: 15:15 - 15:45
Date: 25th July 2018
Location: Machine 2

67 - Citizen Foresters: Building Conservation Capacity Through Technology & Citizen Science

Ian Hanou[1], Jolie Wanger[2]
[1]Plan-It Geo, Arvada, CO. [2]Smart Trees Pacific, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Tree canopy in and around cities on Oahu provide a wealth of services ranging from environmental, economic, social and health. Urban canopy goals are set across the world to combat climate change, improve public health, provide nature-based solutions, and make vibrant, livable areas.

To maximize these human and ecological benefits, we launched a Citizen Forester program to inventory city trees on Oahu. Volunteers apply mobile mapping technology to assess Honolulu's trees, creating awareness of urban forest diversity and increasing resiliency from storms through risk assessment. This program demonstrates ways to meet urban challenges while building a community of trained Citizen Foresters and empowering all ages and audiences. With only a smartphone or tablet, volunteers are now contributing to our ability to manage the vegetation resource. They can interact and share online maps from anywhere and see the data collected in real-time and view dashboards of species composition, further amplifying the value of the data gathered for management and outreach/education.

Along the way we have seen existing partnerships grow and new partnerships bloom as many have been inspired by these committed citizens. Tree data gathered by the Citizen Foresters over the course of two years, methods and quantification of the associated ecosystem services will be presented. A brief demo of the online mapping app will be provided, along with challenges/limitations, benefits received, technology considerations, and recommendations to others. Related applications of the mapping tool will also be introduced, including invasive species mapping and parks management.

Poster 183: Nā kūkuluae'o lele ma luna o ka'āina i māheleʻia: Hawaiian stilt movements through an urban landscape

Time: 15:45 - 16:15
Date: 25th July 2018
Location: Machine 1

183 - Ka lele ana on nā kūkuluaeʼo ma ka ʻāina kūlana kauhale : Hawaiian stilt movements through an urban landscape

Marty Kawasaki[1,2], Eben H. Paxton[1]
[1]USGS- Pacific Island Ecosystems Research Center, Volcano, HI. [2]TCBES graduate program, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The unique geography of Hawaiian wetlands on older islands create isolated habitats that have been degraded by the increase of western anthropogenic effects, leading to an overall reduction in functional waterbird habitat. The critically endangered Ae'o or Hawaiian stilt, *Himantopus mexicanus knudseni*, navigates the heterogeneous landscape surrounding Hawaiian wetlands. Ae'o populations have been slowly recovering since the 1900s, when numbers were devastated by over hunting and mammalian predation. Previous observational studies on Ae'o have demonstrated them to be a highly mobile species making them difficult to track across urban environment. The use of GPS solar satellite tracking devices have offered a glimpse into the dynamic habitat uses of Ae'o. Four Ae'o, on Oʼahu, were outfitted with satellite transmitters and followed for several months. Categories for landscape features were used to examine temporal occupancy by Ae'o given these habitat characteristics. Ae'o use a variety of atypical habitats. This should be considered when thinking about conservation strategies, and that the extensive use of non- wetland habitats provides opportunities and additional threats to the bird's long-term persistence.

Poster 48: Contributions of State and Private Forestry (USDA Forest Service) towards Solutions for Some of Hawai‘i’s most Serious Forest Health Problems

Time: 15:45 - 16:15
Date: 25th July 2018
Location: Machine 2

48 - Contributions of State and Private Forestry (USDA Forest Service) towards Solutions for Some of Hawaii’s most Serious Forest Health Problems

Phil Cannon[1], Rob Hauff[2], Sheri Smith[3], David Bakke[1]
[1]US Forest Service, Vallejo, CA. [2]DOFAW, Honolulu, HI. [3]US Forest Service, Suisanville, CA

Track

III. Invasive Species & Biosecurity

Abstract

For decades, State and Private Forestry has provided support to Hawaiian institutions interested in finding solutions to several of Hawaii’s most important forest health problems especially in the arenas of forest pathology, forest entomology and invasive plants. Much of this support is financial. Over the past decade S&PF has annually provided Hawaii with about $450,000 per year to spend on Forest Health problems. Most of this money has been provided to DOFAW, which in turn distributes these funds to the institutions doing the work. Some of the work is also done by S&PF Program managers who work with DOFAW and other institutions in Hawaii largely in an advisory capacity. Some of the pathology problems being tackled include the development of koa that are genetically resistant to wilt (*Fusarium oxysporum*), an evaluation of the rust problem of ohia (caused by *Austropuccinia psidii*) and the monitoring and management of rapid ohia death caused by *Ceratocystis fimbriata*. Invasive plants that have been worked with include Miconia (*Miconia calvescens*), Strawberry guava (*Psidium cattlianum*), Himalayan blackberry(*Rubis discolor*) Australian tree fern (*Cyathea cooperi*), Mules foot fern (*Angiopterus evecta*), gingers (*Hedychium spp*), Pampas grass (*Cortadera spp*.) and Cane ti (*Tibouchina herbacea*). Insect problems being worked on include the coconut rhinoceros beetle (*Oryctes rhinoceros*), the Erythrina gall wasp (*Quadrastrichus erythrinae*), a seed-boring bruchid beetle (*Speclarius impressithorax*) Myoporum thrips (*Klambothrips myopori*) and the Hala scale (*Thysanococcus pandanis*).

Poster 239: The Green Machine: Intersection of Science, Culture, and Sustainability for Innovative Island Stewardship

Time: 15:45 - 16:15
Date: 25th July 2018
Location: Machine 3

239 - The Green Machine: Intersection of Science, Culture, and Sustainability for Innovative Island Stewardship

Chai Blair-Stahn, Taylor Fujimoto, Jamie Nakama
Hawai'i Nature Center, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Green Machine, also known as the Living Machine, is a constructed wetland located in Makiki Valley, Oʻahu, that processes wastewater for both the Hawaiʻi Nature Center (HNC) and DLNR's DOFAW base yard. With predictions of decreased precipitation as a result of global warming, combined with an increasing island population, the Green Machine highlights wise reuse of freshwater. Consisting of a metal tank divided into 14 treatment cells, the Green Machine contains an array of microbes, plants (including native kohekohe and makaloa), and small aquatic animals that recycle nutrients and naturally treat wastewater, thereby mimicking the process of a natural wetland. The treated effluent is then used to irrigate a native plant garden of loulu, koa, ʻōhiʻa lehua and others.

HNC has been using the Green Machine to teach environmental science concepts for over 10 years, most recently incorporating the cutting-edge scientific field of biomimicry into curricula to showcase nature-inspired sustainable design as a solution to current environmental problems.

This poster presents data collected with a water quality probe (YSI ProDSS) for quantitative and comparative analyses between treatment cells of the Green Machine, and well as describes how the Green Machine serves as an invaluable teaching tool at the intersection of science, culture, and sustainability that can inspire innovative approaches to island stewardship in future generations.

Poster 155: Hawai'i Predator Control Hui: 2018 forum

Time: 15:45 - 16:15
Date: 25th July 2018
Location: Machine 4

155 - Hawai'i Predator Control Hui: 2018 forum

Jonathan Sprague[1], Michelle Bogardus[2], Lisa Crampton[3], Tyler Bogardus[4], Rachel Sprague[5], Kyle Pias[6]
[1]Pacific Islands Fish and Wildlife Office, USFWS, Lanai City, HI. [2]Pacific Islands Fish and Wildlife Office, USFWS, Honolulu, HI. [3]Kauai Forest Bird Recovery Project, Hanapepe, HI. [4]Oahu Army Natural Resources Program, Schofield Barracks, HI. [5]Pulama Lanai, Lanai City, HI. [6]Kauai Natural Area Reserve System, Lihue, HI

Track

III. Invasive Species & Biosecurity

Abstract

Many conservation organizations control predators across Hawaii's landscape in an effort to protect native resources. However, communication between programs is often challenging, and there has long been a recognized need to bring predator control practitioners together to share techniques and foster dialogue across the state. To this end, over 150 predator control practitioners representing more than 55 organizations from across the state, met for a four-day forum at the Kilauea Military Camp in Volcano National Park and field trip to Pu'u Lā'au with the Mauna Kea Forest Restoration Project in January 2018. In this talk, we review the goals, format, and outcomes of the forum and suggest ways that this community can improve communication towards more effective predator control state wide.

Forum 294: Environmental Law & Policy: Lessons from Tomorrow's Leaders

Time: 16:15 - 17:15

Date: 25th July 2018
Location: 311

294 - Environmental Law & Policy: Lessons from Tomorrow's Leaders

Nicholas Altuzarra, Chase Livingston, Rachel James
William S. Richardson School of Law, Honolulu, Hawai'i

Track

II. Building the Future

Abstract

Each spring, second-year law students at the University of Hawai'i at Mānoa's William S. Richardson School of Law are required to write a scholarly paper based on in-depth research. These students are creating a strong foundation for their careers, while researching how law and policy decisions can ensure an abundant future in Hawai'i and around the globe. This year, three students have been selected to present their findings at the Hawai'i Conservation Conference. Each of these students has each chosen to research an issue that sits at the intersection of the environment and the law. Nicholas Altuzarra will discuss Maui County's problematic approach to taxing conservation easements, and the impact it has on families and the future of private land conservation. Chase Livingston will describe how key indigenous principles, embodied in the law, pave the way for accelerating climate-conscious energy regulation in Hawai'i. Rachel James will propose using community-manage makai areas as a model for implementing community-based renewable energy. This forum will be moderated by David Forman, Director of the Environmental Law Program at the William S. Richardson School of Law.

General Session: Rats

Time: 16:15 - 17:15
Date: 25th July 2018
Location: 316BC

195 - Evaluation of the GoodNature A24Rat Trapand Automatic Lure Pump (ALP)

Tyler Bogardus

Pacific International Center For High Technology research, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

Beginning in 2009, The Army's O'ahu Natural Resources Program implemented the first of three ecosystem-scale trapping grids of traditional snap traps in the Waianae Mountains using the model outlined in The New Zealand Department of Conservation's current best practices for kill trapping rats. Traps were generally checked every two weeks and bait longevity was an issue. Due to the amount of labor required for single set traps, trials with GoodNature A24s were conducted from 2014-2016. Early findings showed that traps were malfunctioning at a rate of ~25%, and there were major deficiencies with the bait and delivery system. In 2016 the bait system was improved when GoodNature developed the automatic lure pump (ALP), which continually releases fresh bait for approximately 6 months. Other improvements were also made to the A24 trap to decrease the malfunction rate. In 2017 the Army replaced more than 1,300 snap traps with 1,000 A24s at all ecosystem-scale grids. This presentation will discuss results of this transition, highlight successes and obstacles, and describe grid spacing and applicability to other sites across the Hawaiian Islands.

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196 - Assessing the Effectiveness of ContraPest Rodent Birth Control in the Waianae Mountains, O'ahu

Tyler Bogardus[1], Brandy Pyzyna[2]
[1]Pacific International Center For High Technology research, Honolulu, HI. [2]Senestech, Flagstaff, AZ

Track

III. Invasive Species & Biosecurity

Abstract

Due to the large negative effects of introduced rats on natural resources at Kahanahaiki, an Army-managed 36-ha tract of mesic forest on the island of O'ahu, the Army's O'ahu Natural Resources Program has been engaged in rodent control since 1995 using different techniques with varied success. In order to protect endangered plant, bird and snail populations from the

depredations of rats, we conducted a trial to determine whether ContraPest can be deployed effectively, safely, and reduce populations of *Rattus* spp. in a forest setting. For this trial, two 4-hectare grids were delineated, one as a reference site and the other as the treatment site. A grid of 25 ContraPest stations in tamper-resistant bait stations at a spacing of 50x50 meters were deployed over the 4-hectare (9.88 acre) treatment site. Staff monitored tracking tunnels within the reference and treatment sites, as well as within another reference site located approximately one mile away where no rodent management has ever been conducted. This presentation will discuss results of this trial, highlight successes and obstacles, and provide insight into possible uses for this technique across the Hawaiian Islands.

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8 - Response of a Native Hawaiian Bird to the Removal of an Invasive Predator in a Mesic Montane Forest

Paul Banko[1], Kelly Jaenecke[2], Robert Peck[2]
[1]US Geological Survey - Pacific Island Ecosystems Research Center, Hawaii National Park, Hawaii. [2]University of Hawaii at Hilo - Hawaii Cooperative Studies Unit, Hawaii National Park, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Introduced rats are notorious predators of birds and their nests worldwide, but especially on remote islands. Rats (*Rattus exulans*) first arrived in Hawai'i with Polynesian colonists about 1,000 years ago, resulting in deleterious consequences for native birds and ecosystems. Since Western contact in 1778, two additional rat species have become established in Hawai'i, including the highly invasive black rat (*R. rattus*), which arrived in the late 1800's. Black rats have contributed substantially to the historical loss of native forest bird populations, in part through nest depredation. We assessed the impact of rat depredation on the reproduction of a relatively common native forest bird, Hawai'i 'elepaio (HAEL; *Chasiempis sandwichensis*) by reducing rat populations in two treatment plots in a before-after-control-impact study in mesic montane forest in Hawai'i Volcanoes National Park. After monitoring rat abundance and HAEL nesting success for two years (2015-16), we distributed diphacinone rodenticide at the beginning of the HAEL nesting season in 2017. Diphacinone bait stations were distributed at 50-m intervals within 700x700m plots at low (1360m) and high (1670m) elevations, which also differed in habitat structure. By the end of the nesting season, rat abundance on treatment plots had been reduced to <10% of levels observed in the previous two years, while it remained relatively unchanged on untreated plots. Analyses indicated that HAEL nest success and daily

survival rate (n=206 nests, 3 years) increased on treatment plots during the application of rodenticide. Our results highlight the conservation benefits of removing invasive predators from island ecosystems.

17 - Investigating Patterns of Rat Lungworm Infection in Wildlife Hosts on Eastern Hawai‘i Island

Chris Niebuhr[1], Susan Jarvi[2], Shane Siers[1]
[1]USDA APHIS WS National Wildlife Research Center, Hawai‘i Field Station, Hilo, HI. [2]Department of Pharmaceutical Sciences, Daniel K. Inouye College of Pharmacy, University of Hawai‘i at Hilo, Hilo, HI

Track

III. Invasive Species & Biosecurity

Abstract

Rat lungworm (*Angiostrongylus cantonensis*) is an emerging zoonotic pathogen that causes rat lungworm disease (angiostrongyliasis) in humans worldwide, including Hawai‘i. The lifecycle of the rat lungworm is complex, requiring both gastropod intermediate hosts and rodent definitive hosts, with humans sometimes acting as accidental hosts due to ingestion of infected larvae. Eastern Hawai‘i Island has recently reported infection rates in humans, slugs, and rats (*Rattus* spp.) to be higher than anywhere else in the U.S. Here we present results from our recent collaborative study identifying 73% of rats (*R. exulans* and *R. rattus*) as infected with adult worms by visual detection, and a total of 94% of rats as testing positive for various stages of *A. cantonensis* using both visual and PCR analysis. Our results indicate that infection levels in rats vary by species and age. Based on these findings, we also suggest the possibility that *R. rattus* populations in Hawai‘i are capable of developing some form of acquired immunity to infection over time, which could have important management implications. Additionally, we also provide an update on our current study investigating seasonal patterns in infection levels and the possible role other wildlife species may be playing in the transmission cycle of rat lungworm in Hawai‘i. Scientific investigations to better understand factors influencing rat lungworm infection levels in the wild can help prioritize future control efforts for reducing human exposure to this disease of concern in Hawai‘i.

My Hawai‘i Story Contest Awards

Time: 16:15 - 17:15
Date: 25th July 2018
Location: 315

Poster 232: Diet of Red-Footed Boobies Provisioning Chicks on O'ahu: Augmented with Genetic Analysis

Time: 16:15 - 16:45
Date: 25th July 2018
Location: Machine 1

232 - Diet of Red-Footed Boobies Provisioning Chicks on O'ahu: Augmented with Genetic Analysis

Sarah Donahue, Josh Adams, David Hyrenbach, Brett Olds, Mark Renshaw
Hawai`i Pacific University, Oceanic Institute, 41-202 Kalaniana`ole Hwy, Waimanalo, HI

Track

II. Building the Future

Abstract

The diet of Red-footed Boobies, (*Sula sula*) was quantified using 106 regurgitations collected opportunistically at Ulupau Crater, O`ahu, from 81 adults during two years: 2014 (1–7 June) and 2015 (17 June–27 July). We sorted 1007 prey items into 3 categories: Fish, Squid, and Other (extremely digested “mush” and parasitic isopods). The average number of prey items per sample was 8.1 ± 5.7 (2014) and 10.6 ± 8.4 (2015). First, we assigned prey items a categorical freshness value: 1 (perfect condition), 2 (superficial digestion), or 3 (highly-digested and incomplete). Next, we measured sizes and took genetic samples from 492 items (freshness 1 and 2). 82% (n = 401) of those items were genetically identified. Rarefaction analyses revealed robust estimation of species richness in the diet which included 29 fish and 3 squid species. Moreover, 98.7% (232 of 235) of identified squids were Purpleback flying squids (*Sthenoteuthis oualaniensis*). Despite dominance of fish in 2014 (%PSIRI fish 32.3%, squid 15.1%) and 2015 (%PSIRI fish 29.9%, squid 22.3%), diet composition varied significantly among the two study years. Squid were also significantly larger in 2015 (7.2 ± 1.1 cm) than in 2014 (6.3 ± 1.7 cm), indicating that differences in relative abundance and size may have been associated with El Niño conditions in 2015, similar to results from French Frigate Shoals (Seki & Harrison 1982). Altogether, due to Red-footed Boobies having opportunistic diets, we suggest they can be used

to sample variability among epipelagic nekton assemblages during periods of contrasting oceanographic conditions.

Poster 249: Persistence and Resistance at Kawainui, an ʻĀina Momona

Time: 16:15 - 16:45
Date: 25th July 2018
Location: Machine 2

249 - Persistence and Resistance at Kawainui, an ʻĀina Momona

Makanani Lopes
Kamakakūokalani, Center for Hawaiian Studies, UH Mānoa, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Ke Kahua O Kūaliʻi (KKOK) is a Native Hawaiian not-for-profit organization integrating traditional and customary practices at a site along Kawainui, in the Kailua ahupuaʻa on Oʻahu Island. KKOK has a 5-year agreement with the Department of State Parks overseeing 14 acres of Kawainui, one of Hawaii's largest wetlands encompassing 850 acres. Initiated as a grass roots effort for the presence of culture at Kawainui, the organization organizes annual Makahiki and Wehe Kū ceremonies, hale building (traditional house) and uhau humu pōhaku (traditional masonry) events. KKOK has grown to represent both Kānaka Maoli (Native Hawaiian) and non-natives in restoration efforts at Kawainui. KKOK has removed over 40,000 pounds of debris, adheres to a non-herbicide practice for invasive plants and conducts monthly native planting opportunities.

Kawainui was once used as an inland fishpond, and was an integral part of the ahupuaʻa, and the Kanaka ʻŌiwi's wellbeing. Kawainui is in a multitude of oral stories connecting the people to the land, a place where an intricate network of loʻi kalo terraces, multiple heiau, and a large archeological site, to name a few, are found that connect us to a life force, our ancestors, and our future.

Kawainui is the focus of the large scale Kawainui-Hāmākua Master Plan and Ke Kahua O Kūaliʻi has been one of the Kānaka ʻŌiwi organizations that made its way into the Master Plan through

persistence and resistance and through personal experience, has found a critical need for more Kānaka ʻŌiwi driven planning.

Poster 290: Team ʻŌpeʻapeʻa: A Maui Middle School Learns to do Science and Connect to Their Natural Resources and Culture

Time: 16:15 - 16:45
Date: 25th July 2018
Location: Machine 3

290 - Team ʻŌpeʻapeʻa: A Maui Middle School Learns to do Science and Connect to Their Natural Resources and Culture

Dave Johnston[1,2], Kristin Jonasson[3], Brad Yuen[3], Kekaula Campbell[4]
[1]H. T. Harvey & Associates, Los Gatos, CA. [2]San Jose State University, San Jose, CA. [3]H. T. Harvey & Associates, Honolulu, HI. [4]Kamehameha Schools, Makawao, HI

Track

II. Building the Future

Abstract

To help expose science to middle school students through bat research, we set up a specialized program for 7th graders attending Kamehameha Schools in Makawao, Maui. The ʻōpeʻapeʻa is a bat endemic to Hawaiʻi and the state's only native land mammal. Despite this, many residents are unaware of the existence of this endangered species. We began by advertising a Bat Club meeting at lunch time and attracted about 30 students. We gave presentations every few weeks during the school year including units on 1) bats and bat biology, 2) the scientific method that included outdoor exercises, 3) how to use Google Earth to record and locate data, 4) the use of bat detectors to confirm locations of bat activity (in the evening with parents), 5) mist netting bats in a local area (in the evening with parents), 6) using equipment to study bats and the development of hypotheses, 7) the selection of study sites, 8) the collection of data, 9) the processing and analysis of data, 10) writing the storyline, and 11) making a poster to be submitted at a conference or public setting (e.g., library or Hawaiian Conservation Conference). Students gained experience in social and emotional skills through teamwork and authentic

learning based in the scientific method and research focused on conservation of the ʻōpeʻapeʻa. This project also provides an opportunity for native Hawaiian students to explore science-related career interests and pathways.

Poster 51: Using an Automatic Trapping Grid to Reduce Rodents on Kaua'i: First Five Years

Time: 16:15 - 16:45
Date: 25th July 2018
Location: Machine 4

51 - Using an Automatic Trapping Grid to Reduce Rodents on Kaua'i: First Five Years

Uma Nagendra, Chiemi Nagle, Kawika Winter
Limahuli Garden, NTBG, Hanalei, HI

Track

III. Invasive Species & Biosecurity

Abstract

Invasive rodents (*Rattus* sp.) remain a major threat to native plants and animals across the Pacific Islands. Although landscape-scale control of black rat populations is necessary to preserve endemic and critically endangered species, tools appropriate for remote areas are limited in Hawai'i. In addition, conservationists are challenged to find effective rodent control that is safe for endemic animals and has support of the local community. Automatic self-resetting kill traps for rodents (Goodnature A24) have been used to eradicate rodents from small islands and areas isolated by predator-proof fencing. Its effectiveness in unfenced systems on Kaua'i is still unknown.

In 2012, the National Tropical Botanical Garden implemented a landscape-scale rodent management trial using Goodnature A24 kill traps in the Upper Limahuli Valley of Northwestern Kaua'i. A grid of 63 Goodnature A24 kill traps was installed along intersecting trails in a 30-acre drainage without a predator-proof fence. Relative rodent presence, as monitored by ink cards, fell from 48% in the first year to 19% in the fifth year. As expected, numbers of rodents killed declined along with rodent activity levels. Most strikingly, the degree of reduction in rodent

presence and kills depended on trap density. Traps in higher density areas experienced a greater reduction in rodent captures over the five year period, indicating that dense trap grids have a synergistic effect on rodent control. These preliminary data suggest that rodent control without rodenticide is possible in remote areas.

Poster 274: Weighing Potential Impacts against Control Feasibility to Prioritize Invasive Plants for Eradication on Kaua‘i

Time: 16:45 - 17:15
Date: 25th July 2018
Location: Machine 1

274 - Weighing Potential Impacts against Control Feasibility to Prioritize Invasive Plants for Eradication on Kaua‘i

Kelsey Brock[1], Tiffani Keanini[2]
[1]Pacific Cooperative Studies Unit - University of Hawai‘i, Honolulu, HI. [2]Kaua‘i Invasive Species Committee, Pacific Cooperative Studies Unit - University of Hawai‘i, Kapa‘a, HI

Track

III. Invasive Species & Biosecurity

Abstract

The goal of invasive plant early detection and eradication is clear: to prevent environmental, economic and cultural impacts before it becomes infeasible to do so. However, achievement of this goal in Hawai‘i is muddled by the incredible number of alien species present and their unknown distributions. Kaua‘i is home to over 700 species of naturalized alien plants with an additional 2500 known in cultivation. Furthermore, a large proportion of these plants are deemed “High Risk” by the Hawai‘i-Pacific Weed Risk Assessment and only a handful of their ever-expanding distributions are being tracked. This complexity prevents answers to the most central question of any invasive plant eradication program: which species should we choose? We present Kauai Invasive Species Committee’s invasive plant prioritization process, which seeks to answer this question using a semi-quantitative assessment of invasive impacts and eradication feasibility for plant species with limited distributions. This process results in a

comparative prioritization tool allowing invasive plant managers to allocate resources to the highest-ranked species. The ranking of 45 potentially eradicable species on Kauaʻi is presented alongside three challenges that were found to be especially important to management decision-making and success: 1) detection and control feasibility on private land, 2) predicting impacts of species that are invasive in Hawaiʻi and nowhere else, and 3) taxonomic uncertainty affecting our ability to score and rank plants. Our results show that despite the prevalence of many notorious, well-established plant invaders on Kauaʻi, numerous species likely to cause further damage may still be eradicable.

Poster 283: Hoʻoulu Kaiāulu: Building Community Capacity for Conservation in Hawaiʻi

Time: 16:45 - 17:15
Date: 25th July 2018
Location: Machine 2

283 - Hoʻoulu Kaiāulu: Building Community Capacity for Conservation in Hawaiʻi

Mehana Vaughan
UH Manoa, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

This presentation focuses on collaborative research with communities caring for ʻāina in Hawaiʻi conducted by faculty and students in natural resource management and Hawaiian studies fields at the University of Hawaiʻi at Mānoa. How are relationships with land and resources built upon obligations to care for, restore, and protect them? How are Hawaiian values and practices guiding research and management efforts? How are Hawaiʻi communities gaining access to lands they no longer own, but continue to care for? And how can the University assist in these efforts, while training future conservation practitioners grounded in culture and community? This presentation will share results from a study to assess training needs in conservation in Hawaiʻi, along with ways that faculty at U.H. Mānoa are working in interdisciplinary teams to develop classes and programs to meet these needs. Student projects

conducted in collaboration with community groups caring for ʻāina and kai in Hawaiʻi will be shared along with lessons from this work.

Poster 228: Twenty Years of Researching the Native Hawaiian Hawksbill Sea Turtle (Eretmochelys imbricata) in its Marine Environment Using Photo-Identification Techniques

Time: 16:45 - 17:15
Date: 25th July 2018
Location: Machine 3

228 - Twenty Years of Researching the Native Hawaiian Hawksbill Sea Turtle (*Eretmochelys imbricata*) in its Marine Environment Using Photo-Identification Techniques

Cheryl King
Turtle Island Restoration Network, Kihei, HI. Hawaiian Hawksbill Conservation, Kihei, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Along with the more common Hawaiian green sea turtles (*Chelonia mydas*), endangered hawksbills (*Eretmochelys imbricata*) inhabit many accessible nearshore habitats within the Main Hawaiian Islands (MHI). This makes this rare species an ideal candidate for a photo-identification research project since juvenile and adult hawksbills can be non-obtrusively monitored long-term by matching photographs of their head and flipper scale patterns. Requesting hawksbill photographs from ocean users plus finding incidental sightings on various websites and social media sites has increased records. Targeted in-water research surveys were conducted to assess habitats beyond popular snorkeling destinations. An educational website was launched in January 2016 to increase awareness plus encourage citizen science involvement: www.HIhawksbills.org. Over 250 photographers have contributed a total of 1,134 sightings of 133 unique MHI individuals (1998-2017), all with various metadata: date, time, location, depth, habitat, behavior, foraging habits, injuries, hookings/entanglements, and reactions to human presence. Since the author resides on Maui, the majority of individuals have been reported and discovered there (Maui= 65, Hawaiʻi Island=

20, Oʻahu= 30, Kauaʻi= 8, Lanaʻi= 7, Molokaʻi= 2, and Kahoʻolawe= 1). All individuals were given numbers, plus each photographer who submitted a unique individual to the catalog was given the opportunity to name it. This insightful 20-year collection showcases the largest amount of population information known about Hawaiian hawksbills in their marine environment. This provides a strong foundation that will be built upon with the utilization of innovative computer-assisted photo-ID matching software and smartphone applications, both of which will be completed in 2018.

Poster 174: Examining the effect of helicopter noise on bird assemblages in Hawaii Volcanoes National Park

Time: 16:45 - 17:15
Date: 25th July 2018
Location: Machine 4

174 - Examining the effect of helicopter noise on bird assemblages in Hawaii Volcanoes National Park

Karen Gallardo Cruz, Kristina Paxton, Patrick Hart
University of Hawaii at Hilo, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

In birds, anthropogenic noise has been linked to decreased breeding success, increased flushing behavior, and changes in vocalization. Helicopter noise in Hawaiʻi's forests could be another stressor native birds face in addition to disease, habitat loss, and non-native species. The number of helicopter overflights in Hawaiʻi Volcanoes National Park (HAVO) is one of the highest in the National Park system, but the effect of helicopter noise on native birds within the park has not been assessed. Our primary objective was to determine if helicopter noise affects the acoustic behavior of native bird assemblages within HAVO. We placed automated acoustic recorders in two forested areas with similar environmental conditions that are known to differ in helicopter traffic. We recorded the soundscape at each location from 7am - 5pm for two consecutive months during peak breeding season, analyzed bird vocalizations using RavenPro 1.5 sound analysis software, and used soundscape indices to analyze the effect of helicopter

noise on the biotic soundscape (biophony). We addressed the following questions: 1) Does helicopter noise affect biophony? 2) Is there a threshold at which helicopter noise affects vocalizing behavior of birds? 3) Does response to helicopter noise vary among bird species? 4) And do bird assemblages in areas of high helicopter traffic respond differently to helicopter noise than bird assemblages in areas of low helicopter traffic? Our results may serve as the foundation of an air tour management plan for HAVO that considers potential effects of air tours on native forest birds.

THURSDAY, JULY 26th, 2018

CONCURRENT SESSION 6

Forum 73: Hoʻolono a Hoʻohuli: Sharing Solutions to Changing Conditions in our Communities

Time: 10:00 - 12:00
Date: 26th July 2018
Location: 311

73 - Hoʻolono a Hoʻohuli: Sharing Solutions to Changing Conditions in our Communities

Mac Poepoe[1], Kekaialoha Han-Krael[1], Solomon Kahoʻohalahala[2], Jenny Yagodich[3], Hannah Springer[4], Shaelene Kamakaʻala[5]
[1]Hui Mālama o Moʻomomi, Hoʻolehua, Hawaiʻi. [2]Maunalei Ahupuaʻa Mauka Makai Managed Area, Maunalei, Hawaiʻi. [3]Mālama Pūpūkea-Waimea, Pupukea, Hawaiʻi. [4]Kaʻūpūlehu Marine Life Advisory Committee, Kona, Hawaiʻi. [5]Hoʻāla ʻĀina Kūpono, Kahana Kilo Kai, Kahana, Hawaiʻi

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

How can we work together to address changing conditions and negative impacts in our communities? Intergenerational members of the E Alu Pū network share solutions they are implementing in their diverse places. Our foundation is to start with the act of "hoʻolono" to listen to both the dynamic movements of our natural ecosystems and lifelong residents. Then how do we convert the problem and implement the "huli", the change which will foster our growth into an abundant future? We invite you to join us for a talk story session and exchange of "can-do" ideas on topics like marine debris, sedimentation and erosion, and citizenship and public process.

Symposium 10: Reshaping Wastewater Treatment in Hawai‘i to Protect Corals and People

Time: 10:00 - 11:00
Date: 26th July 2018
Location: 316BC

10 -
Reshaping Wastewater Treatment in Hawai‘i to Protect Corals and People

80 - Identifying Locations of Sewage Pollution Within Puakō's Watershed and Comparison of On-site Sewage Disposal Systems for Management Actions

Tracy Wiegner[1], Leilani Abaya[1], Steve Colbert[1], Jazmine Panelo[1], Saria Adan Sultan[2], Adel Sharif[3], Carey Demapan[1], Kristina Remple[4], Craig Nelson[4]
[1]University of Hawaii at Hilo, Hilo, HI. [2]University of Northern Florida, Jacksonville, FL. [3]Moravian College, Bethlehem, PA. [4]University of Hawaii at Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Determining the location of sewage pollution in a watershed is important for implementing management actions to reduce pollution impacts on coral reefs. The study’s goal was to identify locations of sewage pollution in the Puakō watershed on Hawai'i Island. To achieve this goal, sewage indicators [fecal indicator bacteria, stable nitrogen isotopes, nutrients] were measured in groundwater at high, mid-, and low elevation wells, as well as along the shoreline. Dye tracer tests, water quality, and $\delta^{15}N$ macroalgal measurements assessed water quality impairment caused by different onsite sewage disposal systems (OSDS) types. FIB concentrations along Puakō’s shoreline were substantially higher than those in upslope wells and resorts’ shoreline waters, with concentrations of Enterococci exceeding state standards and *Clostridium perfringens* ones indicative of non-point source sewage pollution. Positive hits for human *Bacteroides* only occurred at Puakō. $\delta^{15}NO_3^-$were indicative of sewage pollution at Puakō, while values upslope and at adjacent resorts were indicative of soil and fertilizers. These findings confirm that sewage is largely entering the water table at Puakō. Dye was detected in front of all OSDS types, reached the shoreline within 5h to 10d, and each OSDS type had an example of dye reaching the shoreline in 1d. FIB, $\delta^{15}N$

macroalgal, nutrient concentrations were also similar in front of all OSDS types. These results suggest that the underlying geology controls how fast sewage flows from the OSDS to the shoreline, not the system type. Our findings highlight the need for improved sewage treatment and collection at Puakō.

159 - Policies Affecting Wastewater Reclamation and Reuse in Hawai'i: Where Do We Go From Here?

Steve Parabicoli
Mana Water, LLC, Lahaina, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Wastewater management is often met with an ‘out of sight, out of mind’ attitude in Hawai’i. It is rarely given sufficient attention or allocation of resources by policymakers or the public until there is a problem such as bad smells, sewage spills, or injection wells polluting the nearshore environment. A significant barrier to innovation such as water reuse or the construction of new or improved wastewater infrastructure is misaligned and reactive policy combined with a ‘not in my backyard’ mentality which views wastewater treatment as something better left hidden and out of the public spotlight. Globally, this attitude is changing, and alternative approaches are reshaping how we perceive wastewater treatment. New and innovative treatment technologies and forward thinking policies demonstrate to the public the valuable public asset a wastewater treatment plant can represent to the community, and underscore that fact that effective treatment is essential for the long term sustainable health of the economy and the environment, and also need not be an eyesore. The current policy landscape in Hawai’i falls short, and while no silver bullet is on the horizon, it is clear that we need to start thinking outside the box and work together to develop policies that will allow us to more effectively manage our wastewater. Steve will discuss alternative policy and technological innovations that together could reshape how we handle this most fundamental of human challenges.

160 - Cheap, Nonproprietary, and Efficient; an Exploration of Alternative Onsite Disposal Systems

Paul Sturm
Ridge To Reefs, Sykesville, Maryland

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Current onsite disposal of wastewater (at the household level) does not adequately protect human and environmental health. Both cesspools and septic systems have high losses of nitrogen that negatively impact ocean waters, groundwater, and surface water bodies. The current alterative, Aerobic Treatment Units (ATUs), can be installed but at a high cost (~$20,000) to the homeowner, and if not properly maintained also do not adequately reduce nitrogen. Denitrifying bioreactors, vetiver grass, and Biochar treatment systems could be utilized as potential low cost alternative systems in Hawai'i for onsite disposal. These systems have been used extensively within an agricultural context in the Midwest and for wastewater treatment in other countries. Paul will discuss overall treatment performance of these systems and describe examples that are applicable to onsite wastewater treatment.

110 - Clean Water for Reefs Puakō: A Case Study of a Community in Hawai'i Taking Action to Solve Wastewater Impacts

Erica Perez[1], Danielle Swenson[2], Jos Hill[3]
[1]Coral Reef Alliance, Keaau, HI. [2]Coral Reef Alliance, Kailua Kona, HI. [3]Coral Reef Alliance, Oakland, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

With the release of the Department of Health's 2017 replacement prioritization document, Hawai'i counties and communities must prepare for a statewide transition away from cesspools. Hawai'i County leads the state with 55,000 cesspools spread across the island. The limited capacity within state and county governments means that concerned communities need to play a key role in identifying threats from wastewater and implementing solutions. In 2013, the Puakō community identified that on-site disposal systems were having a direct negative impact on the marine ecosystem. Galvanized by community will to solve this problem, the Coral Reef Alliance launched the Clean Water for Reefs Puakō project to implement a solution to Puakō's wastewater problem.

The Clean Water for Reefs Puakō project provides a roadmap for communities across Hawai'i that are interested in addressing wastewater issues. This case study can help communities navigate important decision points and identify tools by answering questions

such as: how do we identify the best technology? How do we implement a recommendation? Where do capital improvement funds come from? Who will operate and maintain a treatment plant? This presentation will highlight lessons learned over the past four years as the Puakō community leads the way in cesspool replacement in Hawai‘i.

Forum 285: Kaiāulu: Growing Community Based and Culturally Grounded Resource Management in Hawai‘i

Time: 10:00 - 11:00
Date: 26th July 2018
Location: 316A

285 - Kaiāulu: Growing Community Based and Culturally Grounded Resource Management in Hawai‘i

Mehana Vaughan
UH Mānoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

This interactive session focuses on the growing movement for community based and culturally grounded care and governance of ‘āina in Hawai‘i. Collaborative and community based efforts recognize land standing ties and kuleana of people to place, along with the reality that government agencies cannot care for Hawai‘i‘s resources alone. This forum offers a snapshot of current community based and culturally grounded conservatin efforts in Hawai‘i, their growth, and impacts. Through discussion and other activites participants will share their own experiences, lessons and challenges, while navigating new ways to support one another and forward community based efforts. Key questions include: What factors have been shown to enhance sucess of community care and governance of resources? What are existing and potential future opportunites for communities to access and care for lands? What key needs and challenges are community groups encountering? How can partners such as students, researchers, agencies, non profits, networks and Native Hawaiian organizations contribute to strengthening community driven conservation? What mentoring, learning and training opportunities exist to enhance skills for collaborative and culturally grounded efforts? How are collaborations built to work effectively and what do we do when they are not? This session

aims to bring experienced practitioners and community leaders together with students and those newer to community based work to discuss, connect, learn, laugh and share. Participants should leave refreshed, inspired, and challenged, with a clearer sense of their own kuleana and ability to contribute.

Forum 58: Hawai‘i’s Forest Action Plan for Conservation -- it’s a Kākou Thing

Time: 10:00 - 11:00
Date: 26th July 2018
Location: 315

58 - Hawai‘i’s Forest Action Plan for Conservation -- it’s a Kākou Thing

David Smith[1], Sherry Hazelhurst[2]
[1]Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, Honolulu, HI. [2]U. S. Forest Service, Pacific Southwest Region, Vallejo, CA

Track

II. Building the Future

Abstract

Hawai‘i’s forests are linked to communities and culture from mauka to makai. Ensuring that our forests continue to sustain our thriving, prosperous society is the kuleana of all. The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) recently updated the Hawai‘i Forest Action Plan, which assesses current forest conditions and trends, and identifies nine priority issues for action. It also provides a long-term strategy for state, federal, and other resources, focusing on areas in which involvement and investment can effectively leverage desired actions and engage multiple partners. The United States Forest Service (USFS) works with DOFAW by actively supporting its Forest Action Plan implementation goals though delivery of five federal Cooperative Forestry & Fire programs, as well as by providing technical assistance. This year, the USFS is conducting its required five-year review of these programs in fire, forest health protection, private land conservation (Legacy), stewardship, and urban and community forestry.

During this Forum, DOFAW and the USFS invite partners, colleagues and stakeholders to join us for 1) short presentations about the Forest Action Plan accomplishments and updates, and 2)

discussions in a roundtable format on what we've learned, what to keep doing (best practices), and what we can do differently together over the next five years to reach our forest conservation goals. The feedback provided will inform future forest actions and investments. We look forward to candid and robust discussion, because conserving Hawai'i's forests is a kākou thing.

Workshop 52: Applying Socio-Ecological Research to Design and Evaluate Community Engagement Programs for Conservation

Time: 10:00 - 12:00
Date: 26th July 2018
Location: 314

52 - Applying Socio-Ecological Research to Design and Evaluate Community Engagement Programs for Conservation

Rebecca Niemiec[1], Franny Kinslow Brewer[2], Nicole Ardoin[3,4], Nancy Lee[5], Kirsten Oleson[6], Liz Foote[7], Christy Martin[8]
[1]Stanford University Emmett Interdisciplinary Program in Environment and Resources, Stanford, CA. [2]Big Island Invasive Species Committee, Hilo, HI. [3]Stanford School of Education and Stanford Woods Institute for the Environment, Stanford, CA. [4]Stanford Woods Institute for the Environment, Stanford, CA. [5]Founder and President of Social Marketing Services, Inc., Seattle, WA. [6]University of Hawai'i at Mānoa, Honolulu, HI. [7]Project S.E.A.-Link, Wailuku, HI. [8]CGAPS-Coordinating Group on Alien Pest Species, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Addressing many of Hawai'i's most pressing conservation challenges will require engaging everyday citizens in conservation efforts. Existing engagement approaches have typically focused on providing citizens with knowledge and awareness of environmental problems, with the hope that this will lead to behavior change. However, in the past decades, socio-ecological research has demonstrated that knowledge and awareness are often necessary, but insufficient

for inspiring sufficient community engagement to achieve desired conservation outcomes. Rather, community engagement programs may be more effective if they build social norms, appeal to existing community values, enhance social capital, incorporate local knowledge, apply decision science, and develop emotional connections to place. In this interactive workshop, we will bring together researchers and practitioners to explore these alternative models for community engagement that have been effective for motivating citizen participation and transforming socio-ecological systems in Hawai‘i. The workshop will begin with short “lightening talks” from leading researchers and practitioners who have applied socio-ecological research methods and theory in the design and evaluation of community engagement programs for conservation. From these talks, facilitators, speakers, and participants will collaboratively synthesize key principles on designing and evaluating community engagement programs using socio-ecological research. For the remaining portion of the workshop, participants will engage in an interactive discussion of challenges and opportunities and pathways forward, including funding opportunities, for using socio-ecological research to shape community engagement for conservation. Pre-registration for this workshop is not required.

Poster 163: Remote Sensing of Invasive Plants with an Unmanned Aerial Vehicle

Time: 10:00 - 10:30
Date: 26th July 2018
Location: Machine 1

163 - Remote Sensing of Invasive Plants with an Unmanned Aerial Vehicle

Jean Fujikawa, Derek Ford
O‘ahu Invasive Species Committee, Pacific Cooperative Studies Unit, University of Hawai‘i at Mānoa, Kailua, Hawai‘i

Track

III. Invasive Species & Biosecurity

Abstract

Advances and cost reductions in unmanned aerial vehicle (UAV) technology led us to conduct initial testing to identify areas of our invasive species field operations that would benefit from this remote sensing platform. While there are numerous UAVs and supporting software available, we used a DJI Mavic Pro drone, DJI GO 4 flight software, and DroneDeploy flight

planning and processing software. We collected imagery and video primarily during our regularly scheduled fieldwork and visually reviewed the collection for the presence of our target species. Our miconia (*Miconia calvescens*) operations benefitted from UAV use through the quick and easy survey of traditionally slow and challenging uluhe (*Dicranopteris linearis*) areas. In addition, areas previously unsurveyable for miconia by ground or helicopter due to a combination of challenging vegetation, and proximity to residences and hazards have the potential to be surveyed using a UAV. When sampling for Rapid ʻŌhiʻa Death (*Ceratocystis* spp.), we found the UAV to be useful in locating the specific location of dead ʻōhiʻa trees. Devil weed (*Chromolaena odorata*) was not successfully detected, but further testing is highly recommended for this species. In our management areas, Himalayan blackberry (*Rubus discolor*), Cape ivy (*Delairea odorata*), and cane ti (*Tibouchina herbacea*) were undetectable. While surrounding vegetation hindered the detection of many of our target species, UAV surveys offered some benefit to our field operations in challenging and inaccessible areas.

Poster 131: HICEAS 2017 –- A Six Month Ship-Survey of the Hawaiian Archipelago with a Focus on Whales, Dolphins, and Seabirds

Time: 10:00 - 10:30
Date: 26th July 2018
Location: Machine 2

131 - HICEAS 2017 –- A Six Month Ship-Survey of the Hawaiian Archipelago with a Focus on Whales, Dolphins, and Seabirds

Kymberly Yano[1], Erin Oleson[2], Jeff Moore[3], Lisa Ballance[3], Jennifer Keating[1]
[1]RCUH, Joint Institute of Marine and Atmospheric Research, Honolulu, HI. [2]NOAA Fisheries, Pacific Islands Fisheries Science Center, Protected Species Division, Honolulu, HI. [3]NOAA Fisheries, Southwest Fisheries Science Center, Marine Mammal and Turtle Division, San Diego, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

In 2017, the Pacific Islands and Southwest Fisheries Science Centers conducted the Hawaiian Islands Cetacean and Ecosystem Assessment Survey (HICEAS), a large-scale ship survey for cetaceans and seabirds throughout the full extent of the Hawaiian archipelago from shore to 200 nmi offshore. HICEAS 2017 was the third survey of its kind in Hawaiian waters, with prior efforts in 2002 and 2010. Even though these large-scale surveys are rare, they are vital. Data from these surveys provide updated information for several management and conservation priorities, including updated population estimates and distribution maps for cetacean and seabird species that are found around the Hawaiian archipelago. After 179 days at sea, we had 345 visual cetacean sightings of at least 23 species of cetaceans, over 58 species of seabirds, and 766 daytime acoustic detections in our study area. The most frequently sighted cetacean species were short-finned pilot whales (*Globicephala macrorhynchus*), false killer whales (*Pseudorca crassidens*), pantropical spotted dolphin (*Stenella attenuata*), striped dolphins (*Stenella coeruleoalba*), sperm whales (*Physeter macrocephalus*), and rough-toothed dolphins (*Steno bredanensis*). The most frequently sighted seabird species were Wedge-tailed Shearwaters (*Puffinus pacificus*), Bonin Petrels (*Pterodroma hypoleuca*), Black-winged Petrels (*Pterodroma nigripennis*), and Sooty Terns (*Onychoprion fuscatus*).

Poster 197: The Honolulu Zoo's Role in Conservation for Hawai‘i: Building Collaborations and Partnerships

Time: 10:00 - 10:30
Date: 26th July 2018
Location: Machine 3

197 - The Honolulu Zoo's Role in Conservation for Hawaii: Building Collaborations and Partnerships

Laura Debnar, Kathryn Rone
Honolulu Zoo, Honolulu, HI

Track

II. Building the Future

Abstract

The 2016 International Union for the Conservation of Nature (IUCN) World Conservation Congress issued a global call to action to prioritize Hawaiian species survival and drafted the

Hawaii Commitments. The commitments include cultivating a culture of conservation, engaging and empowering youth, global food supply and preserving nature, the health of the ocean, eliminating wildlife trafficking, and the global impact of climate change. The Honolulu Zoo was very involved in the 2016 congress and in the planning of the congress events. In October 2015 the Honolulu Zoo hosted a workshop for zoo staff that was put on by IUCN Species Survival Council (SSC) instructors. Through those meetings it was determined that the Honolulu Zoo was committed, on all levels, to conservation in Hawaii and needed to act. This year the Honolulu Zoo hosted a Red List Workshop, taught by an IUCN SSC instructor, for various government agencies, conservation groups, and zoo management staff, on assessing Hawaiian endemic species. Current conservation partners include IUCN SSC; Hawaii Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DFW), Hawaii Invertebrate Program; United States Fish and Wildlife Service (USFW); Hawaii Wildlife Center, and Hawaii State Plant Quarantine. The zoo is becoming a conservation hub for Hawaii. The Honolulu Zoo is currently working with DLNR at the zoo's invertebrate lab, breeding Kamehameha butterflies and Hawaiian snails for release back into the wild. Our role as a zoo is conservation and educating guests from all over the world about conservation, sustainability and healthy living.

Poster 256: Translocation of Hawaiian seabirds to high islands to mitigate effects of climate change

Time: 10:00 - 10:30
Date: 26th July 2018
Location: Machine 4

256 - Translocation of Hawaiian seabirds to high islands to mitigate effects of climate change

Eric VanderWerf, Lindsay Young, Robby Kohley, Megan Dalton, Rachel Fisher, Leilani Fowlke, Erika Dittmar
Pacific Rim Conservation, Honolulu, HI

Track

II. Building the Future

Abstract

The most serious threats to birds nesting on oceanic atolls are sea level rise and introduced predators. The Northwestern Hawaiian Islands support some of the largest tropical seabird

colonies in the world, but most of the islands are < 5 meters high and are losing land area. We are attempting to mitigate the threat of climate change by translocating chicks to managed habitat on higher islands. Our goals are to achieve no net loss of seabird nesting habitat by protecting a similar amount of habitat that is being lost in the NWHI, and to create new colonies of four vulnerable seabird species that are secure from predators and sea level rise. We constructed a 16-acre predator exclusion fence at James Campbell National Wildlife Refuge on Oahu to protect seabirds. In 2015-2017, we translocated 50 Laysan Albatross chicks from Kauai to JCNWR, of which 46 fledged. In 2017 and 2018, we translocated 40 Black-footed Albatross chicks from Midway and Tern Island to JCNWR. In 2018, we moved 53 Bonin Petrel chicks and 25 Tristram's Storm-Petrel chicks from Midway and Tern Island. We expect the birds raised during this project to begin returning to the release site as adults in 3-5 years and to start nesting there in 5-9 years. The methods we are developing will be useful for other projects involving similar species.

Poster 57: Use of microhabitats as thermal refugia by Nerita picea (pipipi) in the Hawaiian intertidal zone and limits to thermal stress

Time: 10:30 - 11:00
Date: 26th July 2018
Location: Machine 1

57 - Use of microhabitats as thermal refugia by *Nerita picea* (pipipi) in the Hawaiian intertidal zone and limits to thermal stress

Caitlin Shishido, Amy Moran
University of Hawaii at Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Hawaiian intertidal zone is relatively understudied and little is known about the ecological stressors that affect intertidal organisms here. Typically, intertidal organisms in tropical locations live close to their thermal limits and are highly vulnerable to temperatures above their normal range. Access to thermal refugia may be the key to their survival as thermal stress

events increase in frequency and intensity. We are investigating the role of microhabitats as thermal refugia in the upper Hawaiian intertidal for the endemic gastropod *Nerita picea* (pipipi). We surveyed the intertidal zone at five sites around the island of O'ahu in summer 2017. We measured temperature distribution at noon-time low tides in 0.25 x 0.25 m quadrats along transects at each site using a thermal IR camera. We also mapped the spatial distribution of snails for comparison with the spatial distribution of temperature. At the hottest location (Ko'olina), temperatures at some points within quadrats reached as high as 51.8°C. *N. picea* were primarily found in small holes and larger tide pools even when these were not the coolest microhabitats available. We found that the rocky Hawaiian intertidal zone is a complex thermal mosaic, which may provide an important buffer for intertidal organisms when the climate warms. Ongoing work focuses determining the physiological temperature tolerance ranges of pipipi. Overall, this research provides a novel approach for rapidly measuring the microhabitat environment of a target species and highlights non-invasive methods for measuring an organism's physiological tolerance.

Poster 24: Hawai'i Environmental Education Alliance - Creating an environmentally literate Hawai'i

Time: 10:30 - 11:00
Date: 26th July 2018
Location: Machine 2

24 - Hawai'i Environmental Education Alliance - Creating an environmentally literate Hawai'i

Meredith Speicher[1,2], Katie Nalesere[3,4], Hōkūokahalelani Pihana[1]
[1]Hawaii Environmental Education Alliance, Honolulu, HI. [2]National Park Service, Honolulu, HI. [3]Department of Land and Natural Resources, Division of Aquatic Resources, Lihue, HI. [4]Hawaii Environmental Education Alliance, Lihue, HI

Track

II. Building the Future

Abstract

The Hawai'i Environmental Education Alliance (HEEA) fosters and develops high quality environmental education by building relationships and organizational capacity through networking and professionalism to promote education about environmental issues in

Hawai‘i. HEEA developed a strategic framework to guide our work called the Hawai‘i Environmental Literacy Plan (HELP). The HELP was developed through an inclusive process that reached out to professionals across the state. The HELP is written to support a growing movement – locally and nationally – to improve education in schools through environmental education (EE), which builds environmental literacy (EL). An environmentally literate person in Hawai‘i is an informed, lifelong learner who values the uniqueness of Hawai‘i, practices environmental and cultural stewardship, and lives sustainably. This comprehensive, statewide plan sets meaningful and achievable goals that, if implemented through public and private partnerships, will lead to measurable success. The HELP sets six major goals:

Goal 1 – Integrate EE in K-12 Schools for Environmental Literacy

Goal 2 – Develop and Support Learning Environments that Promote Environmental Literacy

Goal 3 – Improve Professional Development for Environmental Literacy

Goal 4 – Monitor and Assess Environmental Literacy

Goal 5 – Make Environmental Education and Environmental Literacy a Statewide Priority

Goal 6 – Provide Sustainable Funding for Environmental Literacy

This presentation will introduce the goals and objectives of the HELP and build our network of professionals through building awareness and opportunities to join the alliance.

Poster 12: Cost effective actions to mitigate land-based sources of pollution in West Maui through decision models

Time: 10:30 - 11:00
Date: 26th July 2018
Location: Machine 3

12 - Cost effective actions to mitigate land-based sources of pollution in West Maui through decision models

Megan Barnes, Kirsten Oleson, Whitney Goodell
University of Hawaii at Manoa, MANOA, HI

Track

II. Building the Future

Abstract

A cocktail of land-based sources of pollution presents serious threats to coral reef ecosystems, and addressing these has become a key global management and policy challenge. Yet causes of coral reef decline are complex, and establishing direct causal links between deleterious inputs, events, or actions, and these declines, is challenging. Using a decision science approach, we identifed a suite of actions and policy measures to maximise coral reef health and support livelihoods in West Maui under extreme uncertainty. We present the results of a structured decision making approach, including objectives development, decision models that combine biophysical models of sediment and nutrient models, and management alternatives that incorporate feasibility and pragmatic constraints collaboratively developed with stakeholders, as well as their relative costs and benefits of and a cost-effectiveness analysis. Through embedding decision science into stakeholder processes, we have already informed strategic decisions, identified spatial priorities for action, and co-developed spatial locations for new projects.

Poster 119: How collaborative research has helped define Hawaiian hoary bat activity in Kalaupapa National Park, thus better informing park management strategies

Time: 10:30 - 11:00
Date: 26th July 2018
Location: Machine 4

119 - How collaborative research has helped define Hawaiian hoary bat activity in Kalaupapa National Park, thus better informing park management strategies

Paul Hosten, Ryan Poland
Kalaupapa National Historical Park, Kalaupapa, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The endemic Hawaiian hoary bat (HHB), *Lasiurus cinereus semotus*, remains a federally listed endangered species. Research efforts within Kalaupapa National Historical Park (KNHP) and on Moloka'i, have not only helped define spatial and temporal fluctuations in HHB activity, but has provided empirical data that is being used as baseline information to better inform management decisions - potentially safeguarding HHBs from human activities.

Collaborative partnership with schoolchildren of Aka`ula School has bolstered research efforts at KNHP, rendering a broader empirical understanding of HHB activity - not simply within the park, but across Moloka'i. Incorporating pupils' local knowledge with discrete data has been key in constructing a fully encompassing understanding of HHB trends and ecology on the island. This new understanding of HHB range and abundance has been critical in facilitating development of realistic management goals within KNHP, aiding in implementation of strategies aimed to protect Hawaii's only native terrestrial mammal. Such strategies detail directives to minimize human-bat interaction, to conserve known occupied habitat, and to curtail vegetation management during the bat breeding season.

Collaborative research has deepened understanding of HHB ecology, without which we could not be confident that management decisions are informed and accurate, and our HHBs are not adversely affected by altering or destroying critical habitat; rather, our comprehensive data helps us prevent negative impacts on bat populations due to human interactions. Additionally, including local keiki as citizen scientists has fostered an interest beyond school; the principal investigators are frequently questioned regarding bat ecology in the streets by strangers.

Symposium 22: 'Auamo, Alu Like, 'Alalā: 25 Years of Conservation

Time: 11:00 - 12:00
Date: 26th July 2018
Location: 316BC

22 -
'Auamo, Alu Like, 'Alalā: 25 Years of Conservation

259 - 25 years of challenges and successes breeding and releasing endangered Hawaiian birds

Joop Kuhn[1,2], Marla Kuhn[3,2], Jay Nelson[4], Megan Laut[4], Jim Cogswell[5], Bryce Masuda[3]

[1]Hawai‘i Endangered Bird Conservation Program, Olinda, HI. [2]San Diego Zoo Global, San Diego, CA. [3]Hawai‘i Endangered Bird Conservation Program, Volcano, HI. [4]U.S. Fish and Wildlife Service, Honolulu, HI. [5]DLNR Division of Forestry and Wildlife, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

In 1993, intensive efforts began to prevent the extinction of ‘Alalā. Initial efforts focused on a rear-and-release project to collect wild eggs and release juveniles. This effort transitioned in the late 1990s to a conservation breeding and reintroduction effort for the ‘Alalā which increased the population from less than 20 birds in the 1990s to over 125 birds today. The effort expanded to include additional Hawaiian bird species and resulted in a total of 16 endemic species and subspecies that have been hatched and raised at the Keauhou Bird Conservation Center (Volcano) and Maui Bird Conservation Center (Olinda) over the past 25 years. We discuss the challenges encountered and lessons learned caring for, breeding, and releasing Hawaiian forest birds. We also share breeding and release success stores, particularly of Nēnē and Puaiohi. We also discuss current and future breeding and release activities with species such as ‘Akikiki. This collaborative effort resulted in the release of over 800 birds into the wild over 25 years.

268 - Keauhou Bird Conservation Center Discovery Forest Restoration Program: building stewards of the forest

Iwikau‘ikaua Joaquin[1], Heather Simmons[2], Bryce Masuda[3]
[1]Keauhou, Kapāpala, Ka‘ū. [2]Hawai‘i Forest Institute, ‘O‘ōkala, HI. [3]Hawai‘i Endangered Bird Conservation Program, Volcano, HI

Track

II. Building the Future

Abstract

From the Kumu or foundation established by a partnership between Kamehameha Schools, San Diego Zoo Global, the U.S Fish and Wildlife Service and the State of Hawai’i, the Hawai’i Endangered Bird Conservation Program started its first long term project at the Keauhou Bird Conservation Center.

This partnership or Kumu(tree trunk) sprouted a Lālā(branch) inspiring the Hawaii Forest Institute and the Hawai‘i Endangered Bird Conservation Program to apply for various grants to support the critical forest bird habitat restoration on the 160 acre conservation center property located at Keauhou, Ka‘u in Volcano, Hawai‘i. Through the volunteer work of visitors, this program plants thousands of native seedlings a year restoring critical forest bird habitat and educates them on how to be better stewards of our natural resources.

The goals of this program are:

1. Replenish native foliage that has been and is harvested for aviaries,

2. Provide easy access to native fruit and foliage for critically endangered Hawaiian forest bird diets,

3. Provide a connection and experience for the youth of Hawai‘i with our native Hawaiian watershed ecosystem.

262 - Using Tools from Animal Behavior and Learning to Help Save the ‘Alalā

Alison Greggor[1], Bryce Masuda[1], Joshua Pang-Ching[1], Jackie Gaudioso-Levita[2], Donna Ball[3], Jay Nelson[4], Paul Banko[5], Colleen Cole[6], Alex Wang[7], John Vetter[4], Susan Farabaugh[8], Ron Swaisgood[8]
[1]Hawai‘i Endangered Bird Conservation Program, Volcano, HI. [2]DLNR Division of Forestry and Wildlife, Hilo, HI. [3]U.S. Fish and Wildlife Service, Hilo, HI. [4]U.S. Fish and Wildlife Service, Honolulu, HI. [5]U.S. Geological Survey, Volcano, HI. [6]Three Mountain Alliance, Volcano, HI. [7]Hawaii Natural Area Reserve System, Hilo, HI. [8]San Diego Zoo Global, San Diego, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Insights from the field of animal behavior and learning can serve as valuable tools in conservation management, especially in reintroduction programs. When captive bred animals are released into the wild, it cannot be assumed that they have retained the survival skills they need to succeed. We explain how we implement and rely on behavioral training as part of the reintroduction program for the critically endangered ‘Alalā (*Corvus hawaiiensis*). As a long-lived, intelligent species, the ‘Alalā are particularly susceptible to the effects of life in captivity. We detail the behavioral methods and evaluation steps we take to prepare the

birds for life in the wild. By using biologically relevant stimuli and focusing on learning mechanisms, we promote anti-predator behavior, track native fruit foraging proficiency and monitor the social interactions of the release cohorts. Together these tools allow us to assess an individual's readiness for release and to evaluate reintroduction success.

266 - ʻAlalā Released into the Wild: Methods and Observations

Joshua Pang-Ching[1,2], Alison Greggor[1], Ron Swaisgood[3], Susan Farabaugh[3], Jackie Gaudioso-Levita[4], Donna Ball[5], Jay Nelson[5], Paul Banko[6], Colleen Cole[7], Alex Wang[2], John Vetter[5], Bryce Masuda[1]
[1]Hawaiʻi Endangered Bird Conservation Program, Volcano, HI. [2]Hawaii Natural Area Reserve System, Hilo, HI. [3]San Diego Zoo Global, San Diego, CA. [4]DLNR Division of Forestry and Wildlife, Hilo, HI. [5]U.S. Fish and Wildlife Service, Honolulu, HI. [6]U.S. Geological Survey, Volcano, HI. [7]Three Mountain Alliance, Volcano, HI

Track

II. Building the Future

Abstract

In the fall of 2017, after intensive planning and preparation, a cohort of eleven critically endangered ʻAlalā were released in the Puʻu Makaʻala Natural Area Reserve on Hawaii Island. The primary goal of the release effort is to establish a wild, self-sustaining population of ʻAlalā. Since the initial release, an intensive field monitoring program continues to monitor and care for the released ʻAlalā in order to enhance their survival in the wild. We discuss the monitoring strategies (i.e. visual observations, camera traps, VHF radio telemetry) and methods of care (i.e. supplemental feeding, food consumption, weights) to support the integration of the ʻAlalā into the wild. We share our field observations of movements, foraging behavior, and general activity of the released ʻAlalā, including observations of interactions between the ʻAlalā and their only endemic predator: ʻIo. We also discuss how the 2017 release along with past release efforts and outcomes serve as *kumu*: helping to inform and guide future releases. The release is part of a large recovery project partnership between the Hawaiʻi Endangered Bird Conservation Program, San Diego Zoo Global, State of Hawaiʻi Department of Land and Natural Resources, U.S. Geological Survey, Kamehameha Schools, Three Mountain Alliance, and the Hawaii Volcanoes National Park.

Symposium 8: Groundwater-Dependent Ecosystems and Sustainable Yield

Time: 11:00 - 12:00
Date: 26th July 2018
Location: 316A

8 - Groundwater-Dependent Ecosystems and Sustainable Yield

142 - The importance of water and wetlands for Hawai‘i’s native waterbirds

Eben Paxton
USGS Pacific Island Ecosystems Research Center, Volcano, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

All five native Hawaiian waterbird species are endangered, largely through loss of habitat, particularly wetlands. However, the degree they are dependent on wetlands and what types of wetlands they prefer varies among species, making managing for multiple species challenging. Factors such as availability of wetlands across the landscape, water level fluctuations, salinity, invasive plant species and predators, all influence where waterbirds are found and whether they can flourish. I will cover species habitat needs, distribution and numbers, and factors associated with water availability that can influence long term sustainability of these important native species.

63 - The endangered orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*) at Kaloko-Honōkohau National Historical Park: does water quality matter?

Robert Peck
Hawai`i Cooperative Studies Unit, USGS Kilauea Field Station, Hawai'i Volcanoes National Park, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The endangered orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*) was formerly found at many low elevation sites across the archipelago. Due to habitat loss and degradation, and predation from invasive fishes, the species' range has been reduced to a few small, isolated populations on O`ahu, Moloka`i, Lāna`i, Maui and Hawai`i Island. Like most damselflies, the orangeblack damselfly requires suitable aquatic habitat for the development of its larvae. Today, this species is primarily restricted to a few coastal wetlands, anchialine pools and streams. Kaloko-Honokōhau National Historical Park (KAHO) on the Kona Coast of Hawai`i Island protects the only known population on the western part of the island. At KAHO we surveyed nearly 150 anchialine pools for damselflies and water quality, and found the orangeblack damselfly to occupy only eight closely associated pools. We also found water quality to vary across the park which may contribute to habitat suitability of the pools. Previous studies have shown that orangeblack damselfly eggs and larvae are influenced by salinity and temperature, with development and survival decreasing dramatically past certain thresholds. Considering these thresholds, our study suggests that only a subset of pools at KAHO appear to be optimal for orangeblack damselfly survival. Because anchialine pool water is a dynamic mix of fresh ground water and saline ocean water, changes in water input from either direction (e.g. groundwater drawdown or sea surface rise) may further affect the suitability of these pools to damselflies.

94 - Recognizing Groundwater-Dependent Species Amid Coastal and Water Resource Issues

Ryan Okano, Troy Sakihara
State of Hawaii Department of Land and Natural Resources, Division of Aquatic Resources, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Groundwater-dependent ecosystems are an integral part of the cultures and lifestyles in island communities across the tropics. Groundwater is one of the natural sources of freshwater which can provide much needed nutrients to these nearshore biological communities. A wide array of native species, many of which are valuable food and cultural resources, use groundwater-dependent habitats as estuaries which are crucial for the developmental and adult stages of their life cycles, especially in areas lacking streams that naturally flow into the ocean. In fact, within areas that lack streams, some species are exclusively found in these groundwater-dependent habitats, therefore making groundwater

quality and discharge important for their survival. Indigenous cultures of the tropical Pacific were aware of this. They sought out these areas to capture and collect particular fish, invertebrate, and algal species. In Hawaii, certain sites of submarine groundwater discharged (SGD) were selected to establish fish ponds. However, in modern times this understanding and appreciation of SGD is in flux. Along porous and conductive coastlines, where nearshore biological communities have been compromised and are adjacent to developments that dispose of wastes via cesspools, this change in perception of SGD is highlighted. Groundwater in these anthropogenically altered settings can be laden with high loads of nutrients and other pollutants, which are detrimental to nearshore biological communities. These threats challenge traditional concepts and ideas in managing groundwater as it relates to nearshore biological communities in Hawaii.

231 - Thirty Six Years of Environmental Monitoring at the Natural Energy Laboratory of Hawaii Authority in Context of Natural Environmental Variability

Keith Olson, Pamela Madden
Natural Energy Laboratory of Hawaii Authority, Kailua-Kona, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Over the past 36 years, the Natural Energy Laboratory of Hawaii Authority (NELHA) has collected an extensive water chemistry and biota survey data set. NELHA will present a summary of its environmental monitoring observations in the context of natural environmental variability in the West Hawaii Region of the island of Hawaii. NELHA tests and reports on regular intervals, samples collected and observations made at 34 groundwater well locations, 30 nearshore transect stations, 3 anchialine pond complexes and 54 terrestrial seawater-return trenches located within and around its ocean-front facility. The purpose of NELHA's environmental monitoring program is to detect changes in the environment which might arise from renewable energy, aquaculture and water bottling development activities on its 870 acre technology park. NELHA supports these innovative businesses and research endeavors by operating a seawater pumping facility that delivers 30 million gallons per day of nutrient-rich deep seawater and nutrient-poor surface seawater to our clients. Our clients' seawater disposal is discharged into surface trenches located in proximity of the shoreline and anchialine pool complexes. To detect possible anthropogenic changes in these sensitive ecosystems, NELHA documents the regional environmental variability due to geological, meteorological, and the oceanographic conditions in West Hawaii. This regional natural background variability provides a context within which to assess potentially harmful conditions. These natural environmental variability boundary

conditions in conjunction with water chemistry regulations and biota surveys guide the environmental management at NELHA.

Forum 295: Evolving Management: Learning From A Decade of Co-Managing Papahānaumokuākea Marine National Monument

Time: 11:00 - 12:00
Date: 26th July 2018
Location: 315

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295 - Evolving Management: Learning From A Decade of Co-Managing Papahānaumokuākea Marine National Monument

Athline Clark[1], Randall Kosaki[1], Sheldon Plentovich[2], Kalani Quiocho[1], Charles Littnan[3], Maria Carnevale[4], Mike Marxen[5], Keola Lindsey[6]
[1]NOAA ONMS PMNM, Honolulu, HI. [2]USFWS, Ecological Services, Honolulu, HI. [3]NOAA NMFS, Honolulu, HI. [4]DLNR DAR, Honolulu, HI. [5]USFWS, Refuges, Honolulu, HI. [6]OHA, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Effective co-management of Papahānaumokuākea Marine National Monument (PMNM) depends upon designing processes tailored to the complex management setting and multiple cultures and knowledge systems involved. This two-part forum summarizes lessons learned in the evolution of PMNM co-management to date, and engages audiences in identifying strategies and tools to inform future management and address key challenges. The forum also will spark conversations and help expand the community of interest around the field of Hawaii marine protected area management.

Poster 141: Ecology of ʻōpeʻapeʻa (Hawaiian hoary bat) on Maui

Time: 11:00 - 11:30
Date: 26th July 2018
Location: Machine 1

141 - Ecology of ʻōpeʻapeʻa (Hawaiian hoary bat) on Maui

Dave Johnston[1,2], Kristin Jonasson[3], Brad Yuen[3]
[1]H. T. Harvey & Associates, Los Gatos, CA. [2]San Jose State University, San Jose, CA. [3]H. T. Harvey & Associates, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Little is known about the ecology of the ʻōpeʻapeʻa (*Lasiurus cinereus semotus*), and the lack of information is hampering efforts to develop effective mitigation and recovery plans. We are investigating three aspects of their ecology: 1) habitat use, 2) home range size, and 3) roost selection within a ~30,000 ha study area of Maui's Upcountry.

To describe current habitat use, we deployed nine bat detectors in different habitat types at randomly chosen points. Detectors recorded bat calls for three consecutive nights in each habitat and then were rotated five times every other month. We used a generalized linear model fit by maximum likelihood with a negative binomial distribution, with night and site as random factors, and habitat as the fixed effect of interest. Bats preferred scrub/grassland and gulch habitats ($P < 0.0001$) disproportionately to the availability of these habitats. Forest habitat (31% of total area available) was seldom used suggesting purchasing forests may not be appropriate mitigation.

We determined bats' home range size with a radio-telemetry study. Two teams with mobile handheld antennae determined the positions of radio-tagged bats at night and allowed us to map their core use areas. Further, we set up four automated receiver stations to help determine positions and activity patterns of radio-tagged bats. Home range size (first 6 months of data) ranged from 1,200 – 26,000 ha.

Roost trees included *Eucalyptus globulus*, *Spathodea campanulata*, and *Cupressus macrocarpa*. Our results should help define the best habitat types for the recovery of this endangered species.

Poster 138: Leading by Example: Implementing Best Management Practices on the Farm

Time: 11:00 - 11:30
Date: 26th July 2018
Location: Machine 2

138 - Leading by Example: Implementing Best Management Practices on the Farm

Frankie Koethe, Jean Brokish, Dave Elliott, Miranda Foley
Oahu Resource Conservation and Development Council, Kunia, HI

Track

II. Building the Future

Abstract

Sustainable watershed-friendly farming provides a strong foundation for an abundant future. The State of Hawai‘i pushes initiatives for increased local agriculture production, while simultaneously promoting increased watershed protection. To some, this may seem counter-productive, but O‘ahu Resource Conservation and Development Council (O‘ahu RC&D), an agriculture-based non-profit, is strategically positioned to enhance both of these goals in an impactful way through the use of extensive community outreach and Best Management Practices (BMPs) on local farms. Sediment and nutrients are detrimental to aquatic and nearshore environments and often are the primary causes of watershed impairment. The O‘ahu RC&D team works one-on-one with farmers to develop conservation plans and implement practices that improve water quality by reducing total nitrogen, phosphorus, and sediment runoff. With funding from the Hawaii Department of Health, O‘ahu RC&D collaborated with farmers in the Waiāhole and Ka‘alaea watersheds to implement a variety of BMPs that resulted in reductions of 90 metric tons of sediment, 68 kilograms of nitrogen and 30 kilograms of phosphorus. O‘ahu RC&D continues to work in these watersheds and has extended efforts to Ma‘ili‘ili, an agricultural hub in Wai‘anae. O‘ahu RC&D’s partnership with farmers illustrates potential for a strong agricultural foundation that supports watershed health and environmental stewardship. Project methods and results demonstrate that community-based strategies to support farmers are applicable to watersheds across the State, and enhances local agriculture for generations to come.

Poster 229: The Role of Climate Change and Ecosystem Services in the Migration Decisions of Marshallese Islanders to Hawai‘i

Time: 11:00 - 11:30
Date: 26th July 2018
Location: Machine 4

229 - The Role of Climate Change and Ecosystem Services in the Migration Decisions of Marshallese Islanders to Hawai‘i

Kees van der Geest[1,2], Maxine Burkett[3], Juno Fitzpatrick[4], Brittany Wheeler[5]
[1]Post-Doctoral Social Science Researcher, Environmental Law Program, Honolulu, Hawaii. [2]Associate Academic Officer, United Nations University, Institute of Environment and Human Security, Bonn, Germany. [3]Principal Investigator, Professor of Law, Honolulu, HI. [4]Social Science Researcher, Environmental Law Program, William S. Richardson School of Law, University of Hawai’i Manoa, Honolulu, HI. [5]Graduate School of Geography at Clark University, Massachusetts

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

As one of the lowest-lying island nation-states in the world, the Republic of the Marshall Islands (RMI) is acutely vulnerable to flooding, storms, hurricanes and the associated impacts on freshwater supply and habitable land. Climatic change often acts in concert with other socioeconomic factors to drive displacement. Numbers of Marshallese residing in Hawai‘i have rapidly risen over the past two decades. We conducted 280 interviews with Marshall Islanders in RMI and Hawai‘i and a geospatial analysis of migration and environmental change to study to what extent climatic stressors, and their impacts on ecosystems, livelihoods, and habitability, are already driving migration in RMI. The results show that Marshallese primarily cite education, healthcare, and work as motivations for migration to Hawai‘i. Interviewees identify impacts of climate change and weather shocks as underlying drivers that contribute to migration by affecting food security, water security, infrastructure, public health and safety in the RMI. Policy makers—including congressional and Hawai‘i state

representatives who have focused recent attention on immigrant access to services—require better information, empirical data, and analysis to understand the factors contributing to current migration, prevent, mitigate, or manage current population movement and to anticipate possible future impacts of climate on human migration and to prepare accordingly.

Poster 28: Super Corals: A Strategy to Save Our Reefs

Time: 11:30 - 12:00
Date: 26th July 2018
Location: Machine 1

28 - Super Corals: A Strategy to Save Our Reefs

Kira Hughes[1], Ruth D. Gates[2]
[1]Hawai'i Institute of Marine Biology, Kāne'ohe, HI. [2]Hawai'i Institute of Marine Biology, Kane'ohe, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Kumulipo, a Hawaiian creation chant, identifies Ko'a (a coral polyp), as the first organism created and a foundation for all others. It teaches that the kai and 'aina are interwoven. Coral reefs protect the 'aina from storm surges and erosion, shelter food sources, have medicinal applications, and support fishing and tourism. However, over the past 30 years we have lost 50% of corals worldwide. Climate change, driven primarily by burning fossil fuels, is the main threat to corals. With temperature projections increasing over time, it is estimated that only 10% of corals will survive past 2050. We must take urgent action to establish a foundation of more resilient corals ("Super Corals") that can resist heat-induced bleaching. In 2015, we spearheaded novel research aimed at accelerating natural selection to enhance stress tolerance (human-assisted evolution). We have used emerging technologies such as 1) selective breeding, 2) inducing acclimatization, 3) modifying symbioses, 4) hyperspectral aerial imaging, and 5) developing genetic markers. We selectively bred two of the main reef-building species in Kāne'ohe Bay, induced acclimatization in three species, identified heat tolerant *Symbiodinium* (i.e. zooxanthellae), mapped resilient colonies by plane, and sequenced bleached and non-bleached colonies. The threats corals face are so extensive that community engagement is essential to their survival. Community volunteers are invited to assist with spawning and

restoration efforts, as well as monitoring coral bleaching. We must intervene now or we will ultimately lose coral reefs along with their unique beauty and the important ecosystem services they provide.

Poster 243: DNA Sequences Help Solve the Mystery of Albizia's Origin for Better Management Using Biological Control

Time: 11:30 - 12:00
Date: 26th July 2018
Location: Machine 2

243 - DNA Sequences Help Solve the Mystery of Albizia's Origin for Better Management Using Biological Control

Kenneth Puliafico[1], Nancy Chaney[2], Tracy Johnson[2], Paul Hodgskiss[3], Jessica Wright[3]
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Track

III. Invasive Species & Biosecurity

Abstract

Falcataria moluccana ("albizia") is considered the world's fastest growing tree species. In Hawai'i this tree has become an invasive alien that outcompetes native plants, modifies natural ecosystems and imperils the lives and livelihoods of communities across the islands. Albizia was deliberately introduced by Joseph Rock in 1917 from Borneo and Java, and was widely planted within Hawaii's Forest Reserve system. The question of the real source of these trees remains since the initial introductions came from outside of the native range of albizia in the Moluccas, New Guinea, the Bismarck Archipelago, and the Solomon Islands. Solving this mystery is important since it is thought that the safest and most effective biological control agents will be the specialized natural enemies that have had long evolutionary associations with these tree populations in the native range prior to their introduction to Hawai'i . In order to find these native populations we used DNA sequencing techniques to determine the population structure of the trees in Hawai'i and compare them to samples across the native and invaded ranges. Leaf

material was collected by collaborators from across the Pacific (French Polynesia, Samoa, Cook Islands, Micronesia, and Palau), while our team collected from sites in Indonesia and Papua New Guinea during surveys for potential biological control agents. Over 160 albizia populations in total were sequenced and analyzed. The results from this study will help us to focus our efforts to find future biological control agents to bring sustainable, safe, long-term management for this giant, beautiful but invasive tree.

Poster 5: Canopy Interception of Native Versus Invaded Mesic Forest in Mākaha Valley, O'ahu: A Comparative Study

Time: 11:30 - 12:00
Date: 26th July 2018
Location: Machine 3

5 - Canopy Interception of Native Versus Invaded Mesic Forest in Mākaha Valley, O'ahu: A Comparative Study

Nancy Matsumoto, Amy Tsuneyoshi, Kaimana Wong, Michele Harman
Honolulu Board of Water Supply, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

A primary goal of the Honolulu Board of Water Supply is to ensure there is an adequate supply of water for current and future generations. In this regard, the capacity of O'ahu's watersheds to capture and store precipitation is critical, as this is the sole natural source of freshwater supply for the island.

Despite its critical role in water supply, it has been noted that the water budget of O'ahu's watersheds has not been well-studied. Of particular interest is the effect of invasive plant species on the ability of these watersheds to capture and recharge precipitation, compared to the relatively intact native forests remaining on the island.

Initially, HBWS found that the only water supply research that assessed differences between native and invaded forest in Hawai'i, was limited research in high-elevation "cloud forest" terrain on the island of Hawai'i, where fog drip is a primary component of precipitation capture.

To better understand the effect of invasive plant species on the recharge ability of watersheds on O'ahu, the HBWS Hydrology-Geology Branch embarked on a Canopy Interception Study on its watershed lands in Mākaha Valley. Native and invaded mesic forest test plots were selected, surveyed, and equipped with gross rainfall, throughfall and stemflow equipment for long-term data collection and evaluation. Preliminary data to date indicate appreciable differences in throughfall and stemflow patterns between the native and invaded test plots. This presentation summarizes the study's forest test plot selection and design, data collection equipment and methodology, and preliminary data and analysis.

Poster 180: Impact of Invasive Cane Toads on the Invertebrate Community and Endangered Waterbirds at James Campbell National Wildlife Refuge

Time: 11:30 - 12:00
Date: 26th July 2018
Location: Machine 4

180 - Impact of Invasive Cane Toads on the Invertebrate Community and Endangered Waterbirds at James Campbell National Wildlife Refuge

Taylor Smith[1,2], Randi Riggs[1], Bethany Chagnon[1], Jeff Burgett[1]
[1]USFWS James Campbell National Wildlife Refuge, Kahuku, Hawaii. [2]KUPU Americorps, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

Invasive cane toads (*Rhinella marina*) were introduced to Hawaii in 1932 and are known to be voracious predators of invertebrates, and are also known to occasionally predate other small vertebrates. Hawaii's endangered waterbirds are threatened by several invasive species that

are direct predators of adults and chicks. In the past, the indirect impacts of cane toads on food resources for endangered waterbirds have not been given much consideration in invasive species management programs targeted at endangered waterbird recovery. We conducted a preliminary assessment of the impact invasive cane toads may have on endangered waterbirds at James Campbell National Wildlife Refuge. Cane toad populations were surveyed periodically in 2017, and a control project began in 2018 due to the high density of toads observed. Invertebrates are a main, protein rich food source for three species of endangered waterbirds that occur on the refuge (Hawaiian Gallinule (*Gallinula galeata sandvicensis*), Hawaiian Coot (*Fulica alai*) and Hawaiian Stilt (*Himantopus mexicanus Knudsen*)). The high densities of cane toads are suspected to significantly reduce available food resources for endangered waterbirds. Stomach contents of captured cane toads were examined to determine prey quantity and type. Preliminary results indicated cane toads prey mostly on small invertebrates such as shrimp larvae and small beetles with the occasional caterpillar and small crayfish. By combining this information with population size estimates from surveys of cane toads, we estimated the amount of invertebrates cane toads are removing from the environment at James Campbell National Wildlife Refuge.

CONCURRENT SESSION 7

Workshop 129: Mobile Mapping & Crowdsourcing: Any Phone, Any Tablet, Any Data, On or Offline

Time: 13:00 - 15:00
Date: 26th July 2018
Location: 311

129 - Mobile Mapping & Crowdsourcing: Any Phone, Any Tablet, Any Data, On or Offline

Ian Hanou
Plan-It Geo, Arvada, CO

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Technology can have a profound impact on our ability to manage data on natural resources, sensitive habitat, forests and more. It can also educate the public about the benefits and services of natural systems, and ways to communicate this efficiently and transparently. In recent years, this data has been incorporated into modern web-based GIS mapping applications. Mobile cloud-based applications involving inventory, assessment, data management tools, and web dashboards are an opportunity not to be missed by any conservationist. This technology inherently provides an interactive map of nature-based information to the public and allows non-technical users to explore, map, assess, monitor, and report green infrastructure with their smartphone, tablet or personal computer.

This hands-on, indoor/outdoor workshop will present, demonstrate, and provide training on benefits and efficiencies gained from data that is instantly stored "in the cloud", viewable anywhere, by a variety of stakeholders (government, contractors, crews, and residents), in real-time. Specific examples will include electronic, web-based access to tree inventories, parks management, invasive species mapping, and regional green infrastructure mapping & prioritization. The workshop will also discuss and engage participants in the decision points, benefits, challenges to new technology, and recommendations.

Attendees will learn new terminology related to GIS, GPS, web browser mapping applications, login user roles/permissions, and more. They will learn to use imagery base maps, navigation tools, interact with and share online maps, and how to map data points of interest from a mobile device in the field. Related online learning resources will be provided.

Forum 181: Biocultural Approaches to Expanding the Impact and Efficacy of Restoration Actions

Time: 13:00 - 15:00
Date: 26th July 2018
Location: 316BC

181 - Biocultural Approaches to Expanding the Impact and Efficacy of Restoration Actions

Clay Trauernicht[1], Natalie Kurashima[2], Kawika Winter[3], Christian Giardina[4]
[1]University of Hawaii at Manoa, Honolulu, HI. [2]Kamehameha Schools, Kailua-Kona, HI. [3]National Tropical Botanical Garden, Limahuli, HI. [4]US Forest Service, Hilo, HI

Track

II. Building the Future

Abstract

The concept of biocultural landscapes recognizes the complex interactions between humans and the environment that have, and continue to, shape ecosystems through time. As conservation efforts in Hawai‘i increasingly work to meaningfully engage the broader public, critical questions emerge about how resources most valued by local communities may alter ‘conventional’ ecological restoration baselines for conservation. Even the motivations and processes involved in restoration are being re-examined. This forum will explore how a biocultural framework can potentially expand the diversity of benefits communities derive from restored ecosystems and reciprocally expand community engagement in ecosystem stewardship. The forum will invite six researchers and practitioners to share their perspectives and engage with the audience to address two key questions: 1) What processes/protocols can we develop to better understand and include communities, their practices and values in restoration projects that seek a more collaborative and community based approach?; and 2) Are there geographic, ecological, or ethical constraints and/or advantages to integrating traditional knowledge system approaches with western approaches for biodiversity conservation? After a presentation to define biocultural restoration, the audience will be asked to share the values and relationships they have with restored ecosystems via a facilitated group activity. The panelists will then share their perspective and address audience questions related to the two key questions above. The forum will close by asking the audience how their perspective on restoration has changed and what knowledge-based or financial resources would help to facilitate integrating community values into their work.

General Session: Climate Change/Social Sciences/Approaches

Time: 13:00 - 14:30
Date: 26th July 2018
Location: 316A

13 - Potential Impacts of Sea Level Rise on Native Coastal Plant Communities on the Main Hawaiian Islands

James D. Jacobi, Frederick Warshauer
U.S. Geological Survey, Pacific Island Ecosystems Research Center, Hawai‘i National Park, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

One of the expected impacts of climate change for the Hawaiian Islands is a projected increase in sea level of approximately one meter by the year 2100; this could severely impact biological resources located along portions of the coastline. We compiled data on composition, distribution, and status of Hawaiian coastal plant communities and their habitats from past and current field surveys, and from several habitat GIS layers, to identify Hawaiian coastlines which currently have high-quality native plant communities, and which areas could be most vulnerable to projected sea level rise. 565 coastline segments were assessed for their composition, status, site characteristics, and vulnerability due to sea level rise on the seven major Hawaiian Islands. 11.5 percent of the coastlines surveyed had very-high-quality native coastal vegetation; 9.1 percent of the coastline was in high-quality status; 18.5 percent was in the moderate-status category; and 60.8 percent of the coastline in highly disturbed or in poor-quality status. Thirty-six of the high and very high quality coastal vegetation segments throughout Hawai`i appear to be in areas that currently have barriers or other limitations that may restrict the movement and establishment of the native plant communities inland from their present locations in response to sea level rise. The results of this study are intended to provide a spatial foundation for identifying priority sites containing native coastal vegetation which can be used for the development of management strategies to help maintain and restore the viability of native coastal plant communities at these sites.

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26 - Implications of pace and direction of climate shifts to conservation efforts in Hawaii

Lucas Fortini[1], Kevin Brinck[2], Paul Berkowitz[2]
[1]Pacific Island Ecosystems Research Center- USGS, Honolulu, HI. [2]Hawaii Cooperative Studies Unit- UH Hilo, Hilo, HI

Track

II. Building the Future

Abstract

The effects of climate change are commonly based on forecasts of changes in rainfall and temperature at some point in the future, typically the end of the century for Hawaii. These seemingly static projected future conditions obscure the fact that climate change is an ongoing

process occurring for decades. The concept of climate velocity illustrates the gradual process of climate change from current to future conditions by illustrating the pace and direction of expected climatic shifts. Conditions at a point on the ground (e.g., Point A) change over time, such that in the future these conditions may be found at a nearby location (e.g., Point B). The distance and direction between point A and B lets us calculate how quickly a set of constant climate properties is moving across the landscape. We have calculated climate velocities for Hawaii that allow us to visualize patterns of Hawaii's changing climate, and see where climate change is occurring fastest. We then use these climate velocities to evaluate how long conservation management areas will retain their present climate and also to identify native plant species present in areas of expected rapid change.

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218 - What was the Fate of Maui Corals after the 2015 Thermal Bleaching Event?

Michelle Loewe[1], Dr. Emily Kelly[2], Dr. Jennifer Smith[2], Dr. Stuart Sandin[2], Dr. Brian Zgliczynski[2], Darla White[3], Russell Sparks[3]
[1]Scripps Institution of Oceanography, UC San Diego, La Jolla, CA. [2]Scripps Institution of Oceanography, UCSD, La Jolla, CA. [3]Hawai'i DLNR Division of Aquatic Resources, Maui, Hawai'i

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

In 2015, the coral reefs of the Hawaiian Islands, including the island of Maui, experienced an unprecedented mass thermal bleaching event. Using a dual camera system, we took thousands of images of three coral reefs around Maui every six months from November 2015 during the bleaching event through July 2017. Images were stitched together to form 10 m x 10 m 3 dimensional photomosaics from which individual corals could be followed through time. We followed five of Maui's most abundant coral species through a post bleaching time series analysis tracking the fate of the corals to understand coral recovery vs. partial or full mortality. Variability in recovery and mortality across species and reefs have implications for recovery, size, and distribution changes of the corals after the bleaching event. This work has further implications for how Maui's reefs could change as thermal bleaching events become more common with global climate change. The photomosaic technology used in this project is an increasingly important tool that provides the ability to document changes to benthic systems and complete thorough analyses of those systems on large spatial scales. The use of photomosaic imagery supports the constant pursuit to better understand how the baselines of our coral reefs are changing and with this understanding, can contribute to informing management decisions.

248 - Climate Adaptation in Hawai‘i: From Research to Action

Wendy Miles[1,2], Deanna Spooner[3,2], Jeff Burgett[2,3], Lucas Fortini[4,2], Patrick Grady[5,2], Lauren Kaiser[5,2], Peggy Foreman[1,2]
[1]Center for Conservation Research and Training, University of Hawai'i at Manoa, Honolulu, HI. [2]Pacific Islands Climate Change Cooperative, Honolulu, HI. [3]U.S. Fish and Wildlife Service, Honolulu, HI. [4]USGS Pacific Island Ecosystems Research Center, Honolulu, HI. [5]Hawai'i Cooperative Studies Unit, Hilo, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

How do we ensure that climate change research and information is integrated into resource management throughout the main Hawaiian Islands? This question lies at the heart of a multi-year effort led by the Pacific Islands Climate Change Cooperative (PICCC) beginning in 2014. The PICCC set out to convene an effective science-management partnership focused on developing a comprehensive understanding of how climate change is affecting terrestrial and freshwater systems and the biological, cultural, and social values they support. The objectives were to: identify current climate science, as well as critical needs and gaps; synthesize best available climate science to support reliable and timely decision-making and stewardship; increase understanding of how biocultural resources are vulnerable to climate change, in addition to the compounding effects of non-climatic stressors; develop scientific, policy, and outreach resources to support adaptation planning and implementation; facilitate the creation of adaptation options to reduce these vulnerabilities; and engage conservation leaders in climate change adaptation, supporting their capacity to make climate-informed decisions in their management of terrestrial and freshwater resources. This presentation explores the genesis of the PICCC effort, how the broader conservation community engaged in and shaped this process, and the lessons learned along the way. We’ll share a sampling of the hundreds of freely-available decision-support tools and informational products unveiled in early 2018 through the interactive, GIS-based HITAI Story Map. One key lesson to be discussed is the necessity of strong working relationships and an iterative engagement process for this type of initiave to succeed.

154 - Hawai'i and Pacific Islands King Tides Project – Using Citizen Science to understand and prepare for sea level rise

Maya Walton[1], Katy Hintzen[1], Bradley Romine[1], Matthew Gonser[2], Shellie Habel[3]
[1]Hawaii Sea Grant, University of Hawaii at Manoa, Honolulu, Hawaii. [2]City and County of Honolulu's Office of Climate Change, Sustainability and Resiliency, Honolulu, HI. [3]University of Hawaii at Manoa, Honolulu, HI

Track

II. Building the Future

Abstract

It can be challenging to connect large scale coastal hazards such as sea-level rise to local community-level impacts. The Hawai'i and Pacific Islands King Tides Project seeks to address this challenge by engaging citizen scientists in documenting the highest annual tides, also known as King Tides. Observing and documenting local impacts of King Tides can help us gain insight into what our coastlines may look like in the future with rising sea-levels. Citizen scientists have already submitted more than 2,400 photo records to this project. This publicly available dataset is a critical resource to scientists, decision makers, and communities in better understanding and preparing for the impacts coastal hazards and sea-level rise. This session will outline how formal and informal educators, K-12 students, and interested community members can participate in the Hawai'i and Pacific Islands King Tides Project. The workshop will include a brief overview for accessing the project's free smartphone app, public data set, and web map. This project aims to increase understanding of King Tides and the impacts of sea level rise on environmental, biological and social systems in Hawai'i. We hope to recruit new citizen scientists to engage in community driven actions to contribute to sea-level rise research, policy, and community adaptation efforts.

Symposium 11: Drought in Hawai'i: State of the Science and Management across Sectors

Time: 13:00 - 14:00
Date: 26th July 2018
Location: 315

11 - Drought in Hawai'i: State of the Science and Management across Sectors

92 - Hydrologic Drought in Hawai‘i

Stephen Anthony, Delwyn Oki
USGS Pacific Islands Water Science Center, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Hydrologic droughts can cover extensive areas and can last for several years, severely impacting ecosystems and many beneficial uses of water in Hawai‘i. Periods of hydrologic drought can affect both surface-water and groundwater resources, which can significantly reduce freshwater availability for public-water supplies, irrigation, cultural practices, recreation, and habitat for freshwater and nearshore aquatic ecosystems. Hydrologic droughts that affect streamflow generally are most severe during periods of persistently low rainfall corresponding to severe meteorologic droughts. Droughts affecting groundwater resources also generally correspond to periods of persistently low rainfall. However, groundwater resources may not respond rapidly to changes in rainfall because of groundwater storage in aquifers. Furthermore, groundwater resources can be affected by withdrawals from pumped wells, particularly in areas where groundwater is heavily developed. Because surface-water and groundwater resources may be affected by different factors and at different time scales, the most severe hydrologic droughts from a groundwater perspective may not necessarily correspond to the most severe hydrologic droughts from a surface-water perspective. The adverse effects of drought on groundwater resources can be magnified in areas where groundwater is heavily developed.

99 - Hawai‘i Drought Synthesis

Abby Frazier[1], Christian Giardina[2], David Helweg[3], Thomas Giambelluca[4], Matthew Lucas[5], Clay Trauernicht[5], Tomoaki Miura[5]
[1]USDA Forest Service, Honolulu, HI. [2]USDA Forest Service, Hilo, HI. [3]DOI Pacific Islands Climate Science Center, Volcano, HI. [4]University of Hawai‘i at Mānoa Department of Geography, Honolulu, HI. [5]University of Hawai‘i at Mānoa Department of Natural Resources and Environmental Management, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Drought is a prominent feature of Hawai‘i’s climate with severe impacts in multiple sectors. Over the last century, Hawai‘i has experienced downward trends in rainfall and stream baseflow, upward trends in the number of consecutive dry days and wildfire incidents, and regional projections show that unusually severe dry seasons will become increasingly common on the leeward side of all Hawaiian Islands. Many recent studies have examined different aspects of drought in Hawai‘i, however, there has not been a complete synthesis of historical drought since 1991. A new literature review was completed to determine the state of the knowledge on drought in Hawai‘i for the five drought types: meteorological, agricultural, hydrological, ecological, and socioeconomic. To assess historical drought regimes in Hawai‘i, a spatially explicit retrospective analysis was performed using a gridded Standardized Precipitation Index (SPI) product for the period 1920 to 2012. Results show that the last decade has been the driest on record, with statewide drought conditions present 90% of the time between December 2006 and December 2012. Strong spatial variations were found between islands, with higher peak intensities found on Maui and Hawai‘i Island, and shorter duration droughts on Kaua‘i. The most severe droughts are typically associated with El Niño events, and in recent decades, the leeward coast of Hawai‘i Island has been the most drought-prone area in the state. This new drought synthesis provides the historical context needed to understand future projections, and contributes to more effective policy and management of natural, cultural, hydrological and agricultural resources.

172 - Ecological Drought at Pu'uwa'awa'a: Management Successes and Challenges in Protecting the Endangered Dry Forests of North Kona

Elliott Parsons[1], Edith Adkins[2]
[1]Division of Forestry and Wildlife, Kailua Kona, Hawaii. [2]Division of Forestry and Wildlife, Hilo, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Ecological drought can have significant negative impacts on Hawai’i’s native ecosystems through increased risk of wildfire, greater susceptibility of native trees and shrubs to infestation by pests or ungulate damage, and loss of native forest cover from water-stressed trees. In particular, tropical dry forests in Hawai’i are especially susceptible to ecological drought because they have been invaded by fire prone grasses, and existing dry forest fragments are small and heavily degraded by invasive species. Conservation and natural resource managers need case studies that demonstrate effects of drought, management responses and how those responses succeeded or failed, and research that is needed to help mitigate future impacts, yet few examples exist. This is particularly concerning as climate

change will likely increase the severity and duration of ecological drought in the Hawaiian Islands. Here we discuss a particularly severe drought at Pu'uwa'awa'a Forest Reserve in 2010-2012, the ecological impacts of that drought on the area's natural resources, how managers responded to those impacts as well as the successes and challenges of the approaches taken. During this drought, precipitation was greatly reduced, measures were put into place to protect some of the 15 endangered plant species in the area, and the Forest Reserve was closed to public access to reduce the chances of a catastrophic wildfire. There were also important direct and indirect impacts on the native species, but more research is needed to further understand the impacts of ecological drought and how to mitigate those impacts.

179 - Drought Indices Reveal Climatic Thresholds for Wildland Fire in Hawaii but Differ in their Application for Real-Time Fire Danger

Clay Trauernicht
University of Hawaii at Manoa, Honolulu, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Wildland fire is one of the more obvious and acute impacts of drought. In Hawaii, the four-fold increase in annual area burned in recent decades is primarily linked to agricultural declines and nonnative grassland expansion. However, existing research points to drought as a key indicator of interannual variability in fire occurrence. El Niño-driven drought events result in an increase in total area burned in Hawaii and climate indices, namely the Keetch-Byram Drought Index (KBDI), show promise as indicators of this pattern. Unfortunately, prior research was only able to use total area burned per year per county, reducing the ability to identify spatial and temporal trends in fire risk. Here, I use a statewide, spatially explicit dataset of wildfire records in Hawaii to illustrate thresholds in the likelihood of wildland fire occurrence based on drought conditions using three available indices: Standard Precipitation Index, the US Drought Monitor, and KBDI. The majority of all wildland fires and a higher proportion of large fires occurred under drought conditions as defined by the spatially explicit Standard Precipitation Index and US Drought Monitor. The KBDI index, currently reported from a single weather station, was less accurate. Differences in performance, however, must be considered in the context of their ability to indicate fire danger in real-time. I will discuss these findings in the context of current fire weather warning protocols in Hawaii. I will also discuss how improving fire prediction efforts must be balanced with investment in our capacity for mitigation actions and wildland fire response.

Forum 293: Kūkaʻi Laulaha: Growing the vision of ʻĀina Momona where ancestral relationships guide actions to support thriving communities, people and place

Time: 13:00 - 15:00
Date: 26th July 2018
Location: 314

293 - Kūkaʻi Laulaha: Growing the vision of ʻĀina Momona where ancestral relationships guide actions to support thriving communities, people and place.

Pelika Andrade[1,2], Kanoelani Steward[3,2], Emily Cadiz[4,2], Lauren Kapono[2], Uakoko Chong[5,2], Kanoeʻulalani Morishige[6,2]
[1]UH Sea Grant, Waimea, HI. [2]Nā Maka o Papahānaumokuākea, Waimea, HI. [3]The Nature Conservancy Hawaiʻi, Honolulu, HI. [4]Hui Makaʻāinana o Makana, Hāʻena, HI. [5]University of Hawaiʻi at Hilo, Hilo, HI. [6]University of Hawaiʻi at Mānoa, Honolulu, HI

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

In order to address cultural, social, and ecological challenges in conservation, we are recognizing the need to shift our focus towards strengthening the foundational relationships and interconnectedness we have with the world around us, as kānaka ʻōiwi and members of our Island Earth. Through building and participating in cohesive networks throughout Moananuiākea (Our Sea of Islands), we remember the legacy and traditions of our ancestors to amplify our collective voice in resource management for present and future generations. Kūkaʻi Laulaha is an international cultural exchange built on the framework of pilina (relationships) that extends to indigenous communities across the Pacific. This exchange creates an opportunity to critically think about the impacts of management strategies and conservation models inclusive of human dimensions. It helps us to understand how to create effective, multifaceted strategies guided by indigenous relationships to place but addressing global issues impacting our shared natural resources. In this session, we will discuss leadership and work ethic grounded in honoring our places, our many cultures, and the reciprocal relationships that need constant tending. We deepen our understanding of the quality time it takes to build long-

lasting, generational pilina and learn from the shared struggles and successes of other indigenous communities to move forward together. Participants will walk away with an understanding of these values, initiatives, and the vision of ʻāina momona so we can move collectively together addressing health of our people and places with the intent to thrive.

Poster 93: Daniel K. Inouye Solar Telescope Hawaiian Petrel Monitoring Project on Haleakalā

Time: 13:00 - 13:30
Date: 26th July 2018
Location: Machine 1

93 - Daniel K. Inouye Solar Telescope Hawaiian Petrel Monitoring Project on Haleakalā

Huisheng Chen, Ciara Ganter, Jayson Panglao
AURA, Makawao, HI

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

The Daniel K. Inouye Solar Telescope (DKIST) Resource Management team has been monitoring burrows of the Hawaiian Petrel (*Pterodroma sandwichensis*) on the summit of Haleakalā since 2011. The data shows that to-date, the construction of DKIST has had no measurable adverse impacts on the adjacent Hawaiian Petrel population. Furthermore, the implementation of the predator control measures prescribed in the Habitat Conservation Plan (HCP) and the Final Biological Opinion (BO) has benefited the Hawaiian Petrel population in DKIST's Conservation Area, both in terms of increased productivity and reduced predation rates. The average annual Hawaiian Petrel productivity in the Conservation Area increased 82.3% after the HCP was completely implemented 2014. The DKIST HCP/BO mitigation measures have resulted in an increased Hawaiian Petrel fledging rate by 19.75 more successful fledglings annually (or 79 more successful fledglings) from 2014 to 2017. The fledging timing pattern has been similar to that of Haleakalā National Park (HNP) data during the same monitoring period, indicating that construction has not had an impact on the nesting cycle. A total of 298 rodents have been removed by long-term rodent control grid traps and rodenticide. In the six seasons since the predator grid system was installed, the long-term rodent control grid has further reduced the

rodent population in the Conservation Area to 8.3% of the adjacent Control Site level. In addition, the fencing and out planting of Haleakalā Silversword seedlings has facilitated the Haleakalā Silversword recovery process.

Poster 78: Dramatic Shifts in Macroalgal Assemblages Over 50 Years in Waikīkī, South Oʻahu

Time: 13:00 - 13:30
Date: 26th July 2018
Location: Machine 2

78 - Dramatic Shifts in Macroalgal Assemblages Over 50 Years in Waikīkī, South Oʻahu

Heather Spalding, Florybeth La Valle, Daniel Arencibia, Zinnia Dagostino, Alexa Foster, Rebecca Katz, Lane Morrow, Kaylee Rowe, Celia Smith, Joanna Philippoff
University of Hawaiʻi at Mānoa, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Long-term quantitative datasets in marine tropical areas are rare, yet needed for comparisons to present community states to identify temporal patterns and inform management about the status of culturally and ecologically important species. From 1966 to 1969, M. Doty and colleagues (Doty 1969) intensively surveyed the biomass and species composition of macroalgae, or limu, in 12 plots from 0 to 230 m offshore of the Waikīkī Natatorium War Memorial, south Oʻahu. In conjunction with the undergraduate research program Our Project in Hawaii's Intertidal (OPIHI), our goal was to resurvey three of these plots (10, 110, and 210 m from shore) using the same methodology as Doty 1969 to identify changes in the species composition and abundance of macroalgae over the past ~50 years. In 1967, the most abundant nearshore (10 m) species were *Ulva* spp., *Dictyosphaeria cavernosa, Valonia aegagrophila*, and the invasive *Acanthophora spicifera,* while the offshore sites (110 and 210 m) were dominated by a high abundance of the native brown algae *Sargassum* spp. (limu kala),

Dictyopteris plagiogramma (limu lipoa), and *Padina* sp.. The species composition in 2018 dramatically shifted to a high abundance of the invasive species *Gracilaria salicornia* and *A. spicifera*, and an absence of large brown algae such as *Sargassum* spp. and *D. plagiogramma*. The loss of these culturally-important native species and increase in invasive species suggests this area has undergone a dramatic shift in community assemblage structure, with unknown ramifications for this area's food web dynamics, fisheries habitat function, and overall ecology.

Poster 226: Lehua Island Ecosystem Restoration Project: An Update

Time: 13:00 - 13:30
Date: 26th July 2018
Location: Machine 3

226 - Lehua Island Ecosystem Restoration Project: An Update

Patrick Chee[1,2], Patty Baiao[3], Josh Atwood[1], Shane Siers[4]
[1]Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, Honolulu, HI. [2]Pacific Cooperative Studies Unit, Research Corporation of the University of Hawaii, Honolulu, HI. [3]Island Conservation, Honolulu, HI. [4]UDSA-APHIS-WS, National Wildlife Research Center, Hilo, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

The Lehua Island Ecosystem Restoration Project (LIERP) is a project to restore Lehua Island as a wildlife sanctuary for seabirds and other species that were once more common there. Located less than a mile North of Niihau and twenty miles West of Kauai, Lehua Island is uninhabited and rises above the ocean over 700 feet, this makes Lehua an ideal place for seabird habitat except for the presence of a number of key invasive species. In 2005, a coalition of agencies and stakeholders foresaw the need and oportunity to restore Lehua Island for seabirds that were threatened and endangered in Hawaii and also seabirds in the Northwestern Hawaiian Islands that are likely to loose much of their habitat to rising sea levels. A plan was made to remove rabbits and Pacific rats from the island. The rabbit eradication was completed in 2006. In 2009, an unsuccessful attempt was made at eradicating the rats. Studies and assessments were done to determine what lead to the failure of the first attempt and to assess the feasibility of

attempting to eradicate the rats again. In August 2017, after many years of consulting with multiple stakeholders and agencies, a second attempt to eradicate Pacific rats from Lehua Island was made. This poster will outline the process the LIERP went through to get to the 2017 rat eradication, the eradication effort itself, the monitoring results, and an update on what the LIERP is doing currently.

Poster 44: Sea Turtle Management Opportunities in Hawai'i: Calling All Partners

Time: 13:00 - 13:30
Date: 26th July 2018
Location: Machine 4

44 - Sea Turtle Management Opportunities in Hawai'i: Calling All Partners

Irene Kelly
NOAA Fisheries Pacific Islands Regional Office, Honolulu, HI

Track

II. Building the Future

Abstract

Two species of sea turtle live in nearshore coastal waters of Hawai'i, green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. Of these species, the green turtle (or honu, as locally known) are increasing in abundance with the nesting population growing at a rate of about 5% per year. Hawksbill turtles (honu 'ea) are having a more challenging recovery trajectory with roughly 20-25 females nesting per year despite long-term nesting beach monitoring and conservation programs on the Islands of Hawai'i and Maui. Anthropogenic threats to these species persist and may affect the recovery potential of these species to varying degrees. The NOAA Pacific Islands Regional Office, the management branch of NOAA Fisheries in Hawai'i, has been working with various state, federal and NGO partners to develop best-practice guidance, messaging, and outreach strategies to address the three primary threats to sea turtles in Hawai'i: 1) bycatch in coastal hook-and-line fisheries, 2) boat strikes, and 3) human disturbance. To address these threats, multi-agency partnerships and cross-agency collaborations are necessary to effectively communicate and engage with the diverse and complex communities of Hawai'i. An overview of available outreach products, messaging, and lessons learned from NOAA's strategies to date will be provided in effort to build

awareness among conservation and management organizations to encourage and expand partnerships to disseminate information widely throughout Hawai‘i.

Poster 65: Addressing Biosecurity Risks Associated with One of the Top Vectors of Marine Non-indigenous Species Transfer into Hawai`i

Time: 13:30 - 14:00
Date: 26th July 2018
Location: Machine 1

65 - Addressing Biosecurity Risks Associated with One of the Top Vectors of Marine Non-indigenous Species Transfer into Hawai`i

Natalie Dunn[1,2], Julie Kuo[1]
[1]Division of Aquatic Resources, Honolulu, Hawaii. [2]Kupu, Honolulu, Hawaii

Track

III. Invasive Species & Biosecurity

Abstract

One of the top vectors of marine non-indigenous (NIS) introductions into Hawai`i is unmanaged ballast water (BW) discharge. NIS threaten Hawai`i's environmental and socioeconomic health, and management of this vector of transfer into the State and among the neighboring islands is imperative. While the State possesses administrative rules (HAR §13-76 “Non-indigenous Aquatic Species”) that authorize DLNR to collect BW data on commercial vessels arriving from overseas to conduct biosecurity risk assessments, it does not take into consideration vessels that transit interisland and discharge unmanaged BW from one island to another. Based on commercial vessel demographics and BW data collected and the presence of NIS in commercial harbors, Honolulu Harbor on O`ahu acts as a hub for marine NIS and poses potential biosecurity concerns for the other less visited commercial ports. As a result, DLNR plans to amend HAR §13-76 to include provisions for requiring BW management interisland. However, more scientific data is required to better understand the biosecurity risks associated unmanaged BW from one port to another. This presentation will focus on how DLNR is currently addressing biosecurity risks associated with unmanaged ballast water discharge and the direction that

DLNR is taking to further minimize risks. Additionally, preliminary data from an ongoing study, investigating zooplankton and phytoplankton concentration and diversity sampled from various commercial ports, will be presented.

Poster 264: Dynamic Waters of He‘eia Fishpond

Time: 13:30 - 14:00
Date: 26th July 2018
Location: Machine 2

264 - Dynamic Waters of He‘eia Fishpond

Aka Beebe[1], Rosanna Alegado[1], Paula Moehlenkamp[1], Paepae o He‘eia Mā[2]
[1]University of Hawai'i, Mānoa, Honolulu, HI. [2]Paepae o He‘eia, Kāne‘ohe

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Situated at the convergence of terrestrial freshwater and marine environments, loko i‘a (Hawaiian fishponds) represent a unique form of aquaculture innovated by Hawaiians in the 12-13th centuries capable of producing ~1 million kg fish annually. Recent estimates place fishpond production at less than 1% pre-Western levels. Socio-economic forces coupled with land-use change, anthropogenic pollution, and invasive species have dramatically eroded the potential for traditional Hawaiian land and marine food production systems. Mangroves were introduced to capture land runoff and reduce sediment deposition on coastal reefs. Unfortunately, mangroves dramatically altered shoreline ecosystems: decreasing native flora, contributing to carbon loading, facilitating establishment of non-native benthic fauna and decline of native populations. Recently, local communities are restoring Hawaiian fishponds as a cornerstone of sustainable food production. We partnered with Paepae O He‘eia, community stewards of the He‘eia Fishpond on O‘ahu, to investigate the effect of removing a monotypic stand of *Rhizophora mangle* that hosts a cattle egret rookery. To characterize changes, we established a baseline by measuring physical water characteristics, nutrient concentrations, and microbial community dynamics. Thus far, we identified highly stratified areas of cool freshwater overlying warm saline water with low oxygen levels in the wind shadow of the mangrove stand. We hypothesize that spatial heterogeneity due to circulation and/or biological processes cluster

specific regions within the fishpond and mangrove removal will likely change this dynamic by altering circulation and nutrient patterns. Work presented here is part of the continual work of restoration and monitoring environmental characteristics of He'eia Fishpond.

Poster 133: Shifting the balance in a Lowland Mesic forest: Hand Removal of invasive species to increase native species natural regeneration

Time: 13:30 - 14:00
Date: 26th July 2018
Location: Machine 3

133 - Shifting the balance in a Lowland Mesic forest: Hand Removal of invasive species to increase native species natural regeneration

David Clements, Devon Gordon, Kyle Clarkin
Kapiolani Community College, Honolulu, HI

Track

III. Invasive Species & Biosecurity

Abstract

On O'ahu, Kapi'olani Community College has partnered with the Hawai'i Division of Forestry and Wildlife as well as the local community to establish a mesic forest restoration project. The purpose of this project is to provide a habitat for native plants and an endemic endangered bird, *Chasiempis ibidis*. In 2013, DOFAW fenced a 2.5-hectare exclosure in Wailupe Valley to remove herbivore ingress, primarily feral pigs. The most common invasives in the plot are *Psidium cattleianum*, *Schinus terebinthifolious*, and *Araucaria columnaris* and are the primary target for removal. The most abundant native species are *Psydrax odorata* and *Diospyros sandwicensis*. Since 2015, KCC Science 295 students have led volunteer groups to the exclosure and averaged 200 hours of work per semester. During this time, growth of native species and regrowth of invasive species post removal was studied. A grid of transects were established where experimental and control plots were chosen from. Our methods include three steps; pre-monitoring, removal, and post-monitoring. Pre-monitoring of the plots include measuring basal area of all species greater than one meter and a count of individuals less than one meter. This is

followed by a removal of invasive species excluding trees that are part of the canopy. During post-monitoring basal area of all species within the plots are re-measured and experimental and control groups are compared. A new focus of this project is to create more partnerships with community groups to determine if sites like Wailupe Valley are sustainable exclusively by the community.

Poster 233: Monitoring Cryptic Populations of Endangered Seabirds on the Big Island

Time: 14:00 - 14:30
Date: 26th July 2018
Location: Machine 1

233 - Monitoring Cryptic Populations of Endangered Seabirds on the Big Island

Alex Wang[1], Ian Cole[2], Hannah Nevins[3]
[1]Natural Area Reserve System, DOFAW, Hilo, HI. [2]Wildlife Program, DOFAW, Hilo, HI. [3]American Bird Conservancy, Santa Cruz, CA

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

During April to November 2017, we sampled calling activity with automatic song meters to determine the presence and phenology of three federally-listed endangered Hawaiian seabirds; the ‘ua’u (Hawaiian Petrel [HAPE], *Pterodroma sandwichensis*), the ‘A’o (Newell’s Shearwater [NESH], *Puffinus newelli*) and ‘Ake’ake (Band-rumped Storm-petrel [BANP], *Hydrobates castro*) on Hawai‘i Island. It is challenging to monitor these species because they arrive on land nocturnally, nest in underground burrows, and inhabit remote areas. Here we summarize our remote sensing methods in 2017 using song meters in Pu’u O Umi Natural Area Reserve (POU) and the Mauna Loa Forest Reserve (MLFR). Song meters were programmed to record 1 of every 5-min for a 5-hr period beginning at sunset, then 1 of every 10-min for the 5-hr preceding sunrise. We detected HAPE

calls at five of the six sites in POU, NESH at five of six sites in POU, and BANP at all three sites within the MLFR. Notably we found that the HAPE population in POU has a breeding phenology offset than other known populations, possibly the earliest breeders in the state, indicating the uniqueness of this population.

Poster 146: Oʻahu ʻĀina Momona, a ʻLand Fat with Food,ʻ in 1880, with 3,600 acres of Hawaiian Freshwater Fishponds

Time: 14:00 - 14:30
Date: 26th July 2018
Location: Machine 2

146 - Oʻahu ʻĀina Momona, a ʻLand Fat with Food,ʻ in 1880, with 3,600 acres of Hawaiian Freshwater Fishponds

Lilikalā Kameʻeleihiwa
University of Hawaiʻi at Mānoa, Honolulu, Hawaiʻi. Kamakakūokalani Center for Hawaiian Studies, Honolulu, Hawaiʻi

Track

I. Lessons from Indigenous Knowledge and Conservation History

Abstract

Historically, Oʻahu was known as an ʻĀina Momona, or a ʻLand Fat with Food,ʻ because our Hawaiian Ancestors became excellent managers of fresh water, in order to increase food production, with wet land taro fields, and especially with fresh water fishponds; the largest of which was the 523 acres of Kuapā Pond in the ʻili of Maunalua in the Moku district of Koʻolaupoko. As of 1880, Oʻahu had 114 freshwater fishponds, comprising 3,600 acres, making 300 pounds of fish per acre per year. Thus, Oʻahu was raising 1 million pounds of fish per year, just on the land! [Kameʻeleihiwa 2016].

The second largest freshwater fishpond, Kawainui in the Ahupuaʻa of Kailua, was completely cut off from the ocean [Monsarrat 1913]. As Dr. Pualani Kanahele says that all water comes from the mountain, it would seem that much of the water collected by the massive Konahuanui mountain flowed underground into Kawainui, emerging as fresh water springs, which the ancestors cleverly made into a 425 acre fishpond. This presentation will showcase

the 1913 Monsarrat series of fishpond maps, especially in the Moku districts of Koʻolaupoko, Kona and ʻEwa, capable of producing enough protein to support an ever enlarging population.

Today in 2018, there are about 12 Fishponds remaining on Oʻahu comprising 692 acres. While this is much less than the 1880 list, still if we could rehabilitate them, these could produce 300 pounds of fish per year, or 207,600 pounds of fish to feed our people. Now that is food sustainability!

Poster 126: Vetiver Grass Erosion Mitigation for former Agriculture Lands, Practical Applications and Lessons Learned from Watershed Restoration Efforts in West Maui

Time: 14:00 - 14:30
Date: 26th July 2018
Location: Machine 1

126 - Vetiver Grass Erosion Mitigation for former Agriculture Lands, Practical Applications and Lessons Learned from Watershed Restoration Efforts in West Maui

Wesley Crile[1], Paul Sturm[2]
[1]The Coral Reef Alliance, Haiku, Hawaii. [2]Ridge To Reefs, Sykesville, Maryland

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Sediment loss from degraded agricultural landscapes within priority watersheds Wahikuli and Honokowai, in West Maui is a major cause of impaired ocean water quality and coral reef health decline in the region. Former sugar cane and pineapple fields are riddled with degraded soils, bare eroding hillslopes, ‘push piles’ of material left over from grading of fields, and unmaintained eroding dirt roads. These landscape features act in unison creating a ‘conveyor belt’ which transports sediment from the land, into gulches and downstream into the ocean.

In 2016, pilot plantings of the USDA approved 'sunshine' cultivar of vetiver grass (*Chrysopogon zizanioides)* were begun in Wahikuli, and later expanded to Honokowai. As opposed to more conventional approaches such as check dams or rock placement, vetiver grass can continue to grow as sediment accumulates, increasing the long term effectiveness of this method. Sediment captured behind vetiver rows also provides a suitable substrate for reestablishing native plants and trees to revegetate large areas of degraded and eroding areas of the landscape.

In Wahikuli and Honokowai, vetiver sediment traps were utilized within three applications; to capture sediment within agricultural road 'kickouts' (channels designed to convey water off of roadways), to decommission and stabilize a disused and severely eroding roadway, and to stabilize a steeply eroding hillslope by planting rows along contour lines. Initial monitoring of the kickouts found an average accumulation of ~2 tons of sediment per year. The presentation will discuss initial applications of vetiver, lessons learned thus far, and ideas for future expansion.

Poster 116: Pupping site trends of endangered Hawaiian monk seals (Neomonachus schauinslandi) at Lalo (French Frigate Shoals)

Time: 14:00 - 14:30
Date: 26th July 2018
Location: Machine 2

116 - Pupping Site Trends of Endangered Hawaiian Monk Seals (*Neomonachus schauinslandi*) at Lalo (French Frigate Shoals)

Brenda Becker[1], Shawn Farry[2], Charles Littnan[1]
[1]NOAA/NMFS/PIFSC/PSD, Honolulu, Hawaii. [2]JIMAR, Honolulu, Hawaii

Track

IV. Putting Research into Practice for Thriving 'Åina

Abstract

Lalo, or French Frigate Shoals (FFS), located in the Northwestern Hawaiian Islands, has the highest annual number (ca. 20%) of Hawaiian monk seal births range-wide. Data from 1984 to

2016 were reviewed to evaluate pupping site use and trends at this atoll. Pupping there peaked in 1988 (127 pups) and is currently one-fourth of this total. Births occur on 10 low-lying sandy islets, which differ in physical attributes (permanence, size, elevation, and protective reef) and potential threats to pup survival. The primary pupping islets were East, Whaleskate, and Trig Islands. Births among the islets have shifted over the last 33 years, along with a decline in pup survival to weaning. East Island was the primary pupping site (ca. 40% births annually) until 1992, when births declined with a simultaneous resurgence of threatened green turtle (*Chelonia mydas*) nesting. Pupping shifted to Whaleskate Island until it completely eroded away in 1998. Since 1998, Trig has been the primary pupping islet, accounting for ca. 40% of annual births. Unfortunately, concurrent with this pupping site shift, pup survival declined significantly, primarily due to a recent phenomenon of Galapagos shark (*Carcharhinus galapagensis*) predation. Overall, Hawaiian monk seals demonstrated plasticity in pup site use. The ability to use alternate pupping sites has enabled this endangered species to persist at FFS despite exposure to increased threats to pup survival (e.g., shark predation, islands going awash). With rising sea levels, we expect a continued loss of quality pupping habitat at FFS and likely lower pup survival rates.