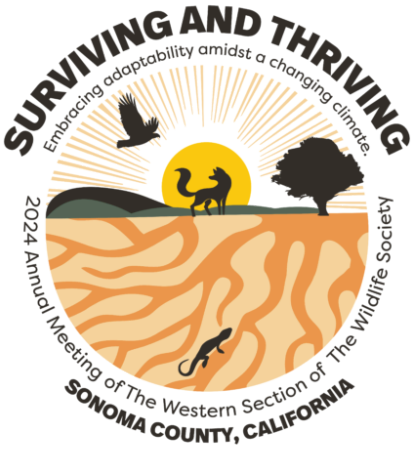
TWS-WS
2024 Annual Meeting

ABSTRACTS



Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide

(sorted by presentation order)

THE SAN JOAQUIN DESERT OF CALIFORNIA: ECOLOGICALLY MISUNDERSTOOD AND OVERLOOKED

David J. Germano; Department of Biology, CSU Bakersfield; dgermano@csub.edu;

Traditionally only four deserts have been recognized in North America: the Great Basin, Mojave, Sonoran, and Chihuahuan. These deserts were recognized based on general aridity, soil types, and arid-adapted plants and animals. The San Joaquin Valley had been classified by many biologists as either a perennial or annual grassland, although some recognized the desert nature of the area in works peripheral to the specific nature of the area. After conducting field studies for 20-25 years on various plants and animals in many parts of the San Joaquin Valley, my colleagues and I set out to formally recognize the San Joaquin Desert that makes up about two thirds of the valley and adjacent areas. Based on coincident ranges of low precipitation, arid soils, and plants and animals that are clearly desert adapted, we delineated the boundaries of this fifth North American desert. Because of the high number of protected species, many of which are endemic to this desert, it is important to recognize the true nature of this part of California so that management actions to restore habitat do so with the aim of reestablishing the correct plant communities.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 8:05 AM

SUPPORTING CONSERVATION AND RECOVERY IN THE SAN JOAQUIN DESERT: A CONSULTANT'S PERSPECTIVE

Randi McCormick; McCormick Biological, Inc.; rmccormick@mcbioinc.com;

As an imperiled ecosystem inhabited by multiple threatened and endangered species, the San Joaquin Desert has long been a focus of research, but recovery efforts did not gain much momentum until the 1990s. Since the USFWS published the “Recovery Plan for Upland Species of the San Joaquin Valley, California” (USFWS 1998) conservation and recovery efforts have greatly increased, with many organizations using the recovery goals of the plan to shape research and conservation actions. Highly visible efforts, such as the Endangered Species Recovery Program, CDFW, and easements set aside for mitigation, along with many other efforts are contributing to conservation and recovery. Consultants can fill many roles in these efforts, both through client-driven project actions and as a complement to direct conservation activities. Contributions can also be made in the form of internships and entry-level employment to students, new graduates, and early career professionals who could be the conservation researchers and wildlife managers of the future.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 8:25 AM

COMPARISON OF SAN JOAQUIN KIT FOX DEN AND CALIFORNIA GROUND SQUIRREL BURROW ATTRIBUTES

Erica C Kelly; California State University-Stanislaus, ESRP; ekelly@esrp.org; Brian L. Cypher, Alyse D. Gabaldon, Francisco Ruiz Ponce

California ground squirrels (*Otospermophilus beecheyi*; CAGS) and endangered San Joaquin kit foxes (*Vulpes macrotis mutica*; SJKF) frequently occur sympatrically. CAGS control strategies include lethal measures administered within CAGS burrows, which could harm or kill a SJKF if mistakenly applied to an occupied SJKF den. To identify attributes to distinguish between SJKF dens and CAGS burrows, we assessed dimensions, penetration depths, ejecta patterns, and the presence of various types of sign at 65 known SJKF dens and 80 CAGS burrows. Mean entrance height, width, and circumference all were significantly larger for SJKF dens. However, the ranges of values for all dimensions for the CAGS burrows encompassed the ranges for the SJKF dens. Penetration depth analyses revealed some general trends, but few absolute criteria to distinguish between the two. Dirt berms, scat, prey remains, and trash were observed at both SJKF dens and CAGS burrows. None of the attributes we assessed provided unequivocal criteria for distinguishing between SJKF dens and CAGS burrows. Also, SJKF occasionally usurp CAGS burrows and CAGS occasionally move into SJKF dens. Therefore, administering lethal control measures within burrows should be avoided as it presents a risk to SJKF and many other species that may use CAGS burrows.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 8:45 AM

A 25-YEAR VISION FOR RECOVERING ENDANGERED SPECIES ON RESTORED FARMLAND IN THE SAN JOAQUIN VALLEY

Scott Butterfield; The Nature Conservancy; scott_butterfield@tnc.org; Jeanette Howard, Abigail Hart, Rodd Kelsey

For most endangered species in the San Joaquin Valley, the only hope for recovery, until recently, has been acquisition, restoration, and management of the few intact habitat remnants left after 100+ years of land conversion. The Sustainable Groundwater Management Act, passed in 2014 and designed to help California achieve groundwater sustainability, has given these species another pathway to recovery, through restoration of the more than 500k acres of farmland expected to be retired to achieve groundwater sustainability. Over the past five years, The Nature Conservancy (TNC) and partners have identified properties across the Valley that will allow us to achieve species recovery – with restoration – of more than 20 species over the next 25 years and for sustainable farming to continue in the Valley, while supporting clean water and air initiatives. And now, in partnership with diverse farming, conservation, and community partners, TNC has begun to experimentally design habitat restoration projects to be cost effective learning laboratories that will realistically allow us to scale the initial 500-acre pilot projects to more than 50,000 acres over 25 years. Working together with seed companies and restoration and farming professionals, we are testing novel approaches to habitat design and creation while laying the groundwork for sustainable native seed production, all with an eye towards developing new economies of scale that will support more and more efficient future projects.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 9:05 AM

PRONGHORN: THE NEXT STEP FOR SAN JOAQUIN DESERT RESTORATION?

Tim Bean; Cal Poly - San Luis Obispo; wtbean@calpoly.edu; H. Scott Butterfield, Jeanette K. Howard, Thomas J. Batter

The San Joaquin Desert is among the most impacted ecosystems on earth. Thanks to a generation of conservation effort, endangered, endemic species such as the giant kangaroo rat and San Joaquin kit fox have secure populations, and a path toward down- or even de-listing is in sight. Unfortunately, one of the most astonishing processes has not returned: the enormous and widespread herds of migratory or nomadic pronghorn reported fewer than two centuries ago. Yet, given changes at the landscape level, it is not well understood if current conditions can support a productive and stable pronghorn population. Restoring pronghorn across the San Joaquin Desert will require landscape-scale planning, engaging with state, federal and international public agencies, as well as private landowners. Pronghorn need reliable access to freshwater, modified fences and roads, and rangelands dominated by a mix of forbs and shrubs rather than non-native annual grass. Success may require large corridors for migration. Pronghorn can serve as an indicator of ecosystem health, an umbrella for conservation, and a flagship for diverse stakeholder support. In this talk, we suggest that reestablishing a self-sustaining, stable pronghorn population to the region may move us closer to a more fully functioning and resilient San Joaquin Desert.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 9:25 AM

REPATRIATING BLUNT-NOSED LEOPARD LIZARDS TO PANOCHE PLATEAU: LESSONS FROM YEAR 1

Rory S Telemeco; Fresno Chaffee Zoo; RTelemeco@fresnochaffeezoo.org; Emily Bergman, Mark Halvorsen, Lynn Myers, Steven Sharp, Michael Westphal

In 2020, the unique, northern-clade population of Blunt-nosed Leopard Lizards (*Gambelia sila*) on Panoche Plateau declined to less than 10 individuals. We received emergency permission to collect 5 animals in 2020 and 2 animals in 2021 to found an assurance colony at Fresno Chaffee Zoo. We successfully bred these animals, producing >100 offspring in three years, and released 17 ~10-month old animals back to Panoche Plateau in 2023. Each animal was radio-collared and regularly monitored throughout the 2023 active season. Although lizards displayed high survival (41% confirmed survival, and 47% slipped collars with no sign of predation), they moved and grew little compared to wild animals, and they did not reproduce. We discuss potential causes for minimal movement and growth and changes we are implementing to our protocols to improve success moving forward. We will continue releasing and monitoring *G. sila* annually until >50 natural-born female *G. sila* successfully reproduce for at least 2 years, at which point we think the population will be able to self-sustain and grow to carrying capacity.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 9:45 AM

DEVELOPING LONG-TERM, SYSTEMS LEVEL SPECIES MONITORING TECHNIQUES WITHIN A RESEARCH FRAMEWORK AT THE PANOCHE VALLEY PRESERVE

Ben S Teton; Center for Natural Lands Management; bteton@cnlm.org; Chris Hauser, Greg Warrick

Mitigation lands protected under conservation easement or fee title conveyance often require annual species monitoring by the stewardship entity responsible for its management. By developing these monitoring activities in association with one another and within an experimental framework, managers have an opportunity to leverage monitoring data to explore long-term research objectives that can help

improve conservation outcomes and inform management strategies within and beyond its borders. Since 2019, the Center for Natural Lands Management has set about applying this approach to its Panoche Valley Preserve, a 26,420-acre conservation property within the Ciervo-Panoche Natural Area, which has been identified as a core area of habitat for the conservation and recovery of numerous San Joaquin desert species. Here, I will discuss practical insights gleaned from the development of the Preserve's landscape scale research and monitoring regime and share preliminary findings following the conclusion of its five-year, baseline data collection period.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 10:05 AM

CLIMATE AND FLORA OF THE SAN JOAQUIN DESERT

Ryan E O'Dell; US Bureau of Land Management; rodell@blm.gov;

Located in the southern Central Valley, the San Joaquin Desert is the smallest, least recognized and most imperiled true desert in North America, with less than 40% of its original area remaining. The desert was not formally described until 1995 and didn't gain recognition by the scientific community until 2011. The San Joaquin Desert is floristically distinct with 37 near-endemic and 40 strict endemic plant species. Nearly half of the species are imperiled and listed as endangered, threatened, rare or watch status. This presentation will delve into why it took so long for the San Joaquin to be recognized as a desert, how it is both climatically and floristically similar to the Mojave Desert and what we can do to conserve what little of it remains.

Challenges and Benefits of Restoring/Monitoring the San Joaquin Desert Biome-Wide
Friday 10:25 AM

Channel Islands Conservation

(sorted by presentation order)

DENSITY-DEPENDENT HABITAT SELECTION AND HOME RANGE SIZES IN A RECOVERING POPULATION OF ISLAND FOXES (*UROCYON LITTORALIS*) ON SANTA ROSA ISLAND, CALIFORNIA

Katie Elder; California Polytechnic State University, San Luis Obispo; kaelder@calpoly.edu; Juliann Schamel, John Perrine, Brian Cypher, Tim Bean

The island fox (*Urocyon littoralis*) is endemic to the California Channel Islands. Over the past thirty years the species experienced a dramatic population decline to near extinction followed by rapid recovery. These drastic fluctuations in population size make the island fox an excellent candidate for studying the effects of density on home range size and habitat selection. In 2010, when density was historically low, researchers on Santa Rosa Island used GPS collars to document male fox home ranges on the eastern portion of the island. Beginning in 2022, with the fox population now at carrying capacity, we tracked the locations of 15 adult male foxes using GPS collars in a similar study area to compare their home range size, characteristics and overlap. Preliminarily, we have found that island foxes display density dependent effects on home range size. Fox home ranges were significantly smaller at higher population density. We also found that island foxes exhibit minimal home range overlap regardless of population density. Due to the inability of island species to disperse as their population increases, understanding density dependent effects on island fox home ranges is especially important for informing management decisions for this iconic species.

Channel Islands Conservation
Thursday 10:40 AM

Student Paper

OCCUPANCY MODELING OF ISLAND SPOTTED SKUNKS

Desirae E Thomaier; Cal Poly SLO; desthomaier@gmail.com; Juliann Schamel, Lara Brenner, David Jachowski, John Perrine, Tim Bean

The island spotted skunk (*Spilogale gracilis amphiala*) is a rare, cryptic mesocarnivores endemic to Santa Rosa and Santa Cruz Islands, part of the California Channel Island archipelago. During the near-extinction of the sympatric island fox via predation by invasive golden eagles, island spotted skunk populations increased significantly. Now island foxes have recovered on these islands and skunks seem to have precipitously declined - potentially due to interspecific competition with foxes, who have a larger body size and broader temporal and dietary niche. We suspect that skunks now have low abundance on both islands. We are investigating island-wide occupancy via year-round camera surveys on both islands, with cameras placed in drainages to maximize detectability of this small mesocarnivore. We installed 92 cameras in the summer of 2023 and will maintain them for one year. Preliminary data suggests that skunks have low rates of occupancy across both islands, and differential rates of occupancy are associated with topographic, environmental, and interspecific interaction-level differences across sites. This study helps address a time-sensitive question of how island spotted skunk populations are responding to high fox abundance, and could be used to inform future studies, conservation, and management on the Channel Islands.

Channel Islands Conservation
Thursday 11:00 AM

Student Paper

USE OF GENOMIC TOOLS TO INVESTIGATE THE EVOLUTIONARY HISTORY OF ISLAND SPOTTED SKUNKS

Julia D. Owen-Ramos; University of California, Davis; jdowen@ucdavis.edu; Cate Brown Quinn, Ellie C. Bolas, Juliann Schamel, Lara Brenner, Bridget Parrino, Dirk H. Van Vuren, Ben N. Sacks

Island species have long been considered an important system for investigating evolutionary forces leading to divergence. The Island spotted skunk (*Spilogale gracilis amphiala*) is an endemic insular carnivore found on two of the California Channel Islands: Santa Rosa Island and Santa Cruz Island. Limited study of morphology found little differentiation between the island spotted skunks and their mainland counterpart, the western spotted skunk (*S. gracilis* spp.), leading some to suggest that spotted skunks may have arrived on the Channel Islands <200 years ago. However, studies using microsatellite and mitochondrial markers found significant differences among the two island populations and mainland populations. Still, these markers were insufficient to precisely estimate when island skunks diverged from one another and their mainland relative. To address this question as well as consequences for genetic diversity and inbreeding, we used a combination of whole genome sequencing on six individuals and reduced representation sequencing on 72 individuals. We estimated genomic diversity, inbreeding, and timing of population divergence. Our results support the antiquity of island spotted skunks, showing high genomic differentiation among all three populations, and both lower diversity and increased inbreeding in island populations. Additionally, demographic trajectories of island and mainland populations diverged >10,000 years ago.

Channel Islands Conservation
Thursday 11:20 AM

Student Paper

BATS OF THE CALIFORNIA CHANNEL ISLANDS: NEW SPECIES RECORDS FROM CAPTURE, SIGHTINGS AND ACOUSTIC MONITORING

Patricia E Brown; Brown Bat Biological Consulting; patbobbat@aol.com; William E. Rainey, Jill M. Carpenter

Currently, 17 of the 26 bat species now known to occur in California have been identified by capture, sightings, or acoustic records on the eight California Channel Islands. Of these only six species are known to breed on the islands. On Santa Cruz Island, breeding Yuma myotis (*Myotis yumanensis*) were documented in 2017 and a lactating long-legged myotis (*M. volans*) was captured in 2022, the latter a first for all the Channel Islands. In 2017 and again in 2018, we captured juvenile red bats on Santa Cruz Island indicating local breeding. Valdez and Haidar (pers.comm.) identified the 2018 capture by total genomic analysis as an eastern red bat (*Lasiurus borealis*), a new record of this species for California. Some call frequencies of eastern and western red bats (*L. frantzii*) overlap, however we infer that both species have been acoustically recorded on Santa Cruz, Santa Catalina and San Nicolas Islands. Between 2017 and 2022, long-term acoustic recording stations have been installed on Santa Cruz (Brown and Rainey); Santa Catalina (Santa Catalina Conservancy); San Nicolas (USN and USGS); and San Clemente, Anacapa and Santa Rosa Islands (USGS). Acoustic data have documented new species for all the islands, and several new records on individual islands.

Channel Islands Conservation
Thursday 11:40 AM

Collaboration Among Wildlife Career Pathways

(sorted by presentation order)

ADVOCACY, ETHICS, AND THE RAMIFICATIONS OF MISPLACED ADVOCACY.

Chris Huntley; Aspen Environmental Group; chuntley@aspeneg.com; Randi McCormick (McCormick Biological), Justin Wood (Aspen), **Justin Wood**

Wildlife biologists play a key role in the preservation and management of wildlife. We also conduct surveys to determine the potential for sensitive species to occur to support development. These studies are used by land managers, resource agencies, and consultants in the evaluation of impacts associated with infrastructure projects. This session focuses on how to ethically balance advocacy for the species, the client, and compliance with environmental laws. consequences that affect projects or studies when critical mistakes are made in the field, in the data analysis, or the conclusions presented in a report. We will discuss how these errors often accumulate or are compounded overtime, where they often occur, and how they should be remedied when discovered. More importantly, we will highlight methods that should be used when planning and conducting field work, how to support your conclusions, and how to prepare legally defensible documents.

Collaboration Among Wildlife Career Pathways
Thursday 10:40 AM

COLLABORATION AMONG WILDLIFE CAREER PATHWAYS EDUCATIONAL OPPORTUNITIES FOR CAREER START AND CAREER ADVANCEMENT -- AND -- CAREER GROWTH AT CDFW

David T Wyatt; Sacramento City College - Dept of Biological Sciences; wyattd@scc.losrios.edu; , **David Wyatt Julie Vance**

David Wyatt: Many new college students start their educational journeys being undecided about their career and educational goals. The ability to “explore” courses in numerous subject areas can serve as gateway events that result in career determinations for many students, for example students that “discover” biology as a career pathway. The Community Colleges offer such opportunities at an affordable price-point and also provide career advancement opportunities for college graduates and current professionals through academic and career education programs and courses. Students can readily pick and choose courses they wish to take whether it is an entire transfer-track program culminating in university degree(s), a career-education Certificate, or single- or multiple-courses intended for professional training and advancement.

Julie Vance: During its early years, the California Department of Fish and Wildlife (CDFW) was focused on enforcing fishing and hunting laws and stocking fish. Over the past 150 years, the role and priorities of CDFW have expanded towards a focus on conservation and science, with some recent periods of intense change within the organization. With this expansion in focus comes an increased diversity of career opportunities for biologists and other scientists. To be effective in this diverse conservation space, regular communication and collaboration with other state scientists, federal agency partners, non-profit organizations, and consulting firm scientists is essential.

Collaboration Among Wildlife Career Pathways
Thursday 11:00 AM

WILDLIFE BIOLOGISTS AND ENVIRONMENTAL LAWS: SHAPING CAREERS AND CONSERVATION OUTCOMES -- AND -- ACCOMPLISHING RESEARCH OBJECTIVES THROUGH THE PRIVATE SECTOR AND ACADEMIA

Linda Leeman; Ascent; linda.leeman@ascent.inc; , **Linda Leeman Eric Hansen**

Linda Leeman Abstract: Numerous environmental laws were passed in the US from the late 1960s to early 1980s. In a broad sense, the purpose of these laws is to protect human health and the environment, and they reflect society's value of the natural world. Since enactment of these laws, careers for wildlife biologists have expanded from management of game species for consumptive use to a myriad of other options, including conservation biologist, restoration ecologist, regulatory specialist, environmental consultant, academic researcher, policy advocate, and more. Potential employers include federal, state, or local governments, universities, nonprofit organizations, zoos and museums, and private companies. Regardless of career track or employer, environmental laws shape the wildlife biology profession. Therefore, understanding the laws is essential to a successful career, and yet, most academic programs do not provide adequate course material on the topic. While environmental laws are not perfectly written or implemented, they are one of the most important tools to achieving conservation outcomes. The presentation will explore the different roles for biologists in implementation of environmental laws and compliance and the importance of collaboration between professionals to achieve successful wildlife conservation.

Eric C. Hansen Abstract: Traditional pathways in wildlife research often are associated with institutional platforms such as agencies, academia, and NGOs, yet vital information is produced in the private sector that can contribute significantly to the body of knowledge required for successful resource management and conservation. Unfortunately, this information frequently is relegated to gray literature unavailable to the public or else is limited in scope due to project constraints. While core research through the private sector is perhaps less common, the ability to specialize in particular areas of expertise, to understand the regulatory nuances to conservation in a particular system, access to institutional knowledge held by other involved in the system, and relationships with other private sector specialists provide an excellent foundation for developing research questions and programs that contribute to regulatory and resource decision making. This presentation will address the importance of collaboration and potential pathways to developing, funding, and publishing research in the private sector and how the knowledge gained through this experience can be passed on to students in developing careers.

Collaboration Among Wildlife Career Pathways
Thursday 11:20 AM

COLLABORATION AMONG PROFESSIONAL WILDLIFE BIOLOGISTS IS IMPORTANT TO SUCCESSFUL CONSERVATION OUTCOMES -- AND -- Q/A SESSION

Stephanie J Parsons; CreativEnvironment Group LLC; sjoparsons@yahoo.com; Kelly Fitzgerald-Holland (moderator), Linda Leeman, Randi McCormick, Julie Vance, Jennifer Nevills, **Stephanie Parson Q&A Session**

Stephanie Parsons started her a career as wildlife biologist working at a nonprofit organization which evolved from a focus on wildlife biology to regulatory compliance working for private firms and ultimately to creating an independent consulting firm. Her career path did not start with a clearly defined path. Rather it started from a passion for the natural environment and took a course that involved taking risks and moving into the unknown. She worked for many organizations within the same industry, with varying levels of responsibility and opportunities, that diversified and improved her skill set as an environmental professional. She learned to adjust her goals and preferences and embrace a mode of learning that shaped and defined her career goals and vision for life.

A Question & Answer Session will follow Stephanie's presentation.

Collaboration Among Wildlife Career Pathways
Thursday 11:40 AM

Conference Theme Session - Adaptive Management - I

(sorted by presentation order)

RECOVERING THREATENED AND ENDANGERED SPECIES IN CALIFORNIA: RECOVERY PLANS AND THE CALIFORNIA ENDANGERED SPECIES ACT

Ange D Baker; California Department of Fish and Wildlife; angela.baker@wildlife.ca.gov;

The California Endangered Species Act (CESA) facilitates the listing and conservation of threatened and endangered species in California. It is state policy to conserve, protect, restore, and enhance listed species, and the California Department of Fish and Wildlife (CDFW) is charged with conducting scientific reviews of species petitioned for listing, administering permitting programs to authorize take of listed species, and conducting periodic status reviews of listed species. While CESA provides protection for listed and candidate species, until recently, CDFW has had neither the funding nor the authority to prepare recovery plans providing a conservation roadmap and delisting criteria for those species. In 2019, CDFW was given authority to produce recovery plans and, in 2021, was provided funding for positions to coordinate recovery planning. Future recovery plans will provide recovery frameworks and criteria for numerous CESA-listed plants and animals, many of which have no current federal recovery plan or conservation strategy. Our first steps include creation of recovery panning guidelines to ensure consistency and prioritization of species which are most likely to benefit from a recovery plan. Recovery planning will involve collaboration with multiple partners including local, state, and federal agencies, academics, conservation organizations, landowners, and the public.

Conference Theme Session - Adaptive Management - I
Wednesday 1:05 PM

USING THE CALVTP PROGRAM EIR TO EXPEDITE WILDFIRE RESILIENCE PROJECTS

Lara Rachowicz; Ascent; lara.rachowicz@ascent.inc;

California is experiencing a wildfire crisis. California’s Forest Carbon Plan and Shared Stewardship Agreement call for federal and state agencies to treat 1 million acres annually by 2025. The California Vegetation Treatment Program (CalVTP) is a cornerstone in California’s strategy to increase the pace and scale of vegetation treatment to address the wildfire crisis. It has become an essential tool to expedite CEQA compliance for wildfire resilience projects and facilitate efficient permitting, with linkages to the federal and state endangered species acts, the California Coastal Act, and other regulations. Since CalVTP implementation began in 2020, the CalVTP has provided CEQA compliance for over 350,000 cumulative acres in California. The presentation will provide an overview of the CalVTP and strategies for regulatory compliance. Current trends, real-world examples, and lessons learned about how to maximize the usefulness of the CalVTP will be shared. Despite recent advancements, at a spring 2023 meeting California’s Natural Resources Secretary Wade Crowfoot appealed to the California Wildfire and Forest Resilience Task Force to “work even bigger, faster, and more collaboratively” given the urgency of the crisis. The CalVTP is a useful tool to meet this challenge.

Conference Theme Session - Adaptive Management - I
Wednesday 1:25 PM

CALIFORNIA VEGETATION TREATMENT PROJECT (CALVTP) LIBRARY TOOLS TO SUPPORT WILDFIRE RESILIENCE PROJECTS

Grace K Mannell; gracem144@gmail.com;

Biological resources are a substantive focus when preparing and implementing a Project-Specific Analysis (PSA) under the California Vegetation Treatment Program (CalVTP) Program Environmental Impact Report (EIR). The Board of Forestry and Fire Protection has collected feedback about how to support efficient CalVTP use, and to this end, has recently released the CalVTP Resource Library, a set of new tools and resources to increase efficiency. The Resource Library features example PSAs, Mitigation Monitoring and Reporting Program Implementation Tools, and updated Frequently Asked Questions. The example PSAs cover a variety of geographies, treatment types and activities, and environmental issues throughout the state. Implementation tools provide organizational and planning aids focused on biological resources to achieve the goal of increasing the pace and scale of critical wildfire resilience treatments while protecting sensitive resources. These resources highlight specific challenges that have been encountered during the preparation of PSAs and approaches to resolving these issues, such as vegetation treatment within sensitive natural communities, maintenance of habitat function for special-status species, and the required agency coordination process.

Conference Theme Session - Adaptive Management - I
Wednesday 1:45 PM

USING CLIMATE-ADAPTED LANDSCAPE MONITORING (CALM) TO PRIORITIZE MANAGEMENT ACROSS LARGE LANDSCAPES IN SUPPORT OF POST-FIRE RESTORATION AND PRE-FIRE PLANNING

Angela M White; USFS Pacific Southwest Research Station; angela.white2@usda.gov; Morris C. Johnson, M. Kate Faber, Eric McGregor

The legacy of fire exclusion, coupled with rapid changes in climate, have led to a dramatic increase in the frequency of large-magnitude disturbances across the west, including massive, high-severity stand-replacing fires. Given the scale of disturbance and implementation challenges, research and monitoring are needed to help prioritize management actions on the landscape including reducing or modifying forest fuels, facilitating reforestation, reducing the spread of invasive species, and maintaining forested habitat that can support wildlife populations. To tackle these challenges several research scientists from the USFS Pacific Southwest and Pacific Northwest Research Stations combined their expertise to develop a single, robust sampling design to answer some of the major land management questions emerging in this era of uncharacteristic wildfire and uncertain climate affects. Desired outcomes for this research are to (1) collaborate with managers to prioritize management actions where they are most needed through the development of a restoration portfolio that, (2) incorporate research plans targeted to the restoration decisions, and (3) improve an understanding of the efficacy of different management actions to direct future landscape conditions that can support functioning ecosystems.

Conference Theme Session - Adaptive Management - I
Wednesday 2:05 PM

LANDSCAPE DESIGN FOR BIODIVERSITY CONSERVATION AND LANDSCAPE RESILIENCE

Liraz Bistritz; US Forest Service Pacific Southwest Research Station; liraz.bistritz@usda.gov; Patricia N. Manley, Nicholas A. Povak, Michelle A. Day

Amid increasing concerns about wildfires in the West, land managers require tools to evaluate the benefits and consequences of implementing management objectives across diverse landscapes. A common management objective is short-term fire risk reduction, the second one is multiple resource benefits which focuses on longer-term resilience, including the conservation of biodiversity. Using optimization modeling, we evaluated the compatibility of these objectives across 980,000 hectares in the central Sierra Nevada, California, at two levels of accomplishment: 50% and 75% per planning unit. At the 50% level, there was little overlap between the hectares selected for treatment in the fire and the ecosystem scenarios. At the 75% level, areas selected for each scenario overlapped substantially, indicating that tradeoffs would be required. We evaluated the magnitude of benefits gained by these two scenarios using socio-ecological outcomes across 10 pillars of resilience. We witnessed slight increases in species richness following treatment in both the fire and ecosystem scenarios, but greater biodiversity benefits were achieved with the ecosystem scenario. Our findings demonstrate that there is potential for concordance between short-term fire risk mitigation and long-term resilience goals, and that both can be implemented in order to maximize benefits across different aspects of the landscape.

Conference Theme Session - Adaptive Management - I
Wednesday 2:25 PM

MONITORING CLIMATE CHANGE AND BIODIVERSITY THROUGH THE CALIFORNIA SENTINEL SITE NETWORK

Whitney Albright; California Department of Fish and Wildlife; whitney.albright@wildlife.ca.gov; Nicole Cornelius, Ryan Bourbour, Phillip Smith, Levi Souza, Dena Spatz

Long-term monitoring is crucial to understanding how ecosystems change over time at local, regional, and state-wide scales, which informs management strategies and actions aimed at conserving California's biodiversity. The California Department of Fish and Wildlife (CDFW) is working with several partners to establish a Climate-Biodiversity Sentinel Site Network to monitor ecosystems and wildlife on public lands and inform land management in the face of climate change and other stressors. As part of this ongoing and growing effort, CDFW sentinel sites are being established on select Wildlife Areas and Ecological Reserves across the state. Each sentinel site will host a series of weather and soil sensors for climate monitoring, suites of wildlife cameras and acoustic sensors, and permanent vegetation plots for biodiversity monitoring, a Motus tower to monitor animal movement, and more. Resulting data is being processed with multiple automated and machine learning tools and will allow scientists to evaluate links between climate change and effects on local species and ecosystems. This presentation will include preliminary data collected during the first field season. Understanding the effects of climate change at multiple spatial, temporal, and taxonomic scales can support adaptive land-management decisions and inform long-term goals and strategies for conserving California's biodiversity.

Conference Theme Session - Adaptive Management - I
Wednesday 2:45 PM

Conference Theme Session - Adaptive Management - II

(sorted by presentation order)

FOREST THINNING EFFECTS ON SMALL MAMMAL SPECIES IN THE SIERRA NEVADA

Kate Faber; USFS Pacific Southwest Research Station; kate.faber@usda.gov; Angela M. White

With the increase of risk of large, high severity fire across forests in the US, thinning of small trees and shrubs (i.e. fuels reduction treatments) has been widely implemented to reduce fire hazards. Although fuel reduction treatments can reduce the intensities of fire, less is known about the impacts of reducing understory complexity on the small mammal community which is not only an important prey base for larger forest carnivores, but also key in dispersing seeds and fungi. Using capture-recapture techniques, we estimate treatment impacts on the density of different species in the small mammal community within the Sagehen Experimental Forest in the central Sierra Nevada using a Before-After Control-Impact design. Our analysis shows that treatment impacts species differently, consistent with their natural history, but that this response was small relative to interannual variation. This study shows how larger-scale heterogeneity can support the small mammal community while increasing resiliency to forest fire across the landscape.

Conference Theme Session - Adaptive Management - II
Wednesday 3:40 PM

UNDERSTANDING POTENTIAL IMPACTS OF FOREST TYPE CONVERSION THROUGH COMPARISONS OF BIOTIC COMMUNITY COMPOSITION, STRUCTURE, AND FUNCTION

Rebecca Wilcox; California Academy of Sciences; rwilcox@calacademy.org; Jack Dumbacher, Becky Estes, Durrell Kapan, Patricia Manley, Peter Roopnarine, Angela White, **Rebecca C Wilcox**

Sierra Nevada forests provide critical habitat for wildlife and associated biotic communities. Climate change impacts combined with a century of fire suppression are leading to disturbances (fire, drought, pest) that can have differential impacts on forested ecosystems based on their species composition and structure (i.e., their habitat type). Examining the extent to which the biotic communities within these habitat types are distinct aids in understanding patterns and drivers of community formation, and how they might be sensitive to changes into the future. We developed functional metrics based of trophic interactions (i.e., food webs) to quantify the complexity of biotic communities, and quantify the degree to which habitat types within the Lake Tahoe basin (e.g., Jeffrey pine forest) are distinct in their composition, structure, and function. Results showed habitat types had similar and variable patterns in metrics describing structure and function, indicating that future changes may have variable impacts on habitat types, while the composition of biotic communities was driven by life zone. This highlights the importance of abiotic factors for structuring communities, and potential impacts associated with changing climate, while providing a more comprehensive view of biotic communities, which can help managers steward healthy and resilient habitats.

Conference Theme Session - Adaptive Management - II
Wednesday 4:00 PM

WILDLIFE PRIORITIZATION AND ASSESSMENT AMIDST DROUGHT HETEROGENEITY IN TIME AND SPACE

Ryan A Peek; California Department of Fish and Wildlife; ryan.peek@wildlife.ca.gov; Zack Steel, Tiffany Chen

California's Mediterranean climate is expected to continue experiencing climate whiplash, going from periods of extreme wet to extreme dry with increasing frequency. The extreme dry periods vary across time and space, making the management of diverse habitats and species assemblages during and after drought periods challenging. Identifying quantitative and reproducible approaches to prioritizing which species may be most vulnerable, and which habitats or localities may be most at risk to both short and long-term drought remains a significant management hurdle. We piloted an effort to quantify the risk to sensitive species and habitats at scale by combining newly developed drought products, such as the Evaporative Demand Drought Index (EDDI), with occupancy records for species of conservation concern, generation time estimates, and range sizes. EDDI provides a measure of how anomalous the atmospheric evaporative demand (E0; also known as "the thirst of the atmosphere") is for a given location and time interval. When combined with species generation time and range size, it enables us to identify where drought exposure is greatest for the species, both in the near- and long-term, and in turn, facilitates science-based prioritization of management and monitoring efforts.

Conference Theme Session - Adaptive Management - II
Wednesday 4:20 PM

BUTCHERBIRDS ON THE CHOPPING BLOCK: USING POPULATION VIABILITY ANALYSIS TO BETTER MANAGE FOR CLIMATE CHANGE

Hunter J Cole; Institute for Wildlife Studies; hcole@iws.org; Nicole Desnoyers, Brian Hudgens, Dave Garcelon

San Clemente Island's native ecosystems were significantly affected by domestic animal grazing and introduced herbivores. While feral goats (*Capra hircus*) and pigs (*Sus scrofa*) were extirpated by the late 1990s, their historic impacts on habitats had lasting negative consequences for imperiled native species such as the endangered San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*). Invasive mesopredators – black rats (*Rattus rattus*) and feral cats (*Felis catus*) – are present on the island alongside naturalized island foxes (*Urocyon littoralis*), all of which have been observed preying upon shrike nests. In addition to past and present threats to shrike populations, we must now consider how climate change may challenge shrike conservation on the island. To better understand potential trajectories of the San Clemente loggerhead shrike population under different climate change scenarios, we first quantified the effects of weather on shrike breeding and survival. We then conducted population viability analyses incorporating predictions from our initial modelling effort for current climate conditions, and both moderate and severe climate change projections. We also examined the effects of increased predator management and captive juvenile shrike releases throughout climate change scenarios. The results of this work provide a foundation for adaptive management practices as climate change progresses.

Conference Theme Session - Adaptive Management - II
Wednesday 4:40 PM

HIDDEN IN PLAIN SIGHT: CALIFORNIA NATIVE HABITATS ARE VALUABLE CARBON SINKS

Tiffany Yap, D.Env/PhD; Center For Biological Diversity; tyap@biologicaldiversity.org; Aruna Prabhala, Ileene Anderson, **Ileene Anderson**

California is at the forefront of the climate crisis. Poor land-use planning and extreme weather events have led to an onslaught of disasters harming communities and threatening the state's ecosystems. Strategies

that maximize the carbon storage and sequestration of trees and forests are important to fight climate change. But offset programs are massively failing to accomplish the proclaimed carbon storage gains or forest protections. And large-scale tree-planting initiatives around the world in the past 50 years have not led to the promised carbon storage or sequestration gains. Policymakers are ignoring other nature-based sequestration strategies right in front of us. Diversifying and maximizing carbon storage opportunities is necessary to ward off the worst harms of the climate crisis. In our report “Hidden in Plain Sight: California’s Native Habitats are Valuable Carbon Sinks” we highlight the carbon-storage potential of California’s iconic habitats including shrublands, grasslands, deserts, and riparian corridors. We recommend strategic land-use planning and mitigation standards to increase local, nature-based carbon sequestration, and we highlight the co-benefits of protecting and enhancing California’s diverse habitats. We also urge additional research into arid and semi-arid habitats for their abilities to store and sequester carbon while remaining resilient under a changing climate.

Conference Theme Session - Adaptive Management - II
Wednesday 5:00 PM

Conference Theme Session - Adaptive Management - III

(sorted by presentation order)

BREAKING BARRIERS, AN OVERVIEW OF WILDLIFE CROSSING STRUCTURES IN CALIFORNIA

Damon Yeh; Wildlands Network; damon@wildlandsnetwork.org; Mari Galloway

Roads and highways pose significant barriers to wildlife movement and have led to habitat fragmentation and isolated populations. This issue of wildlife connectivity has been gaining substantial traction as a priority conservation issue and is garnering significant investments by Departments of Transportation and land management agencies. Wildlife crossing structures can help increase permeability for wildlife across those barriers and create safer roadways for drivers. Different types of crossings will facilitate different types of wildlife and implementing these structures is a complex marriage of science, policy, engineering, and design. To better understand the state of wildlife connectivity in California, Wildlands Network has compiled, to date, the most comprehensive database of wildlife crossing structures in the State and is continually cataloging and mapping structures that are in planning or in construction. We cataloged over 200 wildlife crossings ranging from amphibian tunnels to the Wallis Annenberg Wildlife Crossing, which will be the biggest wildlife crossing in the world. During this presentation, we will explore the wildlife crossings map and some of the unique projects in California. I will also discuss how this information can be utilized by land managers, researchers, and NGOs, and where more research is needed to advance wildlife connectivity in California.

Conference Theme Session - Adaptive Management - III
Thursday 8:05 AM

PROTECTING PUMAS THROUGH SCIENCE, POLICY, AND ART

Tiffany Yap; Center for Biological Diversity; tyap@biologicaldiversity.org;

California’s pumas are being driven towards extinction. These wide-ranging predators face many threats from humans. Poorly planned roads and development have fragmented the landscape, dividing pumas into isolated subpopulations and leading to high levels of inbreeding. Puma mortalities due to car strikes, rat poisons, disease, and retaliation for preying on pets or farm animals are common while wildfire and climate change present ongoing and intensifying threats. If we want pumas to thrive in our changing landscapes for generations to come, we must adapt our behaviors and infrastructure to safely coexist with this iconic species. The Center for Biological Diversity’s Urban Wildlands Program advocates to protect pumas and improve wildlife connectivity by pushing back against poorly planned sprawl development with environmental laws, sponsoring science-driven conservation policies that improve wildlife connectivity and restrict rat poisons, and spreading the word about puma conservation. To engage a broader audience with the science of puma ecology and conservation, I released a graphic novel, Tales of the Urban Wild: A Puma’s Journey, in October 2023. Using science, policy, and art, we highlight the challenges that pumas and other wildlife face and demonstrate how we can safely coexist to ensure the state’s rich biodiversity thrives.

Conference Theme Session - Adaptive Management - III
Thursday 8:25 AM

TECHNIQUES FOR MAPPING AND MONITORING SUBTIDAL WILDLIFE HABITAT IN A CHANGING CLIMATE

Liz Allen; WRA, Inc.; liz.allen@wra-ca.com;

Eelgrass (*Zostera marina*) is the most widely occurring marine angiosperm in the world and the primary type of subtidal vegetation found in estuarine ecosystems on the continental west coast. Eelgrass beds function as critical nurseries and spawning sites for a variety of invertebrates and fish, including the Dungeness crab, Pacific herring, and salmonids, and provide foraging habitat for many birds. Because of its important ecosystem functions, eelgrass is protected as Essential Fish Habitat by the National Marine Fisheries Services, providing it with regulatory protection. Impacts to this often under-appreciated resource are accounted for using pre- and post-construction monitoring. However, it can be challenging to tease apart project-related impacts from natural and climate- related fluctuations in eelgrass distribution and density, which can affect a project's mitigation obligations. The establishment and long-term monitoring of reference sites can help these analyses and inform mitigation strategies. Here we present an overview of eelgrass survey methods, limitations of each method, and best practices for monitoring eelgrass beds in the face of elevated variability in marine ecosystems driven by climate change.

Conference Theme Session - Adaptive Management - III
Thursday 8:45 AM

ENHANCING STAKEHOLDER ENGAGEMENT IN THE WILD WORLD OF WILD HORSE ISSUES

Celeste Carlisle; science@returntofreedom.org; Dan Adams

Wild horse (*Equus caballos*) and burro (*E. asinus*; WHB) stakeholders in the American West are divergent in their views of free-roaming equids on public lands. Management authority for free-roaming equids on designated public lands was given to the Bureau of Land Management (BLM) and the U. S. Forest Service (USFS) in 1971 by U.S. Congress with the passing of the Wild and Free-Roaming Horses and Burros Act (WFRHBA). In 1976 the Federal Land Policy and Management Act (FLPMA) mandated the BLM and USFS to manage public lands for multiple-uses which included livestock grazing, energy development, recreation, and timber harvest. Since the passage of WFRHBA and FLPMA almost every WHB management option has been met with frustration and contention by some faction of stakeholders. Currently, WHBs populations on designated public lands exceed numbers the BLM and USFS determined were in balance with other multiple-uses. Historically, true collaboration around the issue has been lacking apart from the banding together of like-minded organizations. As climate change exacerbates resources impacts on Western public landscapes, leaving already arid lands drier and forage amounts and diversity lessened, the need for true collaboration among divergent stakeholders is abundantly clear. However, how to collaborate sustainably and healthily is unclear. This talk outlines frameworks, developed by coalition groups and specifically with BLM in mind, for achieving collaboration with diverse stakeholders and decision-makers. Progress has been made in terms of educating Congressional representatives, appropriators, and broader environmental, wildlife, and conservation groups who have typically kept this extremely noisy issue at arm's length, and which has resulted in increased funding for the agency towards more comprehensive, ecologically sound and humane management approaches. These positive changes will be described.

Conference Theme Session - Adaptive Management - III
Thursday 9:05 AM

FORMING A SPECIES SPECIFIC NONPROFIT FOR THE MOHAVE GROUND SQUIRREL

Kathryn Simon; kebsimon@outlook.com; Denise LaBerteaux, Ed LaRue, Donald Mitchell, Leo Simone, Jacob Robinson, MNark Bratton

The Mohave ground squirrel is a California state-listed threatened species that has been petitioned for federal listing twice, in 1993 and 2005 and is not currently federally listed. In March 2022, coordinated meetings resulted in draft proposals directed at the most critical research questions for this species. There is currently a Technical Advisory Group (TAG) for MGS that is led by the California Department of Fish and Wildlife and this group has been active since at least 2008 to support this species. The TAG acts as an advisory group to the Department but does not include functions that could actively support funding these research proposals or training opportunities for this species. To support these functions as well as coordinating the active MGS volunteer corps, a new non-profit was officially formed in January 2023. Our group now has state and federal non-profit status, over 75 members, and has obtained grant funding to assist in determining the distribution and status of the species throughout its range in the western Mojave Desert. We have many active committees with activities to report. We've made many strides forward, and learned a few lessons along the way.

Conference Theme Session - Adaptive Management - III
Thursday 9:25 AM

ADAPTIVE MANAGEMENT TO REDUCE BAT FATALITIES AT WIND ENERGY FACILITIES

Katrina J. Smith; katrina.smith@wildlife.ca.gov; Bronwyn Hogan, Doug Leslie

Hoary bats (*Lasiurus cinereus*) are at risk of severe population decline and face significant impacts from wind energy facilities (Friedenberg & Frick 2021; Rodhouse 2019). For the first time in California, actions to reduce these impacts are being implemented at the Altamont Pass Wind Resource Area. An adaptive management strategy was designed to ensure that the best available science and emerging technologies are used to assess impacts on bats, and that impacts are minimized to the greatest extent possible while maximizing energy production. First, blanket curtailment stops turbines from spinning at low wind speeds during the high-risk period from April to October. Second, acoustic monitoring at turbine height and ground level facilitates analysis of bat activity in relation to wind speeds and bat fatality patterns, which could inform smart curtailment. Third, submission of carcasses and tissue samples supports genetic research to inform population-level impacts. Finally, installation of Motus towers near wind energy facilities and funding Motus tag deployment supports migration research, which could inform siting of future wind energy facilities. As wind energy scales up, collaboration and incentives to implement creative solutions are needed to mitigate adverse impacts to bat populations.

Conference Theme Session - Adaptive Management - III
Thursday 9:45 AM

Ecology and Conservation of Amphibians and Reptiles

(sorted by presentation order)

LONG-TERM IMPACTS OF URBAN FLOODPLAIN MANAGEMENT AND HABITAT RESTORATION ON LIZARD COMMUNITIES IN A SONORAN DESERT CITY

Jules T. Wyman; Swaim Biological Inc.; jwyman@swaimbio.com; Aaron D. Flesch, Jennifer L. Becker, Philip C. Rosen (posthumous)

In urban contexts, restoring riparian ecosystems can have widespread benefits, but these efforts are often limited by needs to mitigate flood risks. To evaluate restoration potential in urban riparian systems, we studied responses of a diverse lizard community, including several species that occur in California, to combined flood control and habitat restoration efforts along two waterways over 15 years in urban Tucson, Arizona. We used a before/after-control/impact design to estimate responses to treatments that included bank stabilization and detention basin construction for flood control combined with passive water harvesting, native vegetation planting and seeding, and targeted creation of microhabitats. Overall impacts were mostly positive or neutral, and negative for just one of six focal species. Most species recovered to pre-treatment abundance within 2-3 years, but recovery dynamics varied among species. In general, widely-moving, faster-maturing terrestrial species recovered quickly and responded most positively to restoration, whereas more arboreal species with longer generation times and smaller home ranges took longer to benefit. Our findings suggest management of urban riparian systems can provide simultaneous benefits to humans and herpetofauna. Future efforts may be improved by fostering more heterogeneous cover and potentially translocating animals into restored but disconnected patches of habitat in urbanized landscapes.

Ecology and Conservation of Amphibians and Reptiles
Thursday 8:05 AM

JUVENILE MOJAVE DESERT TORTOISES SHIFT NIGHT MICROHABITATS DURING SUMMER HEATWAVES

Thomas A Radzio; San Diego Zoo Wildlife Alliance; tradzio@sdzwa.org; Talisin T. Hammond, Katelyn N. Rock, Ronald R. Swaisgood, Melissa J. Merrick

Behavioral plasticity can buffer animals against physiological impacts of climate change, but research is needed to understand the limits and consequences of behavioral responses to warming. Increased night activity by diurnal animals is a potential response to warming thought to require considerable behavioral flexibility. We hypothesized that juvenile Mojave desert tortoises (*Gopherus agassizii*), diurnal ectotherms that typically rely on burrows to conserve limited energy and water reserves during summer, may respond to rising burrow temperatures by shifting from using burrows at night to overnighting at the surface where cooler temperatures reduce metabolic expenditure. This strategy could be energetically adaptive but may increase predation risk. Using time-lapse cameras at burrows and iButton temperature loggers affixed to juveniles and placed at burrow and surface microhabitats during a summer heatwave, we found that individuals often emerge from burrows on evenings when their temperatures approach the voluntary thermal maximum of well-fed, hydrated laboratory animals. Tortoises remained inactive at the surface before returning to burrows after sunrise. By shifting to surface microhabitats at night, tortoises dramatically reduced nighttime body temperatures and energy expenditure during the heatwave. Future research will examine whether this behavioral adjustment to temperature entails greater predation risk.

Ecology and Conservation of Amphibians and Reptiles
Thursday 8:25 AM

PERSONALITY, MATERNAL EFFECTS, AND OUTCOMES IN THE WILD FOR MOJAVE DESERT TORTOISES (*GOPHERUS AGASSIZII*)

Talisin T Hammond; San Diego Zoo Wildlife Alliance; thammond@sdzwa.org; Thomas A. Radzio, Ronald R. Swaisgood, Melissa J. Merrick

Repeatable individual behavioral traits, or personalities, mediate the way that organisms interact with and respond to their environments. Such traits are known to predict survival in the wild, thus, in the context of conservation head-starting programs, it is critical to understand how they may be shaped by maternal effects and rearing regimens. As a first step toward understanding these dynamics, we assayed behavior in Mojave desert tortoise (*Gopherus agassizii*) mothers and offspring that were involved in a head-starting and translocation program. Tortoises were repeatedly tested to characterize exploratory tendencies and boldness. Radiotelemetry was used to track individual movement, habitat use, and survival in the wild. Both hatchlings and mothers exhibited significant repeatability in the majority of behavioral traits. Some traits were correlated with each other, suggesting the possibility of a behavioral syndrome. Correlations between mothers and offspring were limited, but there were significant differences in behavioral traits across clutches. For mothers, we found significant associations between behavioral traits and time spent in burrows in the field. Field data for juveniles are still being collected and analyzed. Our results will be discussed in the context of desert tortoise conservation specifically and head-starting and translocation programs more generally.

Ecology and Conservation of Amphibians and Reptiles
Thursday 8:45 AM

BUILDING A CASE CRITERIA FOR NEWT MASS DIE-OFFS

Bria N Boose; San Francisco State University; briaboose7@gmail.com; Max Lambert, Vance Vredenburg

Salamanders known as “newts” that occur along the west coast of North America include four species *Taricha torosa*, *Taricha granulosa*, *Taricha rivularis*, and *Taricha sierrae*. These newts occur from southern California, all the way to Alaska, and are generally thought to be quite common; however, they may be experiencing a new threat. Recent online non-peer reviewed reports identify enigmatic mass mortality events across their range. Disease is a leading contributor to global amphibian declines, as evidenced by epizootics caused by the fungal pathogens *Batrachochytrium dendrobatidis* (*Bd*) and may be implicated in newt die offs, but this has not been investigated. In order to document the extent of mass mortality events in western newts and determine whether *Bd* may be implicated, we conducted two broad surveys and collected disease data at three focal populations In our first survey, we used community science data from iNaturalist to search for examples of emaciated newts across the entire range. In our second, we targeted herpetologists conducting research within *Taricha*’s range; and, third, we selected three focal sites where emaciated animals and mass die-offs had been observed. At these focal sites we collected repeated disease diagnostic data and environmental data to determine whether these variables were correlated with emaciated and dying newts (e.g., skin swabs, body condition, and water quality measurements). The three focal populations were located at Point Reyes National Seashore, CA (PR), Briones Regional Park, CA (BR), and Pine Lake, WA (PL). At these sites, mass die offs were reported in 1991 (PR), 2014 (PR), 2020 (BR), and 2021-2023 (PL). The iNaturalist survey included 84,596 observations (2013-2023), of the 5,000 we analyzed, we identified 65 sites with photos of emaciated newts. The herpetologist survey identified 12 sites with the presence of emaciated or dead newts, and 3 sites with mass die-offs. At our focal study sites, we collected 349 skin swabs at PR (243 in 2014, and

106 in 2023), 64 from PL (2023), and 14 from BR (x in 2020, and 14 in 2023). In addition, we collected 8 swabs from preserved museum specimens at University of California Berkeley (specimens collected in 1991) from PR, all other samples were collected from live animals at the focal sites. At our focal sites, we found higher prevalence of *Bd* infection and *Bd* intensity than previously reported in Taricha. In 2023 we found 34.9% of samples were *Bd*-infected at PR (37 *Bd* positive out of 106 total), 46.9% at PL (30 out of 64), and 78% at BR (11 out of 14). Thus, while our data should be considered preliminary, they indicate that *Bd* may be implicated in emaciation and mass-die offs of western newts. However, we suggest that additional data is needed to understand whether *Bd* is the causative factor or a secondary outcome of a more potent unknown reason for these events.

Ecology and Conservation of Amphibians and Reptiles
Thursday 9:05 AM

SEASONAL MIGRATION AND EARLY-STAGE DISPERSAL PATTERNS IN ADULT AND JUVENILE RED-LEGGED FROGS (*RANA DRAYTONII*)

Hale V Garcia-Dean; Sonoma State University; garciadean@sonoma.edu; Jennaca Hajek, Jeffery T. Wilcox, Derek J. Girman

We examined the patterns of dispersal and seasonal migration in the California Red-legged frog (*Rana draytonii*), a federally threatened species. We used radio telemetry techniques to examine the movement patterns and habitat use of post-breeding adults and metamorphs migrating away from an established breeding pond in a grassland and oak-savannah habitat in Sonoma County, CA. By sampling one to three times per 24-hour period, we were able to evaluate the effects of weather, canopy cover, ground moisture, and time of day on migration, forays, and rate of movement across these age classes. We found significant patterns of movement with respect to time of day, precipitation, wind, canopy cover and location relative to known moisture corridors (inundated waterways and wetlands). Patterns of humidity also impacted movements of non-migrating frogs making frequent forays between the pond and adjacent wetlands. Both experienced adults and naïve metamorphs demonstrated a non-random orientation away from the pond, suggesting a preference for specific landscape features. Finally, preliminary results suggest that short-term survivorship of first year metamorphs may be highly dependent on microhabitat use and dispersal timing.

Ecology and Conservation of Amphibians and Reptiles
Thursday 9:25 AM

Student Paper

FROGS AND FISH IN THE KLAMATH MOUNTAINS: ADAPTIVE, LANDSCAPE-LEVEL MANAGEMENT FOR SENSITIVE SPECIES IN THE FACE OF CLIMATE CHANGE.

Braden A Herman; California Department of Fish and Wildlife; braden.herman@wildlife.ca.gov; Justin Garwood

Cascades Frogs are a high elevation specialist, aquatic-breeding amphibian species that inhabits the Klamath Mountains and Southern end of the Cascades Range in Northern California. California Cascades frog populations have been declining for decades. Due to this decline, the species is a California Species of Special Concern and in 2017 was advanced to candidate status pursuant to the California Endangered Species Act by the Fish and Game commission. Three dominant risk factors include introduced predatory salmonid fishes, recent outbreaks of the fungal pathogen Batrachochytrium dendrobatidis (i.e. chytrid fungus) and habitat alteration and desiccation through climate change. To combat these threats, nearly a decade ago CDFW changed their fish stocking policies by ceasing stocking waters that contained Cascades Frogs until a thorough inventory of fish and frog populations could be completed. This management shift has had profound changes on fish distributions in the Klamath Mountains and CDFW is now actively managing fish populations through active fish removal and regulated fish stocking to protect critical

Cascades Frog habitats in the face of climate change. This talk will discuss the methods, actions, and expected amphibian benefits from this adaptive, landscape-level management of recreational fisheries in the Klamath Mountains of Northern California.

Ecology and Conservation of Amphibians and Reptiles
Thursday 9:45 AM

Ecology and Conservation of Amphibians and Reptiles - II

(sorted by presentation order)

POST-METAMORPHIC SURVIVAL IN A POPULATION OF CALIFORNIA RED-LEGGED FROGS (*RANA DRAYTONII*); RESULTS FROM A 4-YEAR STUDY IN SONOMA COUNTY, CALIFORNIA

Jeffery T Wilcox; Mitsui Ranch Preserve; jtwilcox@comcast.net; Lisa L. Surber, Jeff A. Alvarez

Amphibians whose life history follows a complex life cycle often occupy different habitats during their ontogeny. Anuran life stages usually include an aquatic larval stage followed by a terrestrial adult form; marked by a dramatic transition between those stages through the process of metamorphosis. Selective pressures and survival success vary within and among habitats, but theory assumes that size at metamorphosis for individuals confers higher fitness with an increased chance for surviving to reproductive age. Selective pressures may include weather, annual precipitation, competition, predation, and parasites. Here, we present estimates for recruitment and survival in a population of California red-legged frogs (*Rana draytonii*) over a 4-year period, informed by a program of marking recently transitioned frogs (metamorphs, froglets) with subdural passive integrative transponders. Marked frogs were recaptured periodically through sexual maturity on the Mitsui Ranch Preserve between 2019 and 2022. Recruitment varied between years, with numbers falling to zero in extreme drought, but long-lived terrestrial adults facilitated a prompt recovery.

Ecology and Conservation of Amphibians and Reptiles - II
Thursday 10:40 AM

WILDFIRE RESILIENCE: A CASE STUDY OF THE MOSQUITO FIRE AND THE CALIFORNIA RED-LEGGED FROG

Maresa Scofield; Westervelt Ecological Services; mscofield@westervelt.com; Jeff A. Alvarez, Jeffrey T. Wilcox, Francesca Cannizzo, Marina L. Olson, Matt Coyle, Kimberly Comer

In California, fire is a natural disturbance factor to which native species have evolved. However, changes in fire management strategies, historical land uses, and confounding effects from climate change have significantly altered the intensity and frequency of large-scale fires in recent decades. The response of wildlife to high severity fire events is still being studied and species in decline may be more vulnerable to such events due to their isolation and low numbers. In 2021, the Mosquito Fire burned through Westervelt Ecological Services' (WES) Big Gun Conservation Bank in Michigan Bluff, California which contains the largest known population of federally threatened California red-legged frogs (*Rana draytonii*) (CRLF) in the Northern Sierra Nevada Mountain Range. This talk will look at the management activities taken prior to the fire, the steps WES took to coordinate with the U.S. Fish and Wildlife Service and fire agencies prior to, during, and after the fire, and finally the results of post-fire CRLF surveys and what that could mean for the species as we look towards a future with climate change.

Ecology and Conservation of Amphibians and Reptiles - II
Thursday 11:00 AM

BUILD IT AND THEY WILL COME- HABITAT RESTORATION SUCCESS FOR CALIFORNIA RED-LEGGED FROGS IN NORTHERN BAJA CALIFORNIA

Tashi R MacMillen; Sequoia Ecological Consulting, Inc.; tmacmillen@sequoiaeco.com; Anny Peralta-García, Jeff A. Alvarez, Jorge H. Valdez-Villavicencio, Bradford D. Hollingsworth

The California red-legged frog (*Rana draytonii*) is a large frog native to California and northern Baja California, Mexico that predominantly inhabits slower-moving permanent water sources such as streams, lakes, marshes, ponds, and ephemeral drainages in valley bottoms and foothills, as well as adjacent upland habitats. Range-wide population decline of the species has been significant and today the species is estimated to occupy less than 30% of its historical range. In Mexico, California red-legged frog populations are declining dramatically, primarily from anthropogenic stresses, including ground water mining, habitat conversion, and spread of exotic species. To improve habitat conditions for the species, a local non-profit conservation organization, along with international partners, created new pond and wetland habitat along an existing stream containing California red-legged frogs in 2018, and has performed annual maintenance since that time. Annual population surveys have shown a strong increase in population at the restoration site since 2018. This data shows that habitat restoration and maintenance can effectively increase local populations of California red-legged frog in Baja California; and funding from international partners to support conversation efforts like this one can be an effective use of funding to benefit threatened species over a relatively short period of time.

Ecology and Conservation of Amphibians and Reptiles - II
Thursday 11:20 AM

AN EFFECTIVE TECHNIQUE FOR THE TRANSLOCATION FOR CALIFORNIA RED-LEGGED FROG EGG MASSES.

Jeff A Alvarez; The Wildlife Project; jeff@thewildlifeproject.com; Mike Paladini, Jeffery T. Wilcox

Effective translocation of wildlife species requires significant understanding of the species' natural history. In addition, translocation techniques should mimic the conditions that natural population experience. We used a technique to translocate California red-legged frog egg masses that expediently reflected the ovipositioning behavior, hatching conditions, and initial larval development conditions that we witnessed in wild populations of frogs. A floating rearing pen that supported egg masses at the surface and subsequently allowed hatchling larvae to shift to deeper conditions among pond bottom substrate was designed to mimic natural conditions. Egg masses were monitored three times per week until hatching. Post-metamoprhic frogs were monitored weekly and PIT tagged. Over two breeding seasons 2,310 eggs hatched from four translocated egg mass halves and resulted in ≥ 648 post-metamorphic frogs. These frogs showed secondary sexual characteristics in 7 months and were adult size (length and weight) in 15 months. We contend that a critical aspect of the success of this translocation was frequent monitoring during the egg mass placement, and that marking post-metamorphic frogs confirmed success rates.

Ecology and Conservation of Amphibians and Reptiles - II
Thursday 11:40 AM

Ecology and Conservation of Amphibians and Reptiles - III

(sorted by presentation order)

LAND USE IMPACTS ON MOVEMENT PATTERNS OF CALIFORNIA TIGER SALAMANDERS (*AMBYSTOMA CALIFORNIENSE*) IN A VERNAL POOL COMPLEX

Victoria L Brunal-Byrd; Sonoma State University; brunalvictoria@gmail.com; Dave Cook, Alessandra Phelan-Roberts, Leslie Rivas, Daniel Crocker, Derek Girman

Seasonal migration between terrestrial upland habitat and vernal pools, is a critical life history component for the endangered Sonoma County California Tiger Salamander (CTS- *Ambystoma californiense*). To better understand migratory movements associated with classic clustered vernal pool habitat surrounded by varying land uses, we employed a two-year pitfall trapping study of adult CTS. Pitfall traps and drift fences were installed around four pools on a preserve in Santa Rosa, CA. Using a non-invasive individual identification system, we investigated orientation of individual adult salamanders leaving their breeding pools, influences of surrounding land use on movement, and levels of among-pool movement. We found that individuals moved non-randomly, maintaining a relatively consistent direction toward original entry points when exiting. Furthermore, the direction between entry and exits was significantly affected by surrounding land use; individual entries associated with rural residences tended to stray further, relative to entries associated with preserve and cattle grazed preserve. Within a breeding season, only a small proportion of individuals visited a second pool; however, by far, most individuals visited only one pool despite the high density of clustered pools available.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 8:05 AM

DIPNET SURVEYS PROVIDE ACCURATE ABUNDANCE ESTIMATES FOR CALIFORNIA TIGER SALAMANDER AND PACIFIC TREEFROG LARVAE

David G Cook; salamanderdave@sbcglobal.net; Leyna R. Stemle, Christopher A. Searcy

Several aquatic sampling techniques are commonly used to detect and quantify amphibian larvae. Although many techniques have been standardized, comparisons among methods have been poorly studied. We employed a removal design to investigate the detection rate of amphibian larvae using box enclosures and evaluated the reliability of timed dipnet sampling relative to the more quantitative box enclosure sampling across 13 vernal pools. For these comparisons, we studied larvae of the endangered California Tiger Salamander (*Ambystoma californiense*; CTS) and the smaller and more abundant tadpoles of the Pacific Treefrog (*Pseudacris regilla*; PTF). Based on N-mixture model estimates, box enclosure sampling captured only 5% more of the CTS larvae present than PTF tadpoles, despite disparities in their sizes and estimated abundances. Dipnet sampling was slightly more effective at detecting CTS larvae than enclosure sampling, while both methods equally detected PTF tadpoles. We found a strong relationship ($R2 = 0.92$) between the densities of CTS larvae estimated from dipnet sampling and those calculated from the more quantitative enclosure sampling, indicating that dipnet sampling is a reliable measurement of relative abundance. We conclude that timed dipnet surveys can be an important tool for monitoring populations of CTS, and possibly other lentic-breeding amphibians, especially given its relative efficiency that can be replicated across both time and space.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 8:25 AM

BURROW EXCAVATIONS: A REVIEW OF A COMMON TAKE AVOIDANCE MEASURE FOR FEDERALLY THREATENED CALIFORNIA TIGER SALAMANDER (*AMBYSTOMA CALIFORNIENSE*)

Sean E MacDonald; WRA Inc.; sean.macdonald@wra-ca.com; Rob Schell, Marisa Ishimatsu, Peter Kobylarz

The federally and state threatened California tiger salamander (CTS; *Ambystoma californiense*) is a large salamander endemic to the San Joaquin-Sacramento River and coastal valleys of Central California. CTS require access to both aquatic and upland habitat throughout their life cycle. The upland habitat must contain subterranean refugia typically in the form of animal burrows [i.e., California ground squirrel (*Spermophilus beecheyi*) or valley pocket gopher (*Thommomys bottae*)] for foraging and shelter from predators and desiccation during nonbreeding periods. Take avoidance measures are required by state and/or federal agencies prior to the start of development projects that have the potential to impact upland habitat include amongst other measures: burrow excavation. Burrow excavation is costly, laborious, and requires extensive experience to perform. Excavation of burrows also includes a variety of inherent hazards to surveyors including exposure to the fungus coccidioidomycosis (i.e., Valley fever). In this presentation we will discuss a case study involving a multiyear burrow excavation dataset collected between 2018-2021 from a project involving a greenfield industrial development in the San Joaquin Valley.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 8:45 AM

PREDATION ON BREEDING NORTHWESTERN POND TURTLES AND THEIR NESTS IN HUMBOLDT COUNTY, CALIFORNIA

Patricia Figueroa; Resource Environmental Solutions, LLC; trish10fig@gmail.com; Christina Varian, Antoine Chery, James Bettaso, Ivan Medel, Greta Wengert, **Christina P Varian**

The northwestern pond turtle (*Actinemys marmorata*; WPT hereafter) is a semi-aquatic freshwater turtle native to the west coast of North America and is experiencing significant population decline. Identifying predators of WPT females and their eggs can address major gaps in data regarding western pond turtle mortality and population-limiting factors. During the WPT nesting season in 2021, we documented nest predation events by examining trace predator DNA (i.e., saliva) collected from WPT eggshell, carapace, or plastron fragments found at predated nest sites located in Humboldt County, California. We also developed a field protocol to collect WPT eggshell and carapace or plastron fragments that would limit the possibility of contamination. To examine the evidence of potential predators, we conducted forensic molecular analyses and developed a polymerase chain reaction (PCR) protocol to detect mammal species, which focused on amplifying carnivore DNA using carnivore-specific primers. Our results successfully identified the western spotted skunk (Spilogale gracilis) as a local mammalian predator of WPT nests. Our study outlines field and laboratory techniques and methods useful for obtaining and amplifying trace DNA exposed to environmental elements, as well as a deeper investigation into declining WPT populations.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 9:05 AM

SOUTHWESTERN POND TURTLE DEMOGRAPHIC SIZE AND SEX RATIO CHANGES AFTER DROUGHT AND FIRE AT THE SANTA ROSA PLATEAU ECOLOGICAL RESERVE

Barry S Nerhus; Endemic Environmental Services Inc. ; bnerhus@endemicenvironmental.net; Hailey Laskey

After a decadal long drought and the recent Tenaja Fire at the Santa Rosa Plateau Ecological Reserve in Riverside County, CA, a southwestern pond turtle population was sampled and demography assessed in Spring 2023. The population experienced a change from previous data, where turtle growth was stunted and the sex ratio shifted to a male bias sex ratio. The changes in population demography indicate that these stochastic events are causing a disruption in population stability and may have long term effects. There is a need to further investigate and monitor this population to better understand the long term effects these events will have on this turtle population.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 9:25 AM

IF YOU BUILD IT WILL THEY COME OR DO THEY LEAVE? THE EFFECTS OF TIDAL RESTORATION ON WESTERN POND TURTLE HOME RANGE AND HABITAT USE

Melissa K Riley; melriley@ucdavis.edu; Brian Todd

The Western Pond Turtle (*Actinemys marmorata*, WPT) – a native freshwater turtle in California – is a species of special concern, as determined by the California Department of Fish and Wildlife and is currently under review to be listed as threatened by the Fish and Wildlife Service. In the Suisun Marsh, WPT are thought to be widespread based on observational data; however, little is known about their population status and habitat requirements in this part of their range. Suisun Marsh consists of a mosaic of tidal and managed brackish water wetlands, with 5,000–7,000 acres of tidal restoration planned by 2043. As changes like tidal restoration and predicted sea level rise occur, it will be increasingly important to understand how freshwater species like WPT respond. In this study, WPT were tracked before and after a restoration project at the Hill Slough Wildlife Area within Suisun Marsh using GPS/GSM trackers. On average home ranges increased after restoration, and in some cases WPT shifted the center of their home ranges by up to 1,500 meters. Lessons learned from this study can help inform adaptive management and provide guidelines for future restoration, aiding managers in efforts to conserve WPT in the future.

Ecology and Conservation of Amphibians and Reptiles - III
Friday 9:45 AM

Ecology and Conservation of Bats - I

(sorted by presentation order)

AUTUMN MOVEMENTS OF HOARY BATS IN CALIFORNIA

Theodore J Weller; USDA Forest Service, Pacific Southwest Research Station; theodore.weller@usda.gov; Gabriel A. Reyes, Katrina J. Smith

Hoary bats (*Lasiurus cinereus*) are renowned as the longest distance migratory bat species in North America, but specific details on such movements are few. During autumn, hoary bats are vulnerable to impacts from wind turbine operation and engage in two activities vitally important to their annual life cycle: mating and moving between summer and winter habitat. In 2014, we began using a new generation of lightweight devices and a newly developed suture attachment method which allowed multi-month attachment and expanded the possibilities for understanding these movements in California. Over the years, we have used geolocators, connectivity tags, and lightweight GPS tags to gain insights into their movement ecology. In 2022, we began using tags compatible with the Motus automated radio-telemetry system and its burgeoning network of receivers throughout Pacific states to enhance our understanding of seasonal movements. We demonstrate the lack of predictability in autumn movements among individuals while at the same time identifying some potential hotspots of autumn activity by hoary bats. We also compare pros and cons of the various tracking devices we have used, concluding that advancing the Motus network is the best way to enhance our understanding of the seasonal movements of bats.

Ecology and Conservation of Bats - I
Thursday 8:05 AM

NOT WAITING FOR DINNER: NOVEL DAYTIME RAPTOR PREDATION ON A MEXICAN FREE-TAILED BAT (*TADARIDA BRASILIENSIS*) MATERNITY COLONY

Leila S Harris; University of California, Davis; leiharris@ucdavis.edu;

Raptor predation on bats occurs globally across a range of raptor and bat species. Colonially roosting bats that emerge in abundance are particularly vulnerable to avian predators. This threat likely constitutes selective pressure for bat nocturnality and preference for day-roosts that are out of reach of vision-oriented predators. Bats remaining well within crevice day roosts are generally considered safe from avian predation. We document novel daytime predation of roosting bats by adult Cooper's hawk (*Accipiter cooperii*) from a maternity colony of Mexican free-tailed bats (*Tadarida brasiliensis mexicanus*). We observed this behavior repeatedly over several weeks late in the hawk nesting effort, during the colony's pupping season. Based on the observed attack success rate, we anticipate the potential for colony-level effects. We seek other observations of bat predation within day roosts to assess the extent of this predation pressure on crevice-roosting bats more broadly, and to consider potential management implications for anthropogenic roost structures. Continued observations of our study roost may shed light on magnitude of impact to local predator-prey populations, prey species response, whether hawk offspring learn to take advantage of this foraging resource, and other intricacies of this potentially new relationship between two urban-tolerant wildlife species.

Ecology and Conservation of Bats - I
Thursday 8:25 AM

BAT USE OF ABANDONED MINES IN CALIFORNIA

Trinity N Smith; California Department of Conservation – Division of Mine Rec; trinity.smith@conservation.ca.gov;

Legacy mining in California has left an estimated 200,000 hazardous abandoned mine features throughout the state. These mines, if left unremediated, pose a hazard for humans and the environment but are nonetheless critical habitat for bats and other wildlife. Several California Species of Special Concern, especially Townsend's big-eared bat and California leaf-nosed bat use mines for hibernation, maternity, and other life history stages. The California Department of Conservation's Abandoned Mine Lands Unit (AMLU) partners with federal, state, and local agencies to protect the public by closing mine entrances. Although maintaining bat habitat has long been a prime consideration when planning remediations, AMLU has revised our approach to consider bat habitat protection throughout the project lifecycle. We now employ a more bat-focused approach from the onset by conducting underground surveys of mines as early as the initial inventory phase to identify bat habitat for future remediation projects. By using a combination of historical bat surveys and our ongoing surveys, we can provide partners with the best remediation option for each feature by considering mine related habitat at a regional and statewide scale. Importantly, we can also identify wildlife friendly remediations that would benefit from continuous monitoring. This critical step can track changing conditions, caused by events such as human vandalism, wildfires, and unstable geology.

Ecology and Conservation of Bats - I
Thursday 8:45 AM

CDFW'S BAT CONSERVATION AND WHITE-NOSE SYNDROME RESPONSE PROJECT: SURVEILLANCE FOR WNS AND THE FUNGUS THAT CAUSES THE DISEASE.

Scott D. Osborn; Calif. Dept. Fish and Wildlife; scott.osborn@wildlife.ca.gov; Amelia A. Tauber, Amanda S. Kindel, Dylan N. Winkler, Deana L. Clifford

CDFW partners with other agencies, landowners, and academic and private sector biologists to conduct both active and passive surveillance for White-nose Syndrome (WNS), a deadly fungal disease affecting bats. CDFW's "Report a Sick or Dead Bat" and "Report a Bat Colony" webpages provide opportunities for the public to report bats that may be affected by WNS. CDFW also screens hundreds of bats submitted to public health departments each year for signs suggestive of WNS. To date, WNS has not been detected through these passive surveillance channels. Active surveillance by qPCR testing of swab samples from live bats captured and released during early spring was conducted at 10 and 11 sites across California in 2022 and 2023, respectively. In 2023, while most samples returned negative results, swab samples from bats at 7 sites in 6 counties yielded high Ct value positive results (these are considered inconclusive results), and one site yielded two samples with low Ct value positives (true positives). These are the first true positive detections of Pd in California. The 2023 results from CDFW's surveillance add to the low-level detections of Pd obtained by partner surveillance projects, with a total of 10 California counties now showing such results.

Ecology and Conservation of Bats - I
Thursday 9:05 AM

AMPLIFYING ACOUSTICS: PROMOTING POSITIVE AWARENESS OF BAT POPULATIONS THROUGH VOLUNTEER ENGAGEMENT

Steve Norton; Psomas; steve.norton@psomas.com; Luma Fowler

Public perceptions of bats have historically been negative, and the potential origins of the ongoing Covid-19 pandemic have further cast a negative light onto the Chiropteran order. Since 2020, our group of volunteers has annually collected ultrasonic acoustic data on bat populations in Southern California under the framework of the North American Bat (NABat) program. The process of adopting NABat cells, deploying acoustic detectors, and analyzing the data collected, has engaged a diverse group of volunteers and increased awareness among group members. By initiating and engaging volunteers (professional and not professional) in bat acoustics associated with NABat, we have created ambassadors that promote bat population awareness.

Ecology and Conservation of Bats - I
Thursday 9:25 AM

HABITAT RESTORATION FOR BATS - SHOULD WE RETHINK THE USE OF BAT BOXES FOR HABITAT RESTORATION?

Dave S Johnston; H. T. Harvey & Associates; djohnston@harveyecology.com;

Habitat destruction and degradation is one of the leading causes of bat population declines. In California, population growth has caused a loss of over 90% of the state's wetlands while 95% of the riparian habitats of San Joaquin Valley have been converted to agriculture and development. Although some environmental laws help conserve bat habitat, there's a need to restore lands to provide all aspects of bats' habitat requirements. Each species of bat has a complex life history, and every aspect of its natural history and life cycle needs to be fully functioning. While most bat species do not typically use bat houses, many environmental documents require only bat houses to mitigate for lost bat habitat. Only rarely do restoration projects (such as for Hawaiian hoary bat and the pallid bat) attempt to fully restore bat habitat. Riparian and wetland habitat restoration is a huge step in the right direction to restore bat habitat; but ideally, habitat restoration for bats should be species specific, address every aspect of the target species' habitat needs year round as appropriate, and should include long-term monitoring so that bat ecologists can learn from experiences.

Ecology and Conservation of Bats - I
Thursday 9:45 AM

Ecology and Conservation of Bats - II

(sorted by presentation order)

CLIMBERS FOR BAT CONSERVATION: CITIZEN SCIENCE TO UNDERSTAND BAT ROOSTING ECOLOGY

Robert A Schorr; Colorado State University; robert.schorr@colostate.edu; Shawn K. Davis

As white-nose syndrome and other threats have decimated bat populations in North America, the need to understand bat roosting affinities and population dynamics becomes more critical. Our knowledge of bats' roosting habitat has been biased by what locations are easily accessible to humans, such as caves, mines, and anthropogenic structures. A citizen science project, Climbers for Bat Conservation, is using recreational climbers to identify bat roosting habitat that is typically outside of human reach. Started in 2014, CBC has developed collaborations with some of the largest climbing advocacy and conservation groups in the world, including Access Fund, American Alpine Club, The Climbing Initiative, and Petzl. CBC has nearly 300 records of bats along cliffs and rocks from U.S., Bulgaria, Italy, Norway, and Kenya. Passively-collected observations continue to feed CBC's database, but active climbing surveys are now being implemented to look for bats and identify roosts. Utilizing recreational citizen-science data CBC is opening new avenues to investigate bat habitat and locate bat populations.

Ecology and Conservation of Bats - II
Thursday 10:40 AM

RESULTS OF LONG-TERM BAT MITIGATION MONITORING: ARTIFICIAL REPLACEMENT HABITAT SUPPORTS RARE TOWNSENDS BIG-EARED BAT, AS WELL AS MATERNITY ROOSTS OF COMMON BATS

Matt J. Sharp Chaney; Midpeninsula Regional Open Space District; mchaney@openspace.org; Dave S. Johnston, Kim Briones

Mitigation for the loss of bat habitat is often a requirement under the California Environmental Quality Act. However, artificial habitat does not always maintain the same habitat value as previously available habitat, particularly for habitat specialist species like the Townsend's big-eared bat (*Corynorhinus townsendii*) or habitat that supports maternity roosting bat colonies. From 2015 to 2023 the Midpeninsula Regional Open Space District, with technical expertise from H.T. Harvey and Associates, worked to develop and implement a bat exclusion and habitat replacement plan to address a loss of habitat due to the demolition of buildings found within Bear Creek Redwoods Open Space Preserve, in Santa Clara County, California. This work included the construction of two new freestanding structures, as well as the modification of an existing structure specifically to attract and support Townsend's big eared bats, a California State Species of Special Concern, as well as a variety of more common crevice roosting species. The new and modified structures were monitored for bat activity by conducting annual emergence surveys during the maternity roosting season, as well as opportunistic daytime surveys during non-sensitive seasons. In-situ temperature probes were also utilized to determine annual thermal characteristics of the interior of the structures to determine habitat suitability and inform management decisions. Surveys have documented an increase in bat use through time, as well as confirmed maternity roosts of common bat species, at each of the replacement habitat structures. Townsend's big-eared bat have been documented utilizing the interior of the modified existing structure as a presumed bachelor roost. Exterior bat boxes on all structures support the majority of individual bats on-site and are utilized by four common species of bats. The habitat use, number of individual bats, as well as species composition on-site is similar to what

was documented by surveys prior to the demolition project. Habitat value at these structures is dynamic as exterior boxes degrade and require replacement, vandalization of structures requires ongoing maintenance and modification, and new crevice roosting habitat becomes available as the structures shift and degrade through time. The findings from this project can inform bat mitigation and monitoring work, particularly for Townsend's big-eared bat, and offer strategies for improved outcomes.

Ecology and Conservation of Bats - II
Thursday 11:00 AM

THE EFFECTS OF WILDFIRE ON ROOST SELECTION OF THE CALIFORNIA MYOTIS

Anna C Doty; California State University Sacramento; anna.doty@csus.edu; Reed D. Crawford, Rachel V. Blakey

Insectivorous bats are considered indicators of ecosystem health due to their ability to occupy a wide variety of habitats as well as differing thermal niches. Therefore, investigating how insectivorous bats respond to habitat variability in an area that has not only long been susceptible to wildfires, but has been managed for fires through fire suppression, gives insight to population persistence not only for bats but for a variety of other small mammals. In 2020, Sequoia and Kings National Parks experienced a wildfire that spanned 3636 ha within park boundaries. We tracked eight California myotis bats (*Myotis californicus*) to 22 roost sites from June – August 2021 in an area with unburned to severely burnt habitat. The majority of *M. californicus* roosts (21 out of 22) were positioned within or <5 m from the burn mosaic, although unburned habitat was easily accessible. However, *M. californicus* showed preference for roosts located in low-severity burn areas, rather than severely burnt habitat. This study demonstrates that while wildfire may be beneficial for certain bat species, severe wildfire could be detrimental to some bats in summer by reducing canopy cover and altering or destroying preferred roost trees.

Ecology and Conservation of Bats - II
Thursday 11:20 AM

THINKING OUTSIDE THE BOX (CULVERT): BAT ROOSTS IN CULVERT STRUCTURES AND IMPLICATIONS FOR CONSERVATION

Jill M Carpenter; LSA Associates; jill.carpenter@lsa.net;

Culverts are sometimes mentioned in the context of anthropogenic structures providing bat roosting habitat; however, there is a paucity of available information about these roosts. Data collected throughout Southern California over a 15-year period show that at least eleven bat species roost in various culvert types; these include concrete box, arch, and pipe culverts as well as corrugated metal pipe culverts. Occupied culverts are found in a variety of habitats, including heavily urbanized landscapes, and bats have been observed day roosting (including maternity roosting), night roosting, and even mating within culvert structures. Features used by bats in culverts vary widely and can include overlap joints, expansion joints, manhole access shafts, drainage pipes, open surfaces, and bird nests. Misconceptions about what constitutes suitable roosting habitat in culverts can result in these structures being overlooked during environmental review, and consequently impacts to bats roosting in culverts are often not adequately mitigated. Bats roosting in these structures are also vulnerable to disturbance from human entry, vandalism, and increases in artificial light at night (ALAN) in adjacent areas. Because roosting habitat is a limited and declining resource for bats, overlooking culverts or less-commonly encountered features in culverts as roosts can have profound conservation implications.

Ecology and Conservation of Bats - II
Thursday 11:40 AM

Ecology and Conservation of Birds - I

(sorted by presentation order)

SURFACE MINING IMPACTS TO SAGEBRUSH VEGETATION COMMUNITIES AND GREATER SAGE-GROUSE POPULATIONS

Sarah C Webster; U.S. Geological Survey; swebster@usgs.gov; Brian G. Prochazka, Steve Abele, Justin Small, Shawn Espinosa, Peter S. Coates

Surface mining activities can have cascading effects within sagebrush ecosystems, fundamentally altering multiple components such as soil composition, topography, vegetation communities, and ultimately wildlife populations. Despite the potential for significant disruption of ecosystem function and species composition, surface mining impacts within sagebrush ecosystems are relatively understudied. We quantified the disturbance footprint and duration of operation for all surface mines within Nevada. We then assessed changes in vegetation communities and sage-grouse populations at varying distances from mine sites during active mining operations, post-mining operations, and post-mine reclamation at each site. We found that vegetation communities were substantially altered at mining locations, with the presence of woody shrubs declining following mining operations, even after reclamation was completed. Further, we found that sage-grouse population annual rates of change (λ) declined near mining sites, with substantive declines in λ detected up to 8 km from mining sites, even after active mining operations had ended. Ultimately, we demonstrate evidence that surface mining alters sagebrush vegetation communities and affects sage-grouse populations during and following active mining operations and extending even beyond reclamation. Results can inform conservation efforts to mitigate impacts of future mining operations. Information is preliminary and provided for best timely science.

Ecology and Conservation of Birds - I
Wednesday 1:05 PM

IMPLICATIONS OF CLIMATE CHANGE FOR SAGE-GROUSE AND THE FUTURE OF WESTERN SAGEBRUSH ECOSYSTEMS

Carl G Lundblad; U.S. Geological Survey, Western Ecological Research Center; clundblad@usgs.gov; Shawn T. O'Neil, Brianne E. Brussee, Peter S. Coates, John C. Tull

Climate change is a primary threat to greater sage-grouse (*Centrocercus urophasianus*; hereafter, sage-grouse), however the mechanisms by which climate affects sage-grouse may be numerous. We reviewed and synthesized the literature describing effects of climate on sage-grouse demography and population performance. Variation in precipitation, drought, and soil moisture underlie patterns of herbaceous growth, protective cover, and food availability across sage-grouse life stages. Nest site selection and nest survival increase with vegetative cover, but most strongly in more-xeric regions, and nest survival may also be sensitive to residual grass cover driven by lagged effects of precipitation. Sage-grouse brood survival and recruitment are sensitive to the availability of mesic habitat resources that are recharged by winter snowpack. Anthropogenic stressors interacting with climate change are altering these ecosystem dynamics. Invasion by annual grasses limits soil moisture for native perennial vegetation, dampens the association between precipitation and sage-grouse population growth, and initiates positive feedbacks with wildfires that impose acute negative effects on sage-grouse demography and cumulative losses of carrying capacity. Given that increasing temperatures and intensified drought cycles are predicted, management to maintain and restore hydrological function would likely benefit sage-grouse persistence in moisture-limited sagebrush ecosystems. Information is preliminary and provided for best timely science.

Ecology and Conservation of Birds - I
Wednesday 1:25 PM

INFLUENCE OF LANDSCAPE CHANGES ON SAGE-GROUSE BROOD-REARING HABITAT WITHIN THE GREAT BASIN REGION OF NEVADA AND CALIFORNIA

Brianne E Brussee; U.S. Geological Survey, Western Ecological Research Center; bbrussee@usgs.gov; Peter S. Coates, Shawn T. O'Neil, Megan C. Milligan, John P. Severson, Mark A. Ricca, Steve Abele, John D. Boone, Elisabeth M. Ammon, Steven T. Mathews, Shawn Espinosa, Michael L. Casazza

During brood-rearing, greater sage-grouse (*Centrocercus urophasianus*; hereafter, sage-grouse) utilize heterogeneous upland meadows that hold moisture and support important food resources. Brood-rearing habitat may become fragmented with widespread habitat loss across the range due to invasion of annual grasses, conifer expansion, and anthropogenic development. We sought to understand impacts of these stressors on sage-grouse brood habitat as these disturbances threaten long-term productivity and population viability. An 11-year study of brood-rearing habitat at 12 sites across the Great Basin demonstrated that increasing annual grass negated positive effects of burned areas on brood survival when annual grass was dominant, highlighting the importance of heterogeneous vegetation communities for sage-grouse broods. Brood-rearing sage-grouse from 10 sites within the Bi-State Distinct Population Segment likely face trade-offs, wherein the need for forage-rich mesic resources at higher elevations may necessitate weakened avoidance of conifers, with consequences for survival. The importance of mesic resources, especially during dry years, was also evident within the Long Valley subpopulation of the Bi-State, where brood survival was positively influenced by the availability and condition of managed mesic resources. Taken together, these findings shed light on the influences of altered landscapes on sage-grouse brood-rearing habitat. Information is preliminary and provided for best timely science.

Ecology and Conservation of Birds - I
Wednesday 1:45 PM

EFFECTS OF MANIPULATING COMMON RAVEN (*CORVUS CORAX*) BREEDING SUCCESS ON RAVEN AND GREATER SAGE-GROUSE (*CENTROCERCUS UROPHASIANUS*) POPULATIONS IN NV AND CA

Steven R Mathews; U.S. Geological Survey; smathews@usgs.gov; Corina A. Sanchez, Shawn T. O'Neil, David J. Delehanty, Peter S. Coates

Greater sage-grouse (*Centrocercus urophasianus*) are experiencing elevated nest predation from common ravens (*Corvus corax*) across their range. Previous research indicates that manipulating raven breeding success by oiling raven eggs (preventing raven chicks from hatching) results in increased sage-grouse nest survival probabilities, but the effect of oiling raven eggs on sage-grouse population growth rates remains unclear. We addressed four questions regarding the effect of egg-oiling on overlapping sage-grouse populations. First, we experimentally showed that oil applied to eggs caused embryonic failure rather than the nest disturbances associated with flushing and spraying eggs with water. Second, we found that causing raven nests to fail by oiling eggs was associated with a decline of raven densities at treatment sites relative to control sites. Third, we confirmed previously published findings that oiling eggs was followed by an increase in sage-grouse nest survival probabilities. Finally, we tested whether oiling raven eggs led to population growth of overlapping sage-grouse populations at treatment sites using a Before-After-Control-Impact design. While questions regarding long term effects remain, wildlife managers can use egg-oiling to help manage overlapping populations of ravens and sage-grouse, and potentially other sensitive prey. This information is preliminary, subject to change, and provided for best timely science.

Ecology and Conservation of Birds - I
Wednesday 2:05 PM

WHY DO DUSKY FLYCATCHERS NEST IN TREES AT HIGH ELEVATIONS?

Kathryn L. Purcell; USDA Forest Service, Pacific Southwest Research Station; kathryn.purcell@usda.gov;

Release from interspecific competition can lead to niche shifts and have positive fitness consequences. I studied two closely-related and ecologically similar *Empidonax* species that breed across an elevational gradient in the southern Sierra Nevada: the Dusky Flycatcher (*Emidonax oberholserii*) and the Hammond's Flycatcher (*E. hammondii*). Both species coexist at low and moderate elevations but only Dusky Flycatchers occur in high elevation forests where they are abundant. My objective was to examine niche shifts and possible fitness consequences in Dusky Flycatchers breeding where their potential competitors are absent. Hammond's Flycatchers nested exclusively in trees while Dusky Flycatchers generally nested in shrubs at low and moderate elevations, but at high elevations they switched their nest location to that of Hammond's Flycatchers. This suggests ecological release, where Dusky Flycatchers shift to the nesting niche of Hammond's Flycatchers where they are absent. Nest survival for both Hammond's and Dusky flycatchers increased with nest height, suggesting that nesting in trees is beneficial for both species. The advantages to nesting at higher elevations are likely complex and not solely related to changes in nest location and elevation. Studying species that segregate along environmental gradients may help us understand and better predict species' responses to climate change.

Ecology and Conservation of Birds - I
Wednesday 2:25 PM

A REVIEW OF THE CALIFORNIA FISH AND WILDLIFE&RSQUO;S LONG-TERM MOURNING DOVE (*ZENAIDA MACROURA*) BANDING PROGRAM.

Sarah F. Laurino; California Department of Fish and Wildlife; sarah.laurino@wildlife.ca.gov; Katherine S. Miller, Dan A. Skalos

The California Department of Fish and Wildlife (CDFW) mourning dove (*Zenaida macroura*) banding program monitors and manages populations of mourning dove across the state to ensure population stability of the species. This mark-recapture program also serves as an important Citizen Science opportunity, where approximately 100 staff and volunteers participate each year. From 2008 to 2023 a total of 54,884 mourning dove have been banded, with 10% (n=5,500) having been recaptured and 4.85% (n=2,664) having been reported. A majority (n=2,457) of banded mourning dove reported have been from hunters, including birds harvested in Mexico. These reports account for 4.7% of all banded dove. Banders classify birds to age, which provides information on annual recruitment. Across all years, hatch year to after hatch year ratio was 0.89:1. A subset are classified as unknown age based on stage of molt. The 2023 banding season concluded with 1,684 mourning dove banded across 52 sites. We will present an overview of distance between capture, recapture, and/or harvest location. This program provides critical data for CDFW and the Pacific Flyway to manage the mourning dove population as both a popular yard bird and a sustainable upland game bird for future generations.

Ecology and Conservation of Birds - I
Wednesday 2:45 PM

Ecology and Conservation of Birds - II

(sorted by presentation order)

OPTIMIZING ARTIFICIAL RAFT PLACEMENT FOR THE LIGHT-FOOTED RIDGWAY'S RAIL

Jessica M Burton; California State University, Long Beach; jessica.burton01@student.csulb.edu; Dr. Christine Whitcraft, Richard Zembal

Artificial habitat supplementation is a valuable management tool for species facing population declines due to habitat loss, as in the case of the federally endangered light-footed Ridgway's rail (*Rallus obsoletus levipes*). The majority of this rail's endemic coastal salt marsh habitat has been developed, and remaining habitat is threatened by degradation, fragmentation, and sea-level rise. Currently, artificial rafts in several southern California marshes provide supplemental habitat for nesting and high tide refugia; however, factors impacting the use of these rafts by rails have not yet been examined. Racoons (*Procyon lotor*), a rail predator, have also been documented using rafts, potentially precluding safe use by rails. To elucidate this, we placed camera traps on artificial rafts and recorded frequency of use of both rails and raccoons and collected data on abiotic conditions, surrounding habitat characteristics and landscape features for each raft. Our preliminary results indicate that rails use rafts more frequently that are placed in habitat with a lower percentage of open, unvegetated area and a higher diversity of prey species. Conversely, raccoon raft use may be more opportunistic. The insights from this study will help determine how to most effectively allocate management resources and bolster the light-footed Ridgway's rail population.

Ecology and Conservation of Birds - II
Wednesday 3:40 PM

Student Paper

ADAPTIVE MANAGEMENT OF SWAINSON'S HAWK LEADS TO NESTING SUCCESS ADJACENT TO TRANSPORTATION CONSTRUCTION

Christopher A Pincetich; California Department of Transportation; Christopher.Pincetich@dot.ca.gov; Lauren Ross, Ruben M. Sanchez

The Swainson's hawk (*Buteo swainsoni*) is a medium-sized buteo. It was listed as threatened in 1983 by the California Fish and Game Commission due to habitat loss and decreased numbers across the state. It breeds in the western United States, often nesting within agricultural areas or along roadways. Caltrans works with CDFW on adaptive management to avoid and minimize adverse effects to Swainson’s hawk when incidental take is authorized. Observations of nesting from several projects constructed from 2018-2023 show this species can be tolerant of disturbance when nesting. In Solano County, Swainson’s hawk nested and successfully fledged near both the Midway Rd. and McCune Creek bridges along Interstate Route 80 within 60 and 140 ft of each construction site, respectively. In Napa County, a large intersection improvement project adjacent to two active nests delayed starting, then worked through the subsequent nesting season where a nest 35 ft from the roadway and 100 ft from active construction was successful, but another nest 700 ft away on private property was harassed by red-tail hawk and did not produce offspring. Ongoing efforts seek to understand disturbance thresholds and behavior patterns of Swainson’s hawk breeding pairs nesting adjacent to transportation infrastructure.

Ecology and Conservation of Birds - II
Wednesday 4:00 PM

AUTONOMOUS RECORDING UNITS AS A METHOD OF INDEXING BREEDING BIRD ABUNDANCE

Ian A Dwight; California Department of Fish and Wildlife; ian.dwight@wildlife.ca.gov; Daniel A. Skalos

Acoustic monitoring is an increasingly common technique for surveying avian species in the field. Low-cost autonomous recording units (ARUs) are driving this increase in acoustic field surveys, which allows for occupancy and abundance data to be collected without a human observer present. Coupled with software that can detect avian species by their call, this method of passive observation allows for large amounts of recorded audio to be analyzed with less manual processing and validation effort required. During 2023, we completed a pilot study deploying 40 ARUs across northern California public hunting areas (n = 8) to monitor ring-necked pheasants. Units recorded 2.5 hours per day for 45 days and were subsequently recovered from the field. The recordings were uploaded to an avian species detection software program (BirdNET Analyzer) that processes sound data and outputs a list of detections with time stamps and confidence estimates. A subset of the total detections was validated (87 percent total accuracy above 0.1 confidence threshold), and we created distributional maps of relative pheasant abundance using an inverse distance weighting function. Using ARUs can facilitate an increase in the capacity to monitor managed game and non-game species of concern over larger areas and in remote regions.

Ecology and Conservation of Birds - II
Wednesday 4:20 PM

AN ECOSYSTEM-SCALE ASSESSMENT OF THE SPOTTED OWL AND OTHER INDICATORS AS UMBRELLA SPECIES FOR AVIAN BIODIVERSITY

Kristin M Brunk; K. Lisa Yang Center for Conservation Bioacoustics; kb572@cornell.edu; M. Zach Peery, **Connor M Wood**

The combined effects of over a century of post-colonial forest management, resource extraction and fire suppression, and climate change in the Sierra Nevada are manifesting in larger, more severe fires, a change with dire implications for biodiversity. For decades, Spotted Owl conservation has shaped forest management, with most other species receiving scant attention – if any. The recent establishment of an ecosystem-scale passive acoustic monitoring program across the Sierra Nevada (>1,600 recording sites across ~25,000km2) and machine learning tools capable of identifying most bird species means that comprehensive assessments of the actual umbrella effects of priority species can now be assessed. We used multi-species occupancy models to estimate the probability of co-occurrence of 70 species of Sierra Nevada birds, including the Spotted Owl and other priority species. Preliminary results suggest that 15 of 69 species (22% of the community) are positively associated with Spotted Owl occurrence, a similar number of non-overlapping species are positively associated with Fox Sparrows, and very few species are associated with the relatively scarce Black-backed Woodpecker. Quantifying the umbrella effects of what have been assumed to be complementary indicator species can help inform urgently needed forest restoration to maximize short-term biodiversity conservation before the presumed long-term benefits of such interventions accrue.

Ecology and Conservation of Birds - II
Wednesday 4:40 PM

FIRST SUCCESSFUL NESTING OF BLACK OYSTERCATCHERS AMONG ENDANGERED CALIFORNIA LEAST TERNS ALONG THE WEST COAST OF NORTH AMERICA

David L Riensche; East Bay Regional Park District; driensche@ebparks.org; Ben Pearl, Susan Ramos

A pair of Black Oystercatchers (*Haematopus bachmani*) established a nest in June 2022 at “Tern Town”, an island located in Hayward, California along the eastern side of the San Francisco Bay. This is the first documented occurrence of oystercatchers successfully nesting and fledgling young in association with California Least Terns. The island provides nesting habitat for three special status species. Since 2015, and for a total of six breeding seasons, the endangered California Least Tern (*Sternula antillarum browni*), the threatened Western Snowy Plover (*Charadrius alexandrinus nivosus*) and species-of-special-concern Black Skimmer (*Rynchops niger*), have nested successfully, in association with American Avocet (*Recurvirostra americana*) and Black-necked Stilt (*Himantopus mexicanus*). We collected shells near the oystercatcher nest to assess their diet. Diet data showed the oystercatchers foraged on, in decreasing order of abundance, Japanese Little-necked Clams (*Ruditapes philippinarum*), Ribbed Mussels (*Geukensia demissa*), Bent-nose Clams (*Macoma nasuta*), Limpets (*Patellogastropoda sp.*) and Bay Mussels (*Mytilus edulis*). This new report on breeding Black Oystercatchers indicates that managing habitat for California Least Tern, Western Snowy Plover, and Black Skimmer can also benefit Black Oystercatcher. This site-specific information on breeding Black Oystercatchers supports recovery plan tasks that are consistent with managing habitat for California Least Tern, Western Snowy Plover and Black Skimmer.

Ecology and Conservation of Birds - II
Wednesday 5:00 PM

Ecology and Conservation of Birds - III

(sorted by presentation order)

MONITORING, CITIZEN SCIENCE, AND FIELD DATA REVEAL A NOVEL ALPINE BREEDING DISTRIBUTION AND VEGETATION ASSOCIATIONS OF A DECLINING, HABITAT-SPECIALIST SONGBIRD

Brett L Walker; Colorado Parks and Wildlife; brett.walker@state.co.us; Aaron A. Yappert, Courtney L. Brennan, Christen M. Bossu, Andrew W. Jones

Documenting the breeding habitat and distribution of migratory songbirds is essential for accurately assessing their conservation status. The “sagebrush” subspecies of the Brewer’s Sparrow (*Spizella breweri breweri*) breeds in greatest abundance in sagebrush-dominated (*Artemisia* spp.) shrublands of western North America, and the “timberline” subspecies (*S. b. taverneri*) breeds in shrubs or krummholz at or above treeline in mountain ranges from Alaska to Montana. Brewer’s Sparrows have also been reported at alpine sites in summer in mountain ranges across the western United States, but their taxonomic affiliation and breeding status are unknown. We reviewed monitoring, citizen science, and specimen data for Colorado and identified 186 historical summer observations of Brewer’s Sparrows at 59 alpine sites (3334–4288 m elevation). We surveyed 39 alpine sites in June-July 2021–2023, detected a total of 100 adults (mostly singing males) at 26 alpine sites (3395–3754 m elevation), and confirmed breeding at three sites. Males occupied mixed-species willow patches 0.9–1.8 m tall, often intermixed with sparse conifer krummholz. We recorded songs and captured, measured, photographed, and collected blood and feather samples from birds at a subset of alpine sites and nearby, lower-elevation sagebrush sites in May-July 2021. Vegetation associations and timing of breeding at alpine sites closely matched those of *taverneri*, but short songs, external morphology, coloration, and genetics of alpine birds overlapped with sagebrush birds and more closely matched those of range-wide *breweri*. Our results indicate that western Colorado supports a widely-distributed, but poorly-documented population of alpine *breweri* breeding in willows with sparse conifer krummholz within a relatively narrow elevation band at or above treeline. Whether alpine birds are itinerant breeders that first nested in sagebrush remains unknown. Our results complicate interpretation of differences in breeding habitat and breeding phenology as supporting criteria for subspecific identification and taxonomic delineation in this species.

Ecology and Conservation of Birds - III
Friday 8:05 AM

ASSESSING THE FEASIBILITY OF CALIFORNIA-WIDE BARRED OWL MANAGEMENT

Daniel F Hofstadter; University of Wisconsin - Madison; dannyhof@gmail.com; J. Mark Higley, William J. Berigan, Brian P. Dotters, Kevin N. Roberts, Alan B. Franklin, Shannon M. Skalos, Virginia O'Rourke, Greta M. Wengert, Angela Rex, Emily Fountain, M. Zachariah Peery

Native to eastern North America, barred owls invaded and occupied the range of northern and California spotted owls in recent times. The invasion of competitively dominant barred owls poses an existential threat to spotted owls and is likely adversely affecting many other native species. Lethal removals are currently the most effective tool for curbing barred owl populations, but whether they can be implemented effectively to recover spotted owl populations across the State of California is uncertain. To test the feasibility of state-wide barred owl management, we have initiated a removal study that encompasses all national forests and national parks in the Sierra Nevada and many landownerships from the San Francisco Bay Area to the Oregon border. Here we report on the number and locations of barred owl removals across

the state and preliminary findings of recolonization patterns by spotted owls. We also discuss challenges and opportunities confronting the implementation of barred owl management in California. Finally, we describe a suite of other questions related to the rapid invasion of this generalist predator that we propose to address using biological samples collected from lethal removals.

Ecology and Conservation of Birds - III
Friday 8:25 AM

Student Paper

SEVERE WILDFIRE POSES A GREATER THREAT TO FOREST OWL COMMUNITIES THAN BARRED OWLS DURING THE EARLY STAGE OF THE INVASION

Josh M Barry; UW-Madison; jmbarry3@wisc.edu; Connor Wood, Gavin Jones, Kate McGinn, Stefan Kahl, Holger Klinck, Kevin Kelly, Anu Kramer, Danny Hofstadter, Brian Dotters, Kevin Roberts, Zach Peery

The consequences of environmental change on animal communities can be difficult to predict and measure because individual ecological stressors can interact in complex ways. Here, we assessed the relative and interactive effects of severe wildfire and invasive barred owls (*Strix varia*) on native forest owls in the northern Sierra Nevada, California, USA, using occupancy data collected via regional-scale passive acoustic surveys under a quasi-experimental design from 2018 to 2023. Our findings suggest severe wildfire reduced occupancy rates for flammulated owls (*Psiloscops flammeolus*) but not for great horned owls (*Bubo virginianus*) or northern pygmy owls (*Glaucidium californicum*). By contrast, barred owl removals did not increase occupancy rates for any of the three owl species. Our research demonstrates the pronounced impact of severe wildfires on some native owls, while the initial invasion of barred owls at low densities seems to have no adverse effects on them, underscoring the effectiveness of barred owl removals in protecting native owl populations. Using a rare Before-After Control-Impact design, our study highlights the importance of experimental methods in diagnosing causes of species endangerment and understanding ecosystem responses, while also elucidating the complexities of multifactorial studies at regional spatial scales.

Ecology and Conservation of Birds - III
Friday 8:45 AM

HIGH-SEVERITY FIRE OFFSETS PREDATOR ENERGETIC BUDGETS

Kate McGinn; University of Wisconsin-Madison; mcginn4@wisc.edu; Ceeanna Zulla, Marilyn Wright, Zachary Wilkinson, Brian Dotters, Kevin Roberts, John Keane, Gavin M. Jones, M. Zachariah Peery

Fire-adapted species have evolved to exploit foraging opportunities in heterogenous landscapes. However, the widespread disruption of historical fire regimes may threaten the ability of fire-adapted species to acquire sufficient energy to survive and reproduce. The California spotted owl is a forest species that benefits from forest heterogeneity for hunting. While fires can have long lasting negative effects on spotted owl populations, we have yet to identify a mechanistic explanation for this species' response to novel megafires. Here, we used a combination of fine-scale GPS tagging and camera monitoring in the Sierra Nevada and San Bernardino Mountains, California, to examine the impact of fire on the foraging behaviors and energetic consumption of breeding spotted owls. We found that individuals spent more energy for no energetic benefits in severely burned landscapes. In landscapes with higher pyrodiversity, individuals spent more energy obtaining resources but delivered prey with higher energetic potential to nestlings. At a fine-scale, successful prey captures were less likely where there was more high-severity fire, while lower-severity fire and a moderate level of pyrodiversity facilitated prey capture for some individuals. Thus, fire-driven heterogeneity may create hunting opportunities that promote energetic investments towards reproduction. However, as the climate warms and fires become increasingly large and

contiguously severe, the energy spotted owls spend to forage may offset any energetic benefits of fire-driven heterogeneity. Ultimately, identifying forest restoration strategies that limit high-severity fire while promoting structural heterogeneity will be necessary to conserve trophic interactions in this and other forested ecosystems.

Ecology and Conservation of Birds - III
Friday 9:05 AM

USING BIOACOUSTICS TO ENHANCE THE EFFICIENCY OF SPOTTED OWL SURVEYS AND FACILITATE FOREST RESTORATION

Anu Kramer; University of Wisconsin - Madison; hakramer@wisc.edu; K. Kelly, S. Whitmore, W. Berigan, D. Reid, C. Wood, H. Klinck, S. Kahl, P. Manley, S. Sawyer, M. Z. Peery

Concern for potential effects on California spotted owls can constrain forest restoration projects intended to reduce large, severe wildfires and drought-related tree mortality in the Sierra Nevada. We developed an acoustically assisted survey design that could increase the efficiency and effectiveness of project-level surveys for spotted owls, allowing surveys to be completed in a single year. To do so, we deployed 126 autonomous recording units (ARUs) and identified spotted owl vocalizations using BirdNET. We evaluated spatio-temporal patterns in vocalizations near occupied territories and a survey crew's ability to locate owls based on these detections. After 3 weeks of acoustic surveys, ≥1 ARU within 750 m of all 17 occupied territories obtained spotted owl detections across ≥2 nights. Surveyors naïve to territory occupancy and location located owls in 93%-100% of occupied territories with ≤3 active (broadcast calling) surveys near ARUs with detections. We also developed a statistical model to identify and prioritize areas across the Sierra Nevada for different survey methods (active only/acoustically assisted/no surveys) based on the expected probability of occupancy. Collectively, these findings can help managers streamline the survey process and thus increase the pace of forest restoration while minimizing potential near term adverse effects to California spotted owls.

Ecology and Conservation of Birds - III
Friday 9:25 AM

UPDATES AND INSIGHTS FROM THE FIRST TWO YEARS OF THE CALIFORNIA SPOTTED OWL BIOACOUSTIC MONITORING PROGRAM

Jason Winiarski; University of Wisconsin - Madison; jwiniarski@wisc.edu; Kevin G. Kelly, Connor M. Wood, H. Anu Kramer, Sarah C. Sawyer, Sheila A. Whitmore, Jonathan P. Eiseman, Erin C. Netoskie, John J. Keane, Stefan Kahl, Holger Klinck, M. Zachariah Peery

Robust monitoring of imperiled species is critical for developing effective forest management strategies and conserving biodiversity. The California spotted owl is a subspecies of conservation concern due to a combination of past land-use practices and emerging threats (e.g., large, high-severity fire), and is at the center of forest planning and restoration efforts. In 2021, we initiated a large-scale bioacoustics monitoring program—significantly expanding upon surveys conducted since 2017—by deploying ~1,600 autonomous recording units annually across the Sierra Nevada. We then leveraged a novel bioinformatics pipeline and machine learning algorithm (BirdNET) to detect spotted owl calls in >1 million hours of audio recordings. Here, we provide a summary of the first two years of the expanded monitoring program, with a focus on estimating spotted owl occupancy and evaluating the effects of high severity fire. Results from such monitoring and occupancy modeling efforts will be used to better inform spotted owl conservation and forest management practices, and can also be extended to derive estimates of population size. Overall, our research program demonstrates the feasibility of monitoring rare, vocalizing species over a large scale with bioacoustics, and in the long-term will enable us to study avian community responses to global change.

Ecology and Conservation of Birds - III
Friday 9:45 AM

MULTISCALE OCCUPANCY OF DUSKY-FOOTED WOODRATS IN THE SIERRA NEVADA

Corbin C Kuntze; University of Wisconsin - Madison; kuntze@wisc.edu; Jonathan N. Pauli, John J. Keane, Brian P. Dotters, Kevin N. Roberts, M. Zachariah Peery

Effective wildlife management requires an understanding of how site, patch, and landscape-scale habitat features interact to shape the distribution and abundance of species. Diverse forest management practices and disturbance events within the Sierra Nevada, California have created a spatially complex landscape where multiscale processes and patch dynamics play a central role in species interactions. In this system, the dusky-footed woodrat (*Neotoma fuscipes*) serves as an important prey species for many forest predators, including California spotted owls (*Strix occidentalis occidentalis*). While site-level features used by woodrats have been previously investigated, the significance of patch dynamics and landscape composition have received considerably less attention. We live-trapped woodrats and modeled occupancy relative to habitat features at all three spatial scales, including a number of *a priori* interactions. Occupancy probability increased with understory cover and hardwoods, although the relative importance of each was greater within mature forest. Further, occupancy was greatest in patches of younger forest and, within mature forest, increased with proximity to younger forest. Our findings highlight the benefits of multiscale approaches and demonstrate that promoting landscape heterogeneity, as well as resource availability and protective cover, may benefit woodrat populations and enhance spotted owl conservation in Sierra Nevada forests.

Ecology and Conservation of Birds - III
Friday 10:05 AM

Student Paper

Ecology and Conservation of Invertebrates

(sorted by presentation order)

THE ECOLOGY OF LONGHORN FAIRY SHRIMP (*BRANCHINECTA LONGIANTENNA*) IN CALIFORNIA ROCK POOLS

Jamie Kneitel; CSU, Sacramento; kneitel@csus.edu; Doug Bell, Brent Helm, Jake Schweitzer

California rock pools are seasonal freshwaters that support several threatened and endangered species. They are a sparse and understudied habitat but important for biodiversity, endangered species, and endemic species. The endangered Longhorn Fairy Shrimp (LFS)(*Branchinecta longiantenna*) is found in rock pools, but little is known of its ecology. The purpose of this study was to assess LFS distribution and abundance as they are associated with numerous biotic and abiotic variables. Rock pools were sampled between November 2016 and May 2019 at sites in Alameda and Contra Costa counties. Since Vernal Pool Fairy Shrimp (VPFS)(*Brachinecta lynchi*) are common in rock pools, we also included it as a focal species in this study. Out of over 900 pools sampled, LFS occurred in 8% and VPFS occurred in 70% of the pools. Both species were influenced by hydrological patterns and associated with many pool characteristics (e.g., depth, exposure), abiotic (e.g., phosphates, conductivity) and biotic (e.g., competitors, predators) variables. Unoccupied pools were not significantly different than occupied pools. These results provide new insight for guidance on future management and the eventual recovery of these threatened and endangered species.

Ecology and Conservation of Invertebrates
Wednesday 1:05 PM

ANOMALOUS SUMMER RAINS AND IMPLICATIONS FOR CONSERVING THE SAN JOAQUIN VALLEY GIANT FLOWER-LOVING FLY

Mario E Gaytan; California State University, Bakersfield; megaytan123@icloud.com; Lucas K. Hall

The San Joaquin Valley Giant Flower-loving Fly (*Rhaphiomidas trochilus*; GFLF) is one of the largest flies in North America which was presumed extinct in the 1970s until its rediscovery in 1997. It is currently pending review for federal listing under the Endangered Species Act. Due to habitat loss, it is now only known to occur at Sand Ridge, approximately 24 km east of Bakersfield, California. This rare species inhabits arid areas characterized by loose sandy soils, scattered vegetation, and perennial shrubs. It spends most of its life underground foraging as a larva before emerging as an adult in the dry summers. Torrential rainfall and anomalous August rains in 2023 may have contributed to the absence of the GFLF from annual surveys conducted over the season. This may be the first recorded instance in which a Rhaphiomidas species has not been observed during its expected flight season possibly due to excessive moisture rather than drought. This poses a question about how excessive precipitation in addition to extreme bouts of drought may affect the long-term survival of rare and endangered species that are vulnerable to the effects of small population size (e.g. inbreeding depression, resiliency to demographic or environmental stochasticity, etc.).

Ecology and Conservation of Invertebrates
Wednesday 1:25 PM

Student Paper

OPPORTUNITIES AND CHALLENGES FOR POLLINATOR HABITAT ON SOLAR FARMS

Rei Scampavia; WRA, Inc.; scampavia@wra-ca.com;

As legislators and the public demand renewable energy sources to replace fossil fuel use, the footprint of solar farms is on the rise nationwide. Solar energy is often considered to be a "green infrastructure." However, historic management of the lands beneath solar panel arrays has not focused on providing ecological value. Efforts to design and monitor pollinator habitat in conjunction with solar arrays has been increasing in popularity throughout the U.S., and multiple states have enacted legislation to promote pollinator-friendly habitat on solar farms. In 2020, Marin Clean Energy (MCE) became the first power purchaser in California to enact a pollinator habitat program. Participating solar farms must plant pollinator habitat, which is monitored and scored for three years following installation. In addition to providing habitat for pollinators and other invertebrates, properly managed pollinator habitat can also improve water quality, decrease erosion, and provide ecological value for other native wildlife. Concerns around the physical properties of arrays, as well as fire safety and pest control, impose unique restrictions upon habitat design and management. This presentation focuses on opportunities for and potential benefits of pollinator-friendly habitat on solar farms, as well as challenges related to design and monitoring of habitat.

Ecology and Conservation of Invertebrates
Wednesday 1:45 PM

BUMBLE BEE DECLINES AND PERSISTENCE: LESSONS FROM THE CALIFORNIA BUMBLE BEE ATLAS

Leif Richardson; leif.richardson@xerces.org; Rich Hatfield, Hillary Sardinas, Dylan Winkler

Bumble bees (*Bombus*) are social insects that depend on flowers for their nectar and pollen diet, making them important pollinators of both wild and crop plants. Many bumble bee species have been reported to be in decline, including in California, where ¼ of native species are threatened, some of these having been afforded federal- or candidate status state-level endangered species protection. Threats driving declines of California bumble bees are related to agricultural activities (especially pesticide use), habitat loss to development, and climate change-related ecological disturbance. One obstacle to bumble bee conservation is a lack of standardized data collection and monitoring, which is necessary to characterize population trends and detect declines. The California Bumble Bee Atlas is a community science effort to address this need. In its first two years, 650 participants have submitted more than 10,000 bumble bee observations using a standardized field survey protocol. The project has documented the persistence of many native species, while also detecting range shifts and declines for others. In this talk, we present data from the Atlas, exploring patterns of species diversity and abundance across the state's diverse ecosystems, with particular focus on the state's six bumble bee Species of Greatest Conservation Need.

Ecology and Conservation of Invertebrates
Wednesday 2:05 PM

PATTERNS OF BUMBLEBEE (*BOMBUS* SPP.) DIVERSITY ON AND NEAR LICENSED CANNABIS FARMS IN HUMBOLDT COUNTY, CALIFORNIA

Mac Wilson; Dept of Wildlife, Cal Poly Humboldt; mw379@humboldt.edu; Jackee Riccio, Cannabis For Conservation, Arcata, CA, Dr. Matt Johnson, Dept of Wildlife, Cal Poly Humboldt

Bees are important pollinators of native and cultivated plants, and consequently there is considerable research on bees in agricultural settings. However, there is limited knowledge of how legal cannabis (*Cannabis sativa*) cultivation may impact these communities, and the potential for licensed farms to support native bee diversity. This project provides baseline data on *Bombus* communities across six farms

located in Humboldt County, California. Furthermore, this project seeks to assess the effectiveness of native hedgerows on bee diversity at these sites. From May to August of 2022 and 2023, native bees were surveyed monthly with a combination of pan and blue vane traps; in 2023 these efforts were expanded to natural habitats surrounding these farms to allow comparison of these wildlife communities to areas that are representative of the habitat before conversion to cannabis production. Additionally, data on floral resources were collected to assess their influence on bee communities. In this presentation, we share preliminary findings on patterns of community richness and abundance for *Bombus* species, and how they vary between landcover types (coastal grassland and mixed hardwood-conifer forests). In general, grassland sites had more even and abundant bee communities, but forest sites supported rarer species.

Ecology and Conservation of Invertebrates
Wednesday 2:25 PM

SURVEYING CALIFORNIA'S BUMBLE BEE ROYALTY: CROTCH'S BUMBLE BEE SURVEY APPROACH

Christina Torres; SWCA Environmental Consultants; christina.torres@swca.com; Sharif Durzi

Approaching the recently released CDFW Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species, can be a prickly task for consultants not familiar with invertebrate/pollinator survey methodology. We discuss our previously successful approaches to surveying for Crotch bumble bee in coastal and inland California from a consultant’s perspective, and how to approach your habitat assessments and presence/absence surveys with the greatest probability of success and agency approval. Additionally, we will highlight basic bumble bee identification and provide refence to materials to further sharpen your bumble bee and common pollinator identification skills.

Ecology and Conservation of Invertebrates
Wednesday 2:45 PM

Ecology and Conservation of Mammals (Large Mammals)

(sorted by presentation order)

JAGUARS, OCELOTS, COATIMUNDIS ... OH MY: SPECIES COMPOSITION AND TEMPORAL OVERLAP OF A DIVERSE CARNIVORE GUILD IN THE SIERRA OF TAMAULIPAS, MEXICO

Aidan B Branney; California Department of Fish and Wildlife; Aidan.Branney@Wildlife.ca.gov; Sasha Carvajal, Jason V Lombardi, W. Chad Stasey, Michael E. Tewes, Arturo Caso

Studying interspecific interactions and community composition within carnivore guilds are often difficult to complete and seldom done in North America. Here we used a camera trap database from 2009 to 2010 to describe the carnivore diversity and investigate the temporal niche partitioning of community members within the northern edge of the Sierra of Tamaulipas, México. We detected 15 different species of carnivores including six Felids, three Mephitids, as well as two Canids, Mustelids, and Procyonids each. In our diel activity analysis, we observed significant differences in diel activity between jaguars (Panthera onca) and mesocarnivores including ocelots (Leopardus pardalis), jaguarundis (Puma yagouroundi), and gray foxes (Urocyon cinereoargenteus). Ocelots, gray foxes, and white-nosed coatimundis (Nasua narica) had the highest occupancy rates across the study. Difficulty to understand temporal interactions between bobcats (Lynx rufus), pumas (Puma concolor), margay (Leopardus wiedii), coyote (Canis latrans), badgers (Taxidea taxus), three species of skunks (Mephitis sp; Conepatus sp.; Spilogale sp.), and long–tailed weasel (Neogale frenata) may have been related to habitat use, activity, or reclusive behavior. This study illustrates the ecologically rich Sierra of Tamaulipas holds a diverse carnivore community and there is a need for continued monitoring to further understand the dynamics within this ecosystem.

Ecology and Conservation of Mammals (Large Mammals)
Friday 8:05 AM

DIETARY NICHE OVERLAP AMONG SIERRA NEVADA RED FOX, COYOTE, BOBCAT, AND MARTEN REVEALS POSSIBLE KEY PREY ITEMS FOR SIERRA NEVADA RED FOX

Grace M Rosburg-Francot; UC Davis Mammalian Ecology and Conservation Unit ; grosburgfrancot@ucdavis.edu; Catherine B. Quinn, Cody M. Aylward, Tali Caspi, Benjamin N. Sacks

The Sierra Nevada red fox (SNRF), Vulpes vulpes necator, is a high elevation subspecies restricted to montane habitat in California and Oregon. The Sierra Nevada Distinct Population Segment is federally endangered due to low population numbers and low genetic diversity. Despite their recent listing, little is known about their basic ecology, including diet and niche overlap with other mesocarnivores in their community. To help fill these gaps, we used DNA extracted from 924 mesocarnivore scats collected from the Sonora Pass region of the Sierra Nevada to characterize the diets of sympatric SNRFs, coyotes, bobcats, and martens. We used metabarcoding to amplify DNA from food items using chloroplast (trnL) and mitochondrial (12SV5) gene regions to identify plant and vertebrate diet items, respectively. We analyzed data to assess which prey were likely of greatest importance to SNRFs during different seasons and used Pianka's niche overlap index to quantify diet overlap among SNRFs, coyotes, martens, and bobcats. Our results on key prey species, diet diversity, seasonal differences in diet, and dietary overlap with potential competitors provide basic ecological understanding fundamental to recovery planning.

Ecology and Conservation of Mammals (Large Mammals)
Friday 8:25 AM

Student Paper

CANCELLED PUTTIN' IN THE RITS: SURVIVAL MECHANISMS AND CONSEQUENCES OF HETEROTHERMY IN A DESERT-ADAPTED UNGULATE

Paige R. Prentice; Oregon State University; paige.prentice@oregonstate.edu; Christina M. Aiello, Holly K. Arnold, Brianna R. Beechler, Anna E. Jolles, Clinton W. Epps

Thermoregulation is essential yet energetically costly in endotherms, resulting in body temperature fluctuations and biological trade-offs. Advanced biologging technologies allow for continuous, remote monitoring of body temperature in wild animals. We used ruminant implant transmitters (RITs) and GPS collars to examine how desert bighorn sheep (Ovis canadensis nelsoni) thermoregulate and survive in extreme desert conditions. We tracked 43 individuals across six populations in the Mojave Desert of California over a 13-month period—15,342 observation days. RITs logged body temperature and collars recorded ambient temperature—we estimated daily median and variation (heterothermy index, HI) for both. We evaluated seasonal differences between sexes and across populations, and validated collar temperatures with external temperature loggers to assess the effect of ambient temperature on thermoregulation. Desert bighorn body temperature was 38.86°C ± 0.305°C (IQR). Annual HI ranged 0.349—0.617, and individuals with HI > 0.55 had lower survival. Daily HI for both sexes increased with ambient temperature, but male temperatures averaged 0.12°C - 0.21°C cooler than females from July thru October. Our research underscores the critical role of thermoregulation in desert bighorn survival, highlighting sex-specific responses and the impact of ambient temperatures, while demonstrating the potential of biologging to inform wildlife research and conservation.

Ecology and Conservation of Mammals (Large Mammals)
Friday 8:45 AM

Student Paper

USING NOVEL AND TRADITIONAL SURVEY TECHNIQUES TO MONITOR SMALL MAMMAL SPECIES IN NORTHWESTERN

Sydney L McCluskey; California State Polytechnic University, Humboldt; slm1074@humboldt.edu; Barbara A. Clucas

Recognizing the critical role of small mammals in forest biodiversity, the study aims to develop efficient monitoring techniques crucial for conservation and management efforts. Addressing two primary objectives, the research compares the effectiveness of three distinct camera-trap survey techniques (ground, tree, and tube) with traditional live trapping methods, and explores the species composition across old- and second-growth forest stands.Results reveal that camera-trap methods outperform live-trap techniques, demonstrating higher small mammal diversity and significantly increased capture rates. Moreover, the study finds that camera-traps are more cost-effective, reducing labor and ethical costs compared to live-trapping. Ten small mammal species were detected, with higher activity recorded in old-growth stands. The tube camera method proved most effective in capturing species richness. This research contributes to a deeper understanding of small mammal ecology in redwood forest ecosystems, supporting informed decision-making for conservation and management strategies in fragmented landscapes. The findings underscore the efficacy and cost-effectiveness of camera-trap techniques, emphasizing their importance in monitoring small mammal populations for effective conservation planning.

Ecology and Conservation of Mammals (Large Mammals)
Friday 9:05 AM

Student Paper

EXAMINING THE INFLUENCE OF ECOTYPIC VARIATION AND ENVIRONMENTAL FACTORS THAT CONTRIBUTE TO THE SUCCESS OF TRANSLOCATED BIGHORN SHEEP

Sean R. McCain; University of Nevada, Reno; seanrmccain@nevada.unr.edu; Kelley M. Stewart, Vernon C. Bleich, Brett P. Wiedmann, Rusty Robinson

Bighorn sheep (*Ovis canadensis*) were extirpated from much of their historic range in the 19th and 20th centuries as a result of widespread disease. In response, translocations emerged as a valuable restoration tool to return bighorn sheep to their native range in North America, but many of these translocated populations were characterized by low recruitment, limited range expansion, and poor population performance. Some investigators have implicated a failure to consider local adaptations to environmental conditions as a factor limiting translocation success, but research examining region-specific environmental factors has been limited. Our objective is to examine the spatial and temporal differences in resource selection between male and female bighorn sheep in the Little Missouri River region of North Dakota, an area that is most appropriate for the Rocky Mountain ecotype, and Antelope Island in Utah, which is most appropriate for the desert ecotype. Historically, populations at both locations experienced poor performance as a result of possible ecotype mismatch, but they are now improving after the addition of stock from source locations that more closely align with their release sites. The addition of bighorn sheep ecotypes from source environments that more closely align with the target environment might appear to be a strong predictor of improved population trajectories. To evaluate factors that might positively influence population trajectories, we are using resource selection functions to compare selection patterns in both locations. Our results will contribute to the improvement of restoration strategies and enhance translocation success.

Ecology and Conservation of Mammals (Large Mammals)
Friday 9:25 AM

AN IMPROVED MODEL AND ESTIMATE OF CALIFORNIA'S BLACK BEAR POPULATION

Thomas A Connor; California Department of Fish and Wildlife; thomas.connor@wildlife.ca.gov; Brett Furnas, Janelle Dorcy

Accurate estimates of wildlife population sizes over time allow for more informed conservation of harvested species. Annual harvest data itself can be a valuable source of information for modeling populations, particularly in cases where age information is collected from harvested individuals. Coupled with prior knowledge of a species' biology, these age-at-harvest (AAH) data can be modeled in an integrated Bayesian framework to estimate population sizes over time. Here, we apply this type of integrated population model (IPM) to AAH data collected from black bears in California over the last decade. We fit our statewide IPM in a hierarchical way to separately estimate black bear demographic rates and population dynamics in different proposed bear management regions (BMRs) by drawing from statewide prior distributions of black bear demography. Additionally, we created a binary annual covariate on survival rate in the hunting season to capture reduced hunting effort due to COVID-19 lockdowns in 2020. Our IPM estimated a stable black bear population of approximately 73,700 (± ~ 15,000) bears in California, with some variation in estimated trends across the different BMRs. The IPM will allow for continued tracking of black bear populations across key areas of California under changing conditions.

Ecology and Conservation of Mammals (Large Mammals)
Friday 9:45 AM

CO-OCCURRENCE OF BLACK BEARS, MOUNTAIN LIONS AND GRAY WOLVES IN NORTHERN CALIFORNIA

Jason V Lombardi; California Department of Fish and Wildlife; Jason.Lombardi@wildlife.ca.gov; Fernando Najera, Aidan B. Branney, Juan Gonzaelz, Kent Laudon, T. Winston Vickers

Sympatric apex predators utilize different behaviors to reduce competitive or antagonistic interactions. Instances where one species is recovering or colonizing new areas, understanding these interactions is immensely valuable and is critical for assessing potential impacts on management of prey species and apex carnivores. Gray wolves (*Canis lupus*) began recolonizing California in 2011, expanding their range into the southern Sierra Nevada by 2023. Mountain lions (*Puma concolor*) and black bears (*Ursus americanus*) have known antagonistic interactions in Northern California, which can impact local big game populations. Additionally, gray wolves have been shown to negatively affect mountain lion abundance and activity patterns across western North America; however, this is understudied in California. Starting in July 2023, we initiated a multi-year camera study to understand gray wolf interactions with other carnivores across two study areas (58 camera stations) in the Cascade-Siskiyou and northern Sierra Nevada mountain ranges of California. Preliminary data gained from this study will shed light on potential temporal and spatial coexistence or avoidance. The study is projected to double in size across each landscape to assess localized population abundance of mountain lions and wolves, as well as interactions with the larger species guild. Future implications will aid apex carnivore ecology in California.

Ecology and Conservation of Mammals (Large Mammals)
Friday 10:05 AM

LOGIC-BASED SITE PLANNING FOR WILDLIFE CROSSINGS

Fraser Shilling; Dudek; fshilling@dudek.com; Brock Ortega, Sasha Dansky, Terah Donovan, Julie King, Tanya Diamond

Planning for wildlife crossings is a critical activity because: 1) location can determine utilization by individual species and 2) once wildlife crossings are built, they are unlikely to be re-located. Despite how critical this aspect of wildlife crossing siting is, there is little guidance for how to scientifically carry out this step. To help develop the scientific basis for this type of conservation action, we developed a spatially-explicit decision-support system (SEDS) that combined various datasets of wildlife occurrence and habitat suitability models. SEDS was based on a series of steps: 1) objective setting by an organization planning wildlife crossings across State route 152 (SR152), the Santa Clara Valley Habitat Agency, 2) collection of data and models describing potential or actual wildlife occurrence; and 3) development of alternative models incorporating habitat, ownership, wildlife occurrence, constructability, and wildlife use of existing structures. These alternatives informed different ways of making crossing decisions, including under- versus over-crossings, duplication of crossings, and inclusion of single or multiple focal species. The SEDS for SR152 resulted in 4 candidate sites for under- or over-crossings which have been advanced to engineering design and environmental permitting. The approach is currently being used for similar wildlife crossing planning for 6 other highways.

Ecology and Conservation of Mammals (Large Mammals)
Friday 10:25 AM

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)

(sorted by presentation order)

APPLICATION OF LIDAR TO ASSESS THE HABITAT SELECTION OF AN ENDANGERED SMALL MAMMAL IN AN ESTUARINE WETLAND ENVIRONMENT

Jason Hagani; University of Michigan; jhagani@umich.edu; John Y. Takekawa, Shannon M. Skalos, Michael L. Casazza, Melissa K. Riley, Sarah A. Estrella, Laureen M. Barthman-Thompson, Katie R. Smith, Kevin J. Buffington, Karen M. Thorne

Light detection and ranging (lidar) has emerged as a valuable tool for examining the fine-scale characteristics of vegetation. However, lidar is rarely used to examine coastal wetland vegetation or the habitat selection of small mammals. Extensive anthropogenic modification has threatened the endemic species in the estuarine wetlands of the California coast, such as the endangered salt marsh harvest mouse (*Reithrodontomys raviventris*; SMHM). A better understanding of SMHM habitat selection could help managers better protect this species. We assessed the ability of airborne topographic lidar imagery in measuring the vegetation structure of SMHM habitats in a coastal wetland with a narrow range of vegetation heights. We also aimed to better understand the role of vegetation structure in habitat selection at different spatial scales. Habitat selection was modeled from data compiled from 15 small mammal trapping grids collected in the highly urbanized San Francisco Estuary in California, USA. Analyses were conducted at three spatial scales: microhabitat (25 m^2), mesohabitat (2,025 m^2), and macrohabitat (~10,000 m^2). A suite of structural covariates was derived from raw lidar data to examine vegetation complexity. We found that adding structural covariates to conventional habitat selection variables significantly improved our models. At the microhabitat scale in managed wetlands, SMHM preferred areas with denser and shorter vegetation, and selected for proximity to levees and taller vegetation in tidal wetlands. At the mesohabitat scale, SMHM were associated with a lower percentage of bare ground and with pickleweed (*Salicornia pacifica*) presence. All covariates were insignificant at the macrohabitat scale. Our results suggest that SMHM preferentially selected microhabitats with access to tidal refugia and mesohabitats with consistent food sources. Our findings showed that lidar can contribute to improving our understanding of habitat selection of wildlife in coastal wetlands and help to guide future conservation of an endangered species.

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)
Wednesday 3:40 PM

Student Paper

JUST ADD WATER? PRACTICAL HABITAT MANAGEMENT FOR SALT MARSH HARVEST MOUSE

Shawn Lockwood; Santa Clara Valley Water District; slockwood@valleywater.org; Janell Hillman, Sarah Gidre, Matthew Bozzo, Carla L. Angulo, Katie R. Smith

The majority of historical tidal wetlands in the San Francisco Estuary have been substantially anthropogenically impacted which makes these areas difficult to restore to tidal action once they are no longer in use, or difficult to manage even when water control infrastructure remains. One such property is Lower Coyote Creek Reach 1A, a mitigation area managed by Santa Clara Valley Water District (Valley Water). This area consists of diked, managed marsh, a shorebird pond, and adjacent uplands, with unmuted tidal marsh directly adjacent to the mitigation area. The diked marsh has been managed for the endangered

salt marsh harvest mouse (SMHM) for decades, though SMHM have never thrived there. Following a SMHM survey in 2020, Valley Water biologists worked with WRA, Inc. biologists to develop updated management strategies. Between 2020-2023, Valley Water increased tidal action to the marsh by flooding the diked marsh for a one-week period once a month at peak tidal cycle, a significant change from the previous management strategy of flooding 2-3 times per year. Subsequently, in 2023, the mean pickleweed cover increased, captures of house mouse and rats decreased by 70%, and captures of Western harvest mouse and SMHM increased by 20% and 100% respectively.

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)
Wednesday 4:00 PM

THE STATUS OF SALT MARSH HARVEST MOUSE POPULATIONS THROUGHOUT THE SAN FRANCISCO ESTUARY

Katie R Smith; WRA, Inc.; UC Davis; ratsmith@ucdavis.edu; Joy Albertson, Carla Angulo, Cody Aylward, Laureen Barthman-Thompson, William Claflin, Sarah Estrella, Jason Hagani, Melissa Riley, Mark Statham, Rachel Tertes, John Takekawa

The state and federally endangered salt marsh harvest mouse (SMHM) was first described 115 years ago, and despite having a relatively restricted and delineated range (San Francisco Estuary) a comprehensive "census" of the species had never been attempted. In 2019 a group of researchers applied successfully to the National Fish and Wildlife Foundation for funding to plan and implement the first ever Rangewide Survey for SMHM. The planning process was supported by both an analysis of potential habitat value throughout the Estuary based on historical trapping data, and the recent development of methods for assessing occupancy via fecal DNA. Sampling areas were selected systematically across the species range, and location and scheduling balanced staff availability, safety and accessibility, king tides, and other considerations. In all, 60 sites were selected for live trapping and 25 for fecal DNA sampling. Over 60 biologists and volunteers working across 9,000 trap nights processed 1,930 rodent captures, resulting in 651 individual SMHM captured at all but seven of the live-trapping sites. SMHM were also detected at 14 of the fecal DNA sampling locations. These results will inform ongoing analyses, and guide future conservation decisions and habitat management efforts, in support of SMHM recovery.

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)
Wednesday 4:20 PM

THE VALUE OF COMPREHENSIVE PRE-PROJECT MONITORING: SALT MARSH HARVEST MICE AT MCINNIS MARSH, MARIN COUNTY AS A CASE STUDY

Carla L Angulo; WRA; carla.angulo@wra-ca.com; Dr. Katie Smith, Serena Hubert, Veronica Pearson

Although tidal marsh restoration is occurring on an almost ongoing basis within the San Francisco Estuary, there has been relatively little monitoring of wildlife composition before, during, and after these projects. Monitoring efforts are imperative to understanding the effects of habitat enhancement efforts on the population dynamics and densities of wildlife, which can be especially important when it comes to special-status species. During the initial planning phases of a potential wetland enhancement project, Marin County partnered with WRA, Inc. to plan and implement a preliminary small mammal study, with a focus on the endangered salt marsh harvest mouse (*Reithrodontomys raviventris*; SMHM). The study area, McInnis Marsh, is a well connected, moderately sized marsh consisting of diked and tidal wetlands. Monitoring has occurred each spring and fall between 2020 and 2023 and across those years precipitation has been highly variable. Results were somewhat unexpected, often with much higher captures of SMHM in the ostensibly low quality diked wetlands, dominated by invasive plants, than the pickleweed-dominated tidal wetlands. There were also shifts in patterns of SMHM captures in response to variable precipitation.

These results have provided valuable insights and influenced the planning process, demonstrating the value of comprehensive pre-project monitoring.

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)
Wednesday 4:40 PM

RISING WATERS: THE EFFECTS OF WINTER FLOODING ON SALT MARSH HARVEST MOUSE PERSISTENCE IN MANAGED AND TIDAL WETLANDS

Melissa K Riley; CDFW/UCDavis; melriley@ucdavis.edu; Katie Smith, Sarah Estrella, Laureen Barthman-Thompson, Loren Roman-Nunez

The salt marsh harvest mouse (*Reithrodontomys raviventris*, SMHM) is an endangered species, endemic to the wetlands of the San Francisco Bay Area. Habitat loss and fragmentation are some of the largest threats to the species, and these threats can be exacerbated by other factors such as sea level rise. In smaller, fragmented habitats with little high tide escape cover SMHM are more vulnerable to climatic events such as winter flooding. After heavy rains during the winter of 2022-2023, we wanted to evaluate the effects on SMHM populations at sites throughout their range. To do this, we re-trapped a subset of sites that were part of the SMHM range wide survey in summer 2022 and sites in Suisun Marsh that are part of long-term monitoring efforts. At all sites but one SMHM captures were lower than the previous year, and we found a significant decrease in catch per unit effort. This study highlights the importance of long-term monitoring efforts and regular monitoring of SMHM populations especially as the frequency of stochastic events like seasonal flooding increases. Regular monitoring will help managers gain a more accurate understanding of the status of SMHM, guiding future conservation and management.

Ecology and Conservation of Mammals (Salt Marsh Harvest Mouse)
Wednesday 5:00 PM

Ecology and Conservation of Mammals (Small Mammals)

(sorted by presentation order)

A HIERARCHICAL MODELLING APPROACH TO PREDICT THE DISTRIBUTION, DENSITY, AND HABITAT RELATIONSHIPS OF FISHERS IN WASHINGTON, OREGON, AND CALIFORNIA

Sean M Matthews; Oregon State University; sean.matthews@oregonstate.edu; Marie E. Martin, Eric L. McGregor, Erika L. Anderson, Christine Jordan, Stephanie Eyes, Frank Weaver

Fishers (*Pekania pennanti*) are a medium-sized carnivore of conservation concern in portions of the western United States. Fishers in the southern Sierra Nevada of California are federally endangered and other populations in the western United States have been evaluated for federal listing. Small and isolated populations are the most immediate and challenging threat to fisher persistence in Washington, Oregon and California. Species distribution, habitat associations, and population size are critical information needs for species recovery. Distribution patterns and habitat associations have been evaluated using presence-only and expert opinion models. These models, however, frequently fail to meet assumptions, increasing calls for analyses in detection-non detection frameworks. We modeled the distribution, abundance, and habitat relationships of fisher across Washington, Oregon, and California. We developed a hierarchical model of detection-non detection data using occupancy and integrated modeling. We found that the use of bait and surveying in the winter had positive influence on the detection of fishers. We also found that canopy cover, the standard deviation of canopy cover, and stand age influenced patterns in fisher abundance. Our results will be a useful decision-support tool to promote species recovery in the face of stochastic events and a changing climate.

Ecology and Conservation of Mammals (Small Mammals)
Friday 8:05 AM

RESTING LOCATIONS, MOVEMENT DATA, AND GIVING UP DENSITY EXPERIMENTS DESCRIBE PERCEIVED RISK BY HUMBOLDT MARTENS WITHIN FORESTS DIVERSE IN COMPLEXITY

Katie Moriarty; Senior Research Scientist; kmoriarty@ncasi.org; Margret Hallerud, David Lamphear, **Jessica K. Buskirk**

Using a combination of fine-scale GPS data and directed experiments, we evaluated the perceived risk and foraging behavior of Humboldt martens (*Martes caurina humboldtensis*), an endangered subspecies of Pacific marten. We used GPS collars to collect location data every five minutes (15M:4F, northern California, southern Oregon). We compared vegetation characteristics between resting sites, movement paths, and giving up density (GUD) experiments with diminishing bait returns. We stratified GUD experiments equally within five treatments differing by stand age and complexity. We used remotely triggered cameras to quantify marten visits and categorize vigilance, predicting these would correlate with individuals' GPS locations (mean±SD: recent clear cuts 3.7±2.8%, regenerating forest 4–20 years 48.3±34.3%, forest >20 years 23.6%±34.9%, riparian 24.4±15.5%). Rest sites often occurred in large structures or rock piles near a high density of downed logs. Within home ranges, martens' GPS locations were similar to available. One study area, an industrially managed landscape, only had stands <100 years old. Dissimilarly between methods, martens visited baited GUD experiments within riparian more than

other landcover types. Visit length did not differ by strata (9.6±16 minutes). Vigilance decreased as the number of visits increased. Multiple methods enhanced our understanding of habitat use and behavior.

Ecology and Conservation of Mammals (Small Mammals)
Friday 8:25 AM

A "LIVING" HABITAT MAP FOR SOUTHERN SIERRA NEVADA FISHERS

Ronan B Hart; University of New Mexico; USDA RMRS; ronanhart1@unm.edu; Jody M. Tucker, Craig M. Thompson, Sarah Sawyer, Stephanie A. Eyes, Zhiqiang Yang, Gavin M. Jones

In 2016, the Southern Sierra Nevada Fisher Conservation Strategy was released, representing an enormous multi-year effort to map habitat of federally endangered Pacific fishers (*Pekania pennanti*) and develop recovery guidance. Yet at the same moment, the southern Sierra Nevada was undergoing rapid change. The unprecedented 2012-2016 California drought and subsequent severe megafires produced widespread tree mortality, undoubtedly reshaping fisher habitat—but to an unknown extent. We used 15,666 fisher locations collected from 2002 to 2022 to develop a habitat model for fishers in the Google Earth Engine environment. We used this model to produce a continually-updating 36-year time series of habitat change for southern Sierra Nevada fishers at 30-m resolution. Our work not only provides a much-needed update to the 2016 Conservation Strategy habitat map but will continue to update in the future as new changes to the landscape inevitably occur. Our maps can be used to assess disturbance effects on habitat change, thus providing support for management decisions. In the face of rapid landscape changes from fire and drought in the western US, new modeling approaches are needed to map changes to species habitat in real-time, so managers have the most up-to-date information possible when making decisions.

Ecology and Conservation of Mammals (Small Mammals)
Friday 8:45 AM

MEASURING DROUGHT SEVERITY WITH WHISKERS: DROUGHT INFLUENCES SMALL MAMMAL DIET IN CENTRAL CALIFORNIA

Shannon Lynch; Cal Poly, San Luis Obispo; shanlynch05@gmail.com; Katie Elder, Tim Bean, Seth Newsome

Rodents provide a unique glimpse into the environmental conditions at specific geographic ranges and timescales and play an important role as primary consumers. Investigating their diet using thermal ionization mass spectrometry reveals resource availability across periods of precipitation fluctuation. Museum specimens and live small mammals were sampled for this study to analyze stable isotopes in correlation with Palmer Drought Severity Indices. Small mammal trapping occurred at the Jack and Laura Dangermond Preserve in Lompoc, California for two consecutive summers to infer diet under varying levels of drought severity. Animal tissues were analyzed in collaboration with the University of New Mexico's Center for Stable Isotopes to determine the diet of small mammals on the Dangermond Preserve and a historical analysis of *Neotoma* specimens from Central California. Variability in the ratios of stable isotopes indicates changes in resource availability during periods of drought across many decades of California's history. Diet changed in response to drought on spatially explicit scales and is subject to habitat-specific pressures as well. Understanding the previous and current ecological niches of native rodents may further our understanding of resource use and conservation efforts.

Ecology and Conservation of Mammals (Small Mammals)
Friday 9:05 AM

Student Paper

SUMMARY OF USGS RESEARCH ON THE AMERICAN BADGER (*TAXIDEA TAXUS*) IN SAN DIEGO COUNTY

Devin T Adsit-Morris; U.S. Geological Survey; dadsit-morris@usgs.gov; Cheryl Brehme, Philip Gould, Robert Fisher

Preferred Session: Ecology and Conservation of Mammals Type of paper: oral presentation Paper Title: Summary of USGS research on the American badger (*Taxidea taxus*) in San Diego County Devin Adsit-Morris, Western Ecological Research Center, U.S. Geological Survey,4165 Spruance Road, San Diego, CA 92101, dadsit-morris@usgs.gov, (619)840-0127; Co-authors Cheryl Brehme; Philip Gould; and Robert Fisher Abstract: The American Badger is a wide-ranging mid-sized predator associated with grassland and upland habitats and is a target species for monitoring regional-scale connectivity under the San Diego Multiple Species Conservation Plan. Due to habitat loss, fragmentation, and road mortality, badgers were considered at risk of loss from the region. Previous to 2011, there was little information of their presence within San Diego County. Since then, we have employed multiple methods for detecting badgers including canine scent surveys, sign surveys (burrows, digs, tracks), infrared cameras, public outreach, roadkill reports, and individual identification using facial markings. Canine surveys found 203 scat samples with 25 confirmed to be badger. Over 300 sign surveys produced 80 confirmed badger occurrences, outreach produced over 200 reports with 110 confirmed to be badger, and 32 road mortalities were documented. We theorize that badgers in the County are at low densities and operating on a large spatial scale. Distribution models and least-cost paths were developed using badger data, slope, soils, and vegetation. Models and roadkill data have enabled us to model high-quality habitats and identify roads of concern. Future plans include refining habitat suitability models, conducting radiotelemetry, and identifying of locations for road passages to facilitate safe road crossings.

Ecology and Conservation of Mammals (Small Mammals)
Friday 9:25 AM

MORTALITIES ASSOCIATED WITH HIGHLY PATHOGENIC AVIAN INFLUENZA H5N1 IN CALIFORNIA WILD MAMMALS

Jaime Rudd; Endangered Species Recovery Program; jrudd@esrp.org; Beate Crossley, Asli Mete, Leslie Woods, Omar Gonzales-Viera, Nicolas Streitenberger, Robert Moeller, Rachel Roberts, Phil Johnston, David Garcelon, Emerson Paton, Deana Clifford

In California, highly pathogenic avian influenza (HPAI) H5N1 virus infections resulted in the deaths of a free-ranging bobcat (*Lynx rufus*), six mountain lions (*Puma concolor*), two fishers (*Pekania pennanti*) and two raccoons (*Procyon lotor*) between October 2022 and April 2023. Three of the animals, a fisher and two raccoons, were reported to have had neurological signs and were either euthanized or died in care. The cadavers of the other eight animals were recovered after mortality sensors from their radio collars were activated. Necropsies were conducted, and tissues were submitted for histopathological analysis. HPAI H5N1 virus was detected in the brains with associated encephalitis. Genotyping showed that the virus belonged to the HPAI GsGd H5 clade 2.3.4.4b of viruses found in wild birds. Further analysis demonstrated that the viruses were not closely related in eight of the 11 cases, suggesting that the virus was not transmitted between these individuals. However, viral sequences were identical in three mountain lions indicating potential for mammal-to-mammal transmission. While mammals primarily become infected through consumption of infected birds, these results indicate infections in mammals should be monitored to detect the emergence of mutations that may increase species spillover and zoonotic potential of HPAI H5N1 viruses.

Ecology and Conservation of Mammals (Small Mammals)
Friday 9:45 AM

CARNIVORE SPACE USE AND HABITAT SHAPE THE DISTRIBUTION OF HUMBOLDT MARTEN DENSITY IN NORTHERN CALIFORNIA

Erika L Anderson; Cal Poly Humboldt and Institute for Natural Resources; erika.anderson@oregonstate.edu; Marie E. Martin, Sean M. Matthews, Micaela Szykman Gunther

The Humboldt marten (*Martes caurina humboldtensis*) is a species of conservation concern in northern California and Oregon. Historically, these populations were threatened by unregulated fur trapping and timber harvest leading to a 90% decline in their distribution. Contemporary populations are small and isolated and continue to be threatened by a loss of habitat from timber harvest and increased wildfire risk. Due to their small body size, martens are also at risk of interspecific competition and intraguild predation. Despite efforts to better understand their contemporary distribution and habitat associations, little is known about the abundance and interspecific relationships of Humboldt martens across their current range. To fill these information gaps, we deployed non-invasive hair snares and remote cameras across three sampling grids in the North Coastal California EPA. We developed a spatial capture recapture model to estimate marten abundance and density, and two single-species occupancy models to estimate the space use of fishers and bobcats. We then tested the effects of habitat and carnivore space use on marten density. Given that this is the first effort to evaluate how biotic and abiotic variables influence the distribution and variation of marten density, we offer insights for management and future survey efforts.

Ecology and Conservation of Mammals (Small Mammals)
Friday 10:05 AM

Student Paper

10-YRS OF OCCUPANCY MONITORING FOR THE ENDANGERED PACIFIC POCKET MOUSE USING TRACK TUBES: PROGRAM SUCCESSES, CHALLENGES, AND MONITORING-MANAGEMENT FEEDBACK LOOP

Cheryl S Brehme; USGS Western Ecological Research Center; cbrehme@usgs.gov; Devin Adsit-Morris, Tristan Edgarian, Robert Fisher

It's important to understand species-habitat relationships over time for effective adaptive management of rare species. We report results from 10-years of track tube monitoring of the two largest extant populations of the federally endangered Pacific pocket mouse (PPM) on Marine Corps Base Camp Pendleton (MCBCP). Total area occupied by PPM has ranged from 117 to 335 ha, with a recent estimate of 165 ha. Dynamic occupancy and structural equation modeling have shown PPM spatial and temporal dynamics are positively associated with open ground, forb and perennial herb cover, while negatively associated with non-native grass cover (NNG), which is strongly influenced by rainfall and fire. MCBCP have used these results to support fire and vegetation management resulting in largely positive PPM responses and colonization of new areas. Due to regulatory concerns about habitat maintainence in PPM occupied areas, management actions have been largely limited to sparsely occupied or unoccupied habitats or after major population declines. Inclusion of habitat maintenance in PPM occupied areas may promote resiliency and reduce population stochasticity, chances of population decline and loss of genetic diversity. We discuss concurrent research on phenology, climate, and diet; and show the power of this program in supporting a monitoring-management feedback loop.

Ecology and Conservation of Mammals (Small Mammals)
Friday 10:25 AM

Genetics in Wildlife Science, Conservation, and Management - I

(sorted by presentation order)

NON-INVASIVE SAMPLING AND DNA METABARCODING REVEAL FORAGING PATTERNS AND SPACE-USE OF MONTANE CARNIVORE GUILD

Marie E Martin; marie.martin@oregonstate.edu; Sean M. Matthews, David S. Green, Jennifer Allen, Dustin Garrison, Jennifer Hartman, Heather Mackey, Mike McDonald, B. Heath Smith, Tessa R. Smith, Sarah L. Stock, Stevi L. Vanderzwan; Benjamin N. Sacks; Taal Levi

Interspecific competition is an integral force in animal communities, shaping the distributions, ecology, and behavior of sympatric species. We evaluated breadth and overlap of diets and space-use within a sympatric carnivore guild, including bobcats (*Lynx rufus*), cougars (*Puma concolor*), coyotes (*Canis latrans*), grey foxes (*Urocyon cinereoargenteus*), and Pacific martens (*Martes caurina*) in Yosemite National Park, CA using two approaches. We used DNA metabarcoding of scats to evaluate composition and overlap among diets and scat locations and remote camera detections to estimate the space-use of carnivores. From 1,176 scat samples, we identified 68 vertebrate prey species from 57 genera, 36 families, 16 orders, and five classes. Composition and body size of prey items varied among consumers. Space-use varied among carnivores with some (e.g., cougars, coyotes) occurring throughout Yosemite, while others predominantly occurred in lower (e.g., grey foxes) or higher (e.g., martens) elevations. Vegetation structure, topography, and precipitation correlated with both foraging patterns and space-use patterns within the carnivore guild. Our results suggest that changes in heterospecific occurrence and habitat could affect competition for space and resources in systems affected by continued climate and landscape change.

Genetics in Wildlife Science, Conservation, and Management - I
Wednesday 1:05 PM

LANDSCAPE AND POPULATION GENETIC INSIGHTS INTO NUTRIA (*MYOCASTOR COYPUS*) INVASION DYNAMICS IN CALIFORNIA

Kristen D. Ahrens; California Department of Fish & Wildlife; kristen.ahrens@wildlife.ca.gov; Joshua M. Hallas, Valerie K. Cook, Antoinette J. Piaggio, Kelly L. Carrothers, Michael R. Buchalski

Nutria (*Myocastor coypus*) is an invasive, semi-aquatic rodent that recently re-emerged in California's Central Valley, threatening ecologically vital wetland habitats. To understand invasion dynamics, we aimed to identify the source of contemporary California nutria, assess genetic structure, estimate kinship to infer colonization social dynamics, and identify dispersal corridors. We sampled contemporary California nutria (n = 267), six other invasive populations across North America (n = 40), and historical samples from California fur farms (n = 10). We sequenced the cytochrome-b locus and used RADSeq to discover 6,809 SNP loci. Consistent with recent invasion, we found a single cytochrome-b haplotype among contemporary California nutria, while historical samples had several haplotypes no longer present. Nuclear and mitochondrial data revealed contemporary California nutria have close genetic affiliation with Oregon and Washington populations. SNP-based estimates of kinship indicated closely related individuals occupy the northern and southern leading edges of the invasion, while more central areas displayed low kinship and minimal genetic structure. Landscape genetic analyses identified dispersal corridors facilitating southern range expansion. We provide the first assessment of genetic relationships among nutria invaded regions in the United States, including insights into landscape connectivity and colonization dynamics that will ultimately aid eradication strategies.

CHARACTERIZING BARRED OWL (*STRIX VARIA*) DIET ALONG AN INVASION PATHWAY

Emma Fehlker Campbell; University of Wisconsin—Madison; Fehlkercampb@wisc.edu; Emily D. Fountain, Nicholas F. Kryshak, Karla A. Bloem, M. Zachariah Peery

Invasive predators can have negative impacts on biological communities through top-down predation, but the ecological processes that shape the consumption of prey in novel communities are less understood. The "Enemy release hypotheses" and "Naïve prey hypothesis" are two explanations for why invasive species succeed in novel environments and, under these hypotheses, diets of invasive predators are expected to initially expand and then contract throughout the invasion process. Furthermore, differing invader densities, and fluctuations in climactic and biogeographic conditions that shape prey community composition are likely to influence prey availability and selection, but the relative importance of these factors has yet to be tested. Here we used DNA metabarcoding on intestinal samples to determine diet composition and diversity of Barred Owls (Strix varia) within their native and invasive ranges. Dietary diversity was greater in the invasive range across all taxonomic levels. Within the native range mice were the most consumed vertebrate (frequency of occurrence = 71%) but were a small component of invasive diet (26%). Non-mammalian prey items had higher importance within the invasive range. We provide preliminary evidence that expansion in hunting opportunities facilitates successful invasions.

Genetics in Wildlife Science, Conservation, and Management - I
Wednesday 1:45 PM

Student Paper

A NEW HIGH-QUALITY REFERENCE GENOME AND WHOLE GENOME RESEQUENCING OF THE LITTLE BROWN BAT *(MYOTIS LUCIFUGUS)* TO PROVIDE UNPRECEDENTED INSIGHTS INTO WHITE-NOSE SYNDROME RESISTANCE IN BATS

Samantha LR Capel; California Dept. of Fish and Wildlife, Wildlife Health Lab; Samantha.Capel@wildlife.ca.gov; Juan Vazquez, U.C. Berkeley, Amy Russell, Grand Valley State University, Maarten Vonhof, Western Michigan University, Thomas Lilley, Finnish Museum of Natural History, Devaughn Fraser, Connecticut Dept. of Energy and Environment, Peter Sudmant, U.C. Berkeley, Michael Buchalski, California Dept. of Fish and Wildlife

White-nose syndrome (WNS) has decimated numerous bat populations in North America. Given the rapid spread of WNS, identifying resistance is critical for mitigating further loss. Yet, detecting genomic signatures of WNS resistance in bat populations has proven challenging. Rapid innovations in sequencing and genome assembly technologies now provide unprecedented opportunity to characterize genomic variation in virtually any species and, in turn, resolve the underpinnings of wildlife disease resistance. We have assembled a near-chromosome-level for the little brown bat *(Myotis lucifugus)* reference genome using Omni-C and PacBio sequencing, resulting in a mean depth of coverage of 37.7X, a scaffold N50 of 99.0 Mb, and a BUSCO completeness score of 98.5%. We optimized gene annotation by combining ab initio gene predictions, orthology inferences, and transcriptomic evidence. Additionally, we conducted whole-genome resequencing on M. lucifugus samples predating, and 10 years following, WNS exposure. Individuals were sequenced from sites in New York and Pennsylvania ($N \approx 15$ per sampling) at a mean depth of 25.7X resulting in >40 million SNPs. To date, this study has produced the highest-quality genomic resources available for M. lucifugus for determining the genomic architecture of WNS resistance. These findings will in turn provide insight into naïve population susceptibility during future spread of WNS.

EXPLORING DIET IN A VANISHING POPULATION OF THE BLUNT-NOSED LEOPARD LIZARD USING DNA METABARCODING

Mark J Statham; UC Davis; statham@ucdavis.edu; Cody Aylward, Jenna Braun, Mike Westphal, Ben Sacks

The blunt-nosed leopard lizard (BNLL; *Gambelia sila*) is an endangered species endemic to the San Joaquin Desert of California. Understanding its diet is fundamental to the conservation of the species and its habitat. A number of populations, including that of the Panoche Plateau, have undergone or are in the process of becoming extinct, which underscores the urgency of obtaining fundamental ecological data. DNA metabarcoding leverages the power of high-throughput DNA sequencing to provide both higher taxonomic resolution and prey-detection capacity over traditional fecal diet analyses. We collected fecal samples from across the range during 2013-2021 and used DNA metabarcoding to recover arthropod diet sequences. Based on data from >700 fecal samples we identified >100 invertebrate diet items. Orthopterans (grasshoppers etc.), Hemipterans (true bugs), and Coleopterans (beetles) were the most abundant orders in the BNLL diet across sites. However, the abundance of individual diet species varied widely even among contemporaneous samples. The Panoche Plateau population appeared to have the lowest diet diversity across all sites examined. This population was considered functionally extinct by 2022. The highly resolved arthropod diet data from this study will also improve our ability to assess sites for BNLL suitability.

SURVIVING WITH LOW GENOMIC DIVERSITY: THE IMPACTS OF REINTRODUCTION MANAGEMENT ON INBREEDING AND GENETIC LOAD IN BIGHORN SHEEP (*OVIS CANADENSIS*)

Michael R Buchalski; Wildlife Genetics Research Unit, CDFW; michael.buchalski@wildlife.ca.gov; Samantha L. R. Capel, Catherine B. Quinn

Bighorn sheep (*Ovis canadensis*) recovery throughout North America over the last century has been accomplished primarily through translocations from relict herds to unoccupied historical range. Yet the genomic consequences of reintroductions, including founder events, inbreeding depression, and genetic drift remain uninvestigated. This includes evaluating the risk of subsequent demographic/genetic rescue using stock from large, genetically diverse populations, as such individuals could introduce new deleterious recessive alleles. To characterize the effects of a founder event followed by complete isolation, we sequenced 12 whole genomes from a 45-year-old population of bighorn sheep, established from as few as 20 animals, in Sespe Wilderness, California. Size of runs of homozygosity suggested inbreeding was intense at the time of introduction but has been minimal in the last < 20 years. Compared to the source population (n = 12), and a genetically diverse reference population (n = 12), the Sespe individuals had a higher proportion of homozygous and fixed missense and loss-of-function mutations, which may reflect increased expression of deleterious alleles. Simulations of various augmentation scenarios are planned to evaluate extinction risk associated with introducing stock from various sized populations with differing genetic load. This study will guide future reintroductions and demographic/genetic rescue efforts for bighorn sheep throughout North America.

Genetics in Wildlife Science, Conservation, and Management - I
Wednesday 2:45 PM

Genetics in Wildlife Science, Conservation, and Management - II

(sorted by presentation order)

WHOLE GENOME SEQUENCES INFORM GENETIC RESCUE OF THE SIERRA NEVADA RED FOX IN LASSEN, CALIFORNIA

Cate B Quinn; USDA Forest Service, Rocky Mountain Research Station; catherine.quinn@usda.gov; Sophie Preckler-Quisquater, Michael Buchalski, Benjamin N Sacks

In principle, genetic augmentations can rescue inbred populations from extinction vortices. In practice, genetic rescue is seldom used as a management tool due to uncertainty about risks and long-term benefits. We analyzed 34 whole genome sequences of North American red foxes to support planning for genetic augmentation of a small, isolated population of Sierra Nevada red foxes (*Vulpes vulpes necator*) in the vicinity of Lassen National Park, California. We found high levels of recent inbreeding in the Lassen population and elevated homozygosity of putative deleterious alleles, supporting inbreeding as a plausible factor influencing viability. We then evaluated the genomic suitability of candidate source populations by comparing the demographic histories and levels of deleterious variation across multiple North American red fox populations. Montane populations share a long-term history and became isolated from each other relatively recently, suggesting low risk of outbreeding depression. Different intensities of anthropogenic declines, however, have created tradeoffs in the potential and realized load of novel deleterious alleles that source populations may contribute to the Lassen population. Such tradeoffs may be particularly influential in genetic rescue of extremely small populations and thus bear careful consideration in source selection for the Lassen Sierra Nevada red fox.

Genetics in Wildlife Science, Conservation, and Management - II
Wednesday 3:40 PM

WHOLE GENOME RESEQUENCING OF MULE DEER (*ODOCOILEUS HEMIONUS*) REVEALS EVOLUTIONARY LINEAGES ACROSS CALIFORNIA

Joshua M Hallas; Wildlife Genetics Research Unit, CDFW; joshua.hallas@wildlife.ca.gov; Benjamin N Sacks, Michael R Buchalski

Hybridization has a large impact on the generation and maintenance of biodiversity. However, genetic integrity among distinct lineages and populations has the potential to be eroded through admixture, thus directly influencing evolutionary trajectories and management policies. Mule deer (*Odocoileus hemionus*) are an important and intensively managed game species in California. We examined the genomic evidence for six putative mule deer subspecies resident to California using low coverage (~1.1X) whole genome resequencing data. We also used whole mitogenomes to evaluate the evolutionary relationships between mule deer in California and white-tailed deer (*Odocoileus virginanus*). Principal component and admixture analyses based on ~215,644 SNPs recovered varying levels of differentiation among putative subspecies. Our results primarily supported the presence of Columbia black-tailed, Rocky Mountain, Southern, and California mule deer lineages with pronounced admixture in regions of sympatry. Our mitogenome phylogenetic estimate suggested close affiliation of Rocky Mountain mule deer in northeastern California with white-tailed deer, similar to previous studies of those two lineages in other regions of North America. Our findings offer insights into the geographic scale of genetic structure and admixture among mule deer subspecies in California, which provides a foundation for future research on adaptative introgression and aid in management decisions.

Genetics in Wildlife Science, Conservation, and Management - II
Wednesday 4:00 PM

NON-INVASIVE GENETIC TRACKING OF HABITUATED BLACK BEARS (*URSUS AMERICANUS*) IN THE TAHOE BASIN

Jillian K Adkins; California Department of Fish and Wildlife; jillian.adkins@wildlife.ca.gov; Alyson Cheney, Kyle Garrett, Erin Meredith, Aleixa Ronning

Since 2020, the California Department of Fish and Wildlife (CDFW) Law Enforcement Division's Wildlife Forensic Laboratory (WFL) has utilized genetic methods to detect individual black bears (*Ursus americanus*) involved in human-wildlife conflict incidents resulting in property damage and public safety concerns in the Tahoe Basin. The collection of DNA samples from home and vehicle invasions has provided a novel and unique opportunity to non-invasively track black bears through their genetic profiles in near real time. Samples are analyzed using forensically validated methods to ensure accuracy of results and to provide statistical significance when an individual profile is detected multiple times. Turn-around time from raw sample to DNA profile ranges from 4 to 12 hours depending on the sample type, and the profiles generated enable historic and near real time geographic tracking of bears without the use of a radio tracking collar. The combination of field and genetic investigation has given insight into the behavioral patterns that are passed down generationally from sow to cub(s) and the need for active management practices.

Genetics in Wildlife Science, Conservation, and Management - II
Wednesday 4:20 PM

POOP TO PEDIGREES: GENETIC GENEALOGY OF CALIFORNIA'S GRAY WOLVES (*C. L. LUPUS*)

Erin P Meredith; California Department of Fish and Wildlife; erin.meredith@wildlife.ca.gov; Jillian Adkins, Kent Laudon, Christina Winters

Since 2016, the Wildlife Forensic Laboratory (WFL) of the California Department of Fish and Wildlife's (CDFW) Law Enforcement Division has used a variety of genetic methods to non-invasively detect and monitor gray wolves (*C. l. lupus*) in California. Over 1500 potential gray wolf samples have been collected and analyzed since inception, detecting a total of 88 different wolves. These methods allow CDFW to genetically detect 1) successful matings, 2) mortalities, 3) migration, and 4) relatedness to known wolves and packs both within and outside of California. In investigations of illegal take or depredation on livestock, the WFL can compare collected evidence with the genetic profiles of known wolves to confirm identity or distinguish from other canid species (i.e. coyotes, domestic dogs, hybrids). Collaborative efforts with outside agencies have yielded nearly 400 gray wolf reference samples from the Northern Rocky Mountain ecosystem, Great Lakes region, Alaska, and parts of Canada, which have been used to construct a genetic database for statistical analyses of individual identification and kinship. Using this information, the pedigree of our California gray wolf packs has been reconstructed through six generations, which traces back to the parents of OR7, the first wolf to enter California since the 1800s.

Genetics in Wildlife Science, Conservation, and Management - II
Wednesday 4:40 PM

Innovation in Wildlife Science, Conservation, and Management

(sorted by presentation order)

PHOTOGRAPHY AS A TOOL FOR MORE ACCURATE AND INCREASED SPECIES DETECTIONS DURING WILDLIFE SURVEYS

Noriko L Smallwood; Independent Researcher; norikosmallwood@yahoo.com; K. Shawn Smallwood

Improving technology aids biologists during wildlife surveys. Cameras are already used widely in wildlife biology in camera traps, drone/aerial footage, and thermal-imaging. Here, we explain how the use of cameras with telephoto lenses can contribute to more accurate characterizations of the local wildlife community, and can serve as evidence of detections. Throughout California, we completed 56 reconnaissance surveys averaging 2.3 hours at sites averaging 19 acres, where we used binoculars and full-frame DSLR cameras fitted with 400mm and 500mm lenses to help detect vertebrate species. Our photography of animals during surveys aided in identifying 7% of the total species detected in a survey (mean = 2 species per survey) by confirmation (3.4%), new identifications (3.5%), and corrections (<1%), species of which could have been missed using binoculars alone. The use of photography reduced mis-identified species and helped detect additional species post-survey, hence reducing the classification errors of species detections in the field. We found photography to be especially useful for taxa we are least familiar with, distant animals, birds in flight, and species that are challenging to identify. Here, we also make recommendations for camera gear and accessories, camera settings, and tips for photographing wildlife during surveys.

Innovation in Wildlife Science, Conservation, and Management
Wednesday 1:05 PM

SNAPSHOT USA: AN ANNUAL NATIONWIDE MAMMAL SURVEY

Brigit Rooney; Smithsonian's National Zoo & Conservation Biology Institute; rooneybr@si.edu; William J. McShea, Roland Kays, Michael V. Cove

Snapshot USA is an annual collaborative effort between scientists and community scientists to sample mammal populations with camera traps across the United States. Every year, Snapshot collaborators use a standardized protocol to sample sites stratified across habitats and development zones from September through October. In 2022, data were collected across 132 camera trap arrays in 44 states and consisted of 2,160 camera sites, 2,393 camera deployments, and 94,175 camera trap nights. All data are managed and identified within the Wildlife Insights platform, which uses Artificial Intelligence to assist with identifications and enables nationwide collaboration. Since the project began in 2019 through 2022, we have recorded over 410,000 detections of 131 mammal species and collaborated with over 150 institutions across all states. We are now processing the 2023 data and are preparing to conduct surveys again in 2024. This continually growing dataset has a wide range of potential uses, including tracking wildlife populations' responses to changes in land use, land cover, and climate across spatial and temporal scales. With this in mind, we are seeking to expand the Snapshot USA network and welcome many new collaborators. To facilitate participation, we have five camera kits available for participants belonging to underprivileged groups.

Innovation in Wildlife Science, Conservation, and Management
Wednesday 1:25 PM

RELATIONSHIPS BETWEEN WILDLIFE DISTRIBUTIONS AND LAND USE CHANGE IN NORTH-CENTRAL CALIFORNIA

Matthew J Toenies; California Department of Fish and Wildlife; matthew.toenies@wildlife.ca.gov; Courtney L. Davis, Sara Bangen, Nicole Cornelius, Austin Kozlowski, Lindsey N. Rich, **Matthew Toenies Kaitlin McGee**

Habitat loss and fragmentation from land use change are a leading driver of wildlife declines and species extinctions. California continues to undergo land use change from ongoing urbanization and agriculture, including expanding cannabis cultivation. To understand impacts on wildlife, we employed non-invasive, automated field methods (ARUs, traditional camera traps, and novel drift fence/camera methods) combined with efficient, cutting-edge data processing tools (e.g., BirdNET and Wildlife Insights). These approaches facilitated large-scale surveys encompassing 170 long-term monitoring sites in north-central CA, where we conduct biennial surveys of bird, bat, reptile, and terrestrial mammal species from rodents to large carnivores. We then integrated this wildlife occurrence data with land use data, to assess how urban development, well-established agriculture like vineyards, newly established agriculture like cannabis, and the resulting habitat edge influence the distributions of vertebrate wildlife species, groups of species, and the entire community. In doing so, we provide critical information on how to minimize the impacts of continuing human development on vulnerable wildlife species and ensure long-term conservation of the region's biodiversity.

Innovation in Wildlife Science, Conservation, and Management
Wednesday 1:45 PM

POTENTIAL FOR DENNING BEHAVIOR TO FACILITATE TRANSMISSION OF SARCOPTIC MANGE IN ENDANGERED SAN JOAQUIN KIT FOXES

Brian L. Cypher; California State University-Stanislaus Endangered Species Recovery Program; bcypher@esrp.csustan.edu; Alyse Gabaldon, Erica C. Kelly, Tory L. Westall, Nicole A. Deatherage

A dense population of endangered San Joaquin kit foxes occurs in the urban environment of Bakersfield, California. Sarcoptic mange was detected in 2013 and rapidly spread causing a significant decline in kit fox abundance. Kit foxes use dens on a daily basis. Sarcoptic mange mites can live off-host under conditions found to occur in kit fox dens. We monitored den use patterns of 37 kit foxes on the CSU-Bakersfield campus. All foxes had unique dye marks and 20 were fitted with radio-collars. During 390 one-week monitoring sessions, the proportion of sessions that other foxes used the same den as the collared fox within two, four, and seven days was 78.5%, 84.4 %, and 89.0%, respectively. The mean number of other foxes using the dens was 1.8, 2.2, and 2.5, respectively. Also, an average of 1.8 foxes was detected in a den concurrently with the collared fox during each week-long session. During 120-day intervals (the time from infection to death), collared foxes used a mean of 7.6 dens, 9.8 other foxes used the same dens within one week, and 7.3 foxes used the dens concurrently with the collared foxes. These results potentially explain the rapid spread of mange throughout this population.

Innovation in Wildlife Science, Conservation, and Management
Wednesday 2:05 PM

FEDERAL POLICY ENGAGEMENT WITH LOCAL IMPACTS: SUPPORTING SCIENCE-BASED DECISION MAKING FROM A SECTION PERSPECTIVE

Kelly Holland; GEI Consultants, Inc.; kholland@geiconsultants.com;

The Western Section's Conservation Affairs Committee (CAC) tracks and responds to policies that may affect the conservation of wildlife and their habitats within the Section's geographical scope, which includes the Hawaii chapter, Nevada chapter, and 6 California chapters, as well as at least 5 active student chapters. The Western Section CAC operates under the framework of the Conservation Affairs Network, which engages and unifies the efforts of The Wildlife Society to advance wildlife conservation policy issues at the national, regional, and local levels. Through a lens that focuses on the efforts of the Western Section CAC from 2017 to present, we will explore the ways that TWS chapters and sections can engage in federal policy. Case studies will include Section-wide comment letters and actions that focused on issues that either (1) touched each of the Section's 8 chapters (such as ESA and MBTA policies), or (2) affected only some of the Section's chapter geographies (such as proposed changes to National Monuments). Further, we will touch on examples where Section-to-Section collaboration has proven beneficial to add our active voice for science advocacy, including collaborating with other Sections on comments on the border wall or on ESA species listings. We will explore the operationalized processes, approaches, and opportunities for responding to federal policy from a Section perspective.

Innovation in Wildlife Science, Conservation, and Management
Wednesday 2:25 PM

Military Lands - I

(sorted by presentation order)

DEPARTMENT OF DEFENSE PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION (DOD PARC) OVERVIEW

Robert E Lovich; U.S. Navy; robert.e.lovich.civ@us.navy.mil; Petersen, Christopher E.

The American public has entrusted the Department of Defense (DoD) with nearly 27 million acres of lands to accomplish its mission. To the surprise of many, DoD's landscapes are home to a significant and diverse array of species, including those of amphibians and reptiles. Here, we discuss more than 14 years of implementation of DoD PARC's goals and the Strategic Plan for Amphibian and Reptile Conservation and Management on Department of Defense Lands. We will present updates about our network's significant recent accomplishments and will discuss future projects, deliverables, and opportunities. Please join us to learn more about DoD PARC and our path forward for continued support of the military mission and herpetofauna management and conservation on DoD lands. Intended to also serve partially as an introduction to the "Military Lands" session, several other DoD Natural Resources Management partnerships will also be briefly discussed.

Military Lands - I
Thursday 8:05 AM

MANAGING MONARCH BUTTERFLIES AT VANDENBERG SPACE FORCE BASE

Jessica L Griffiths; CEMML; jessica.griffiths@colostate.edu;

Vandenberg Space Force Base (VSFB), located in northern Santa Barbara County, California, is one of the very few military installations in the U.S. which is home to western monarch butterfly (*Danaus plexippus*) overwintering sites. The monarch butterfly is currently a candidate species for listing under the Endangered Species Act, and it is therefore crucial to understand which overwintering sites are used by monarchs, and what management is needed at those sites. In 2022 and 2023, we increased our overwintering monarch monitoring efforts, conducted standardized habitat assessments, and began searching for new overwintering sites. We also partnered with multiple organizations to bring monarch and monarch habitat focused research projects to VSFB. In 2022 we monitored 28 overwintering sites, and in 2023 we monitored 36 sites (including 3 newly discovered sites). We also conducted habitat assessments at 27 sites. These efforts have allowed us to identify the most important overwintering sites on VSFB and draft mission-compliant habitat management actions for those sites (including habitat restoration/enhancement).

Military Lands - I
Thursday 8:25 AM

MOVEMENT OF WEANED NORTHERN ELEPHANT SEAL PUPS DURING THEIR FIRST AT-SEA FORAGING MIGRATION

Katie Saenger; California Polytechnic State University; esaenger@calpoly.edu; William T. Bean, Heather S. Harris, Lauren Campbell, Elizabeth Eby, Kate Riordan, Molly Murphy, Rhys Evans, Gita R. Kolluru, Heather E.M. Liwanag

The northern elephant seal (*Mirounga angustirostris*, NES) is a well-studied marine mammal known for engaging in long foraging migrations at sea. Adult male NES follow pathways along the coast towards Alaska and adult female NES follow pathways to open ocean. However, there is little to no information about newly weaned NES pup foraging behavior. This lack of knowledge is significant because NES have a mortality rate of >50% in the first year. This project aims to better understand the migratory pathways of NES during this critical life stage. We deployed satellite tags on newly weaned NES pups at Vandenberg Space Force Base (VSFB, est. 2016, n=10) and San Nicolas Island (SNI, est. 1949, n=5). We hypothesized that weaned NES pups would [1] prioritize near-site foraging areas and thus migrate shorter distances compared to adults, [2] exhibit no sexual divergence in their pathways, and [3] have pathways that differ between the two breeding sites. Examining these migratory pathways and comparing them between rookeries and years provides insight into important foraging grounds for this life stage, differences between breeding sites, and environmental influences on migration, which will inform the conservation and management of this species.

Military Lands - I
Thursday 8:45 AM

Student Paper

INTEGRATING PROCESS-BASED RESTORATION: MONITORING WILDLIFE DIVERSITY AND HABITAT RESPONSE POST-DAM REMOVAL AT BEALE AFB, CA

Matt E Berry; Sierra Streams Institute; matt@sierrastreamsinstitute.org; Josh Zupan, Jonathan Gomez, Jeff Lauder, Tamara Gallenitne, Kirsten Christopherson

This study, centered on the removal of a dam at Beale Air Force Base (AFB), CA, investigates wildlife diversity, habitat response, and the integration of Process-Based Restoration (PBR) concepts. The dam removal, a pivotal environmental intervention, aimed at restoring natural riverine ecosystems and enhancing biodiversity through PBR techniques. Using a comprehensive monitoring approach, we employ standardized field surveys to quantify changes in wildlife diversity post-dam removal. Concurrently, we assess habitat responses, including vegetation composition and hydrological patterns, to understand the ecosystem's adaptive capacity within the framework of PBR. Integrating GIS and remote sensing technologies, our analysis extends to landscape-scale changes, emphasizing the interconnectedness of habitat alterations and wildlife utilization. Preliminary findings highlight positive shifts in wildlife diversity, affirming the ecological benefits of dam removal and the application of PBR concepts. Additionally, observed changes in habitat structure contribute valuable insights into ecosystem resilience, crucial for understanding the success of PBR initiatives. This research not only advances our comprehension of dam removal's ecological consequences but also provides critical information for future restoration projects, emphasizing the integral role of PBR in achieving sustainable habitat restoration and fostering wildlife diversity.

Military Lands - I
Thursday 9:05 AM

HEADSTARTING DESERT TORTOISES: FROM GROWTH, SURVIVAL AND HOTTER SEX, TO TRANSLOCATION AND POPULATION AUGMENTATION AND VIABILITY

Brian T. Henen; MAGTFTC ISD Environmental Affairs; brian.henen@usmc.mil;

Scientific analysis of headstart effectiveness has generated powerful basic biology that applies to augmenting tortoise populations that are on the cusp of minimum viable densities. Committing to evaluating headstart effectiveness requires long-term commitments of resources for long-lived, late-maturing species like desert tortoises, but enables assessments of fundamental vital rates, growth rates, and variables influencing them, to enhance effectiveness of headstart techniques. These programs also provide

opportunities for serendipitous findings in basic and applied biology. The tortoise headstart program for the Marine Corps Air Ground Combat Center, Twentynine Palms California, has successfully produced 475 hatchlings and released 234 juveniles with hard shells, which improve resistance to predators such as common ravens. More releases will ensue. Headstarting has improved stock of juveniles (ten years old) to ten times that would occur in the wild, and released tortoises are being monitored for their survival, growth and long-term success post release.

Military Lands - I
Thursday 9:25 AM

DOD ACHIEVES LARGEST DELISTING IN ESA HISTORY

Melissa A Booker; melissa.a.booker.civ@us.navy.mil; Kim O'Connor, **Melissa A. Booker**

San Clemente Island (SCI) is part of the Navy's Southern California Range Complex, the most heavily used range complex in the eastern Pacific and only continental US range supporting ship to shore, air to ground, and ground troop training. It hosts Endangered Species Act (ESA) listed taxa, candidate agreement taxa, and rare endemics. In 2023, the Navy achieved the largest delisting in ESA history. The SCI lotus, SCI paintbrush, SCI larkspur, SCI bush-mallow, and San Clemente Bell's Sparrow, listed in 1977, were delisted on the 50th anniversary of ESA. Bell's Sparrow is one of nine birds delisted due to recovery in the Continental US and only 10 plants had been delisted due to recovery before 2023. Adaptive monitoring documented recovery and supported Species Status Assessments, a critical step in delisting. This achievement demonstrates proactive management of robust populations is the effective way to manage species on DoD lands. The Navy will continue monitoring through the Post Delisting Monitoring Plan period and management under a pending Delisting Conservation Agreement, providing continued protection without ESA process constraints. SCI has increased military training while delisting multiple species providing a blueprint for conservation success on military lands.

Military Lands - I
Thursday 9:45 AM

Military Lands - II

(sorted by presentation order)

ASPECTS OF THE DEMOGRAPHY OF A RELICT AND TENUOUS POPULATION OF NORTHWESTERN POND TURTLES (*ACTINEMYS MARMORATA*) IN A WEST MOJAVE DESERT STREAM FLOWING ONTO EDWARDS AIR FORCE BASE

Jeff E Lovich; U.S. Geological Survey; jeffrey_lovich@usgs.gov; David Muth, Rodrigo Macip-Rios, Doug Gomez, Kristy Cummings, Shellie Puffer, Charles B. Yackulic

The genus *Actinemys* includes two species, *Actinemys marmorata* (Northwestern Pond Turtle) and *A. pallida* (Southwestern Pond Turtle). Both species are found in different wetland locations in the Mojave Desert of California. Southwestern Pond Turtles are restricted to scattered populations along the Mojave River. The Northwestern Pond Turtle population is currently restricted to a small but unknown number of turtles in Piute Ponds, Edwards Air Force Base, in the terminal endorheic basin of Amargosa Creek near Rosamond, California. Historically, there was a breeding population living in the upper reaches of Amargosa Creek that varied between roughly 78 and 104 individuals from 1997 to 2003. Annual survival was relatively high (0.87 +/- 0.04) during the study with variation in abundance driven by a recruitment pulse early in the study. From 2000 to 2003 recruitment was much lower and numbers dropped sharply, coincident with the beginning of a multi-decadal megadrought that caused the extirpation of another large population in nearby Elizabeth Lake by 2015. Only a small number of turtles are known to survive at Piute Ponds. Given the disappearance of the rest of Amargosa Creek upstream of Piute Ponds due to drought, recolonization of the upper basin is unlikely without human intervention.

Military Lands - II
Thursday 10:40 AM

MANAGING CALIFORNIA TIGER SALAMANDER MIGRATION AT TRAVIS AIR FORCE BASE, CALIFORNIA

Jaymee Marty; martyjt@me.com; Kirsten Christopherson, Deanne Weber, Jeff Alvarez, Sarah Foster

In May 2017, large numbers of California tiger salamander (CTS; *Ambystoma californiense*) metamorphs were observed on one of the active runways at Travis Air Force Base in Solano County, California. This was noteworthy given that fewer than a half dozen CTS had been recorded on the 5,100-acre base prior to 2017. The Air Force responded by implementing a number of actions to study and protect CTS on the base. These actions included drift fence with pitfall trap studies, road and runway checks, and breeding pond surveys to characterize the movement patterns and size of the CTS population. Over the past seven years, these studies have recorded over 6,500 juvenile and adult CTS on the base. This talk will cover what we've learned about the Travis AFB CTS population including population size variability; movement patterns and the factors that influence CTS movement; and best practices for CTS management and monitoring.

Military Lands - II
Thursday 11:00 AM

AN UNLIKELY SALAMANDER; THE ECOLOGY AND EVOLUTION OF THE NEWLY DISCOVERED ARGUELLO SLENDER SALAMANDER (*BATRACHOSEPS WAKEI*).

Morgan Ball; ManTech SRS Technologies, Inc.; Morgan.Ball@ManTech.com; John P. LaBonte, Alice A. Abela

Salamanders of the genus *Batrachoseps* are notable for deep evolutionary divergences and species radiations that reflect the movements of geologic plates over millions of years. In 2006, a new species within the *Pacificus* group was discovered on Vandenberg Space Force Base, which was formally described as *B. wakei* in 2020. The results of extensive surveys between 2006 and present indicate that this species likely only exists as an isolated, disjunct population with a very small range. It is currently known from less than 200 records within a narrow strip of coastal scrublands largely infested by invasive iceplant species. Molecular analysis showed that it is a relict species with closest relatives in the Los Angeles Basin and on the Channel Islands, with more distantly related taxa in San Luis Obispo County. *B. wakei* shows extremely little genetic variation, suggesting it has undergone population contractions in the recent past, potentially a result of ocean level rise and retraction of the coastal plain since the last glacial maximum. This species' constricted range, lack of genetic variation, and susceptibility to climate change make it extremely vulnerable and worthy of further study and conservation stewardship.

Military Lands - II
Thursday 11:20 AM

NAVAL BASE CORONADO WESTERN SNOWY PLOVER (WSPL) AND CALIFORNIA LEAST TERN (CLTE) MANAGEMENT

Loni J. Beyer; NAVFAC SW NBC; loni.j.beyerwilson.civ@us.navy.mil; Loni Beyer (NBC Natural Resources), Rachel Smith (SDZWA), Jake Manley (Wildlife Innovations), Diego Johnson (American Eagle Research Institute), Kim O'Connor (Conservation Program Manager (US Pacific Fleet), DiAnna Abdo (NAVFAC SW), Melanie Colon (NBC Conservation & Planning), **Melanie R. Colon**

Naval Base Coronado (NBC) has managed federally endangered California least tern (*Sternula antillarum browni*; CLTE) and federally threatened western snowy plover (*Charadrius nivosus*; WSPL) populations since the species' listings in 1970 and 1993, respectively. The NBC tern and plover program, born out of Navy mission and regulatory requirements, has grown into a large, dynamic team. We employ an adaptive management approach that includes: habitat restoration and maintenance, nest monitoring, winter WSPL monitoring, ecosystem-based predator control, captive rearing, outreach, and law enforcement. Our team conducts and collaborates on research critical for species conservation and mission support. Data collected informs local and region-wide conservation and recovery efforts. NBC harbors the largest CLTE breeding population in California; though populations are mirroring region-wide declines. NBC WSPL populations are gradually increasing, with breeding birds meeting the USFWS recommended recovery goal for over a decade. Partners include: US Fish and Wildlife Service, San Diego Zoo Wildlife Alliance, Wildlife Innovations, American Eagle Research Institute, California Department of Fish and Wildlife, Naval Information Warfare Center Pacific, and SeaWorld. Funding for the program directly comes from Commander, U.S. Pacific Fleet (PACFLT), and Commander Navy Installations Command (CNIC), with extensive collaboration across Navy bases, organizations, USFWS and CDFW.

Military Lands - II
Thursday 11:40 AM

Pacific Islands Conservation

(sorted by presentation order)

HAWAIIAN HOARY BAT DISTRIBUTION AND FIVE-YEAR TREND IN OCCUPANCY ON O'AHU

Joel Thompson; Western EcoSystems Technology, Inc.; jthompson@west-inc.com; Leigh Ann Starcevich

Hawaiian hoary bat is the only land mammal endemic to Hawaii and is listed as Endangered at both the state and federal levels. Hawaiian hoary bat is regularly included as a covered species in Habitat Conservation Plans developed for actions that may result in incidental “take” of the species; however, determination of recovery benefits has been challenging due to the paucity of information concerning threats, limiting factors, and ecology of the species. In collaboration with Hawaii’s Endangered Species Research Committee, we initiated a multi-year study in 2017 to investigate the overall distribution and seasonal occupancy of Hawaiian hoary bats on the Hawaiian island of Oʻahu. One of the primary objectives of the study was to investigate bat occupancy and distribution across Oʻahu. Data from acoustic bat detectors probabilistically distributed throughout the island and monitored year-round were used to assess bat distribution and seasonal occupancy over a five-year period. Bats were detected at 95% of detectors at least once during the study. However, activity rates were generally greater in the western and northwestern regions of the island. We present our findings on seasonal differences in bat distribution across Oʻahu and trends in occupancy estimated by season over the five-year study period.

Pacific Islands Conservation
Wednesday 3:40 PM

WEAVING INDIGENOUS AND CONVENTIONAL SCIENCE IN SHOREBIRD MONITORING

Claire Atkins; UH Mānoa; ca68@hawaii.edu; Keliʻi Kotubetey, Hiʻilei Kawelo, Yoshimi M. Rii, Lee Tibbitts, Kawika Winter, Melissa R. Price

Migratory shorebirds are declining worldwide, with serious implications for social-ecological systems. Indigenous stewardship facilitates an ability to sustain an abundance of biocultural resources, and could play a role in recovery of migratory shorebirds. Our co-developed research wove Indigenous science methodologies with those of conventional science to understand patterns for five species of shorebirds who connect Alaska with Hawaiʻi through annual migration: Kōlea (*Pluvialis fulva*); ʻŪlili (*Tringa incana*); ʻAkekeke (*Arenaria interpres*); Kioea (*Numenius tahitiensis*); and Hunakai (*Calidris alba*). A layered exploration of Indigenous observation methodologies from a loko iʻa (Hawaiian aquaculture system) and regional eBird data suggest: (1) decreases in juvenile recruitment of shorebirds across the Hawaiian Islands; (2) dissimilarities in oversummering patterns between the loko iʻa and the eBird dataset; (3) environmental characteristics which support large/diverse assemblages of migratory shorebirds. Co-interpretation of data showed correlations between climatic shifts and the phenologies of seasonal anchor events. Our findings strengthen and inform stewardship, conservation, and management practices for shorebirds at both ends of the migratory pathway.

Pacific Islands Conservation
Wednesday 4:00 PM

Student Paper

MENACING MOANANUIĀKEA: ANALYZING THE THREAT OF NATURAL DISASTER INFLICTED PESTS ON PACIFIC ISLANDS

Andie C LeDoux; University of Hawai‘i at Mānoa; andie30@hawaii.edu; Dexter K. Kishida

As climate change progresses, we see increasing severe weather events, often hitting coastal communities and Pacific Islands the hardest. Alongside these events are small pests that pose a large threat to Pacific Island wildlife, food, and habitat. Little Fire Ants (LFA) and Coconut Rhinoceros Beetles (CRB) are rapidly spreading invasive pests. LFA sting native wildlife and make the plants inedible as a food source for wildlife. CRB attack variations of palms in addition to taro, destroying habitat specifically for native birds such as ae‘o (Hawaiian Stilt). This research examines case studies of specific storms across the Pacific: Typhoons Dolphin and Mawar in Guam, as well as case studies from detected high wind and high rainfall events in the Hawaiian Islands. Two types of spread were identified, initial spread and restoration spread. The initial spread refers to spread from the high winds and storm, whereas restoration spread follows the rebuilding efforts for impacted areas bringing in soil, compost, and other natural material that can be contaminated with CRB and LFA. Both types of spread are being mapped to represent the increase in spread of pests post-natural disaster, in order to visualize and help predict the long-lasting environmental and community impacts.

Pacific Islands Conservation
Wednesday 4:20 PM

Student Paper

BIRDS, BUGS, AND BATTLE PLANS: ASSESSING AVIAN MALARIA ON HAWAI‘I ISLAND FOR HONEYCREEPER CONSERVATION

Cara M Thow; Hawai'i Division of Forestry and Wildlife; thow@hawaii.edu; Lisa Crampton, Hanna Mounce, Lindsey Nietmann, Alex Wang

Avian malaria is a primary cause of native Hawaiian honeycreeper declines and extinctions. Without management of the disease or its vector, the southern house mosquito, several endangered honeycreepers will become extinct within one to ten years, and remaining species will continue to decline. Additionally, climate change has enabled the spread of mosquitoes and malaria into previously unaffected habitats, especially on Maui and Kaua‘i. The application of Incompatible Insect Technique (IIT) in key native forests and translocation of birds to refugia with lower disease prevalence on Hawai‘i Island provide hope for critically endangered birds on other islands. We conducted surveys of bird and mosquito populations in high elevation native forests on Hawai‘i Island in 2022 to assess their viability for conservation translocations and priority for mosquito control efforts. Initial results indicate avian malaria prevalence ranges from 0 to 0.75±0.15 (SE) in key indicator bird species. Mosquito surveys did not detect mosquitoes in some forests, while other locations housed moderate populations of mosquitoes that could transmit avian malaria locally. These data suggest that while some Hawai‘i Island forests are viable targets for translocations of species from other islands, others are already in need of IIT and other forms of mosquito control to protect existing species. We will also provide updates on the current state of conservation actions aimed at protecting honeycreepers from extinction.

Pacific Islands Conservation
Wednesday 4:40 PM

OPTIMIZING CONSERVATION ACTIONS TO RECOVER SENSITIVE SPECIES ACROSS MAUI NUI

Melissa R Price; University of Hawai‘i at Mānoa; pricemel@hawaii.edu; Kristen C. Harmon, Abbey Camaclang, Tara Martin, Scott Fretz

With hundreds of species on the brink of extinction, conservation practitioners must decide which conservation actions to implement given limited funds. Decision processes that aim to maximize conservation benefit for a given cost should address complementarity of actions across taxonomic groups.

To address this need we modified a Priority Threat Management approach to guide resource allocation decisions for the conservation of biodiversity in Maui Nui (the islands of Maui, Molokaʻi, Lānaʻi, and Kahoʻolawe). Through expert elicitation, data were gathered on: (1) key threats to sensitive species; (2) management strategies to address key threats; and (3) expected cost, feasibility, and benefit of management strategies. Elicited data were analyzed to identify strategies that would provide optimal gains in recovery across multiple taxonomic groups given costs and feasibility. Predator control and fencing were identified as cost-efficient actions with the greatest gains in recovery across taxonomic groups, but those actions alone were not effective at recovering many plants and invertebrates. Participants emphasized the importance of investing in research and development of novel techniques to address persistent problems such as avian malaria and invasive pests. Findings from this study will improve the efficient use of existing funds and competitiveness for resources needed to achieve recovery.

Pacific Islands Conservation
Wednesday 5:00 PM

Public Policy and Wildlife Management

(sorted by presentation order)

A DECISION SUPPORT TOOL FOR RANGELAND GRAZING PLANNING AND MANAGEMENT

Cali L Weise; U.S. Geological Survey; croth@usgs.gov; Derek A. Friend, John C. Tull, Peter S. Coates

Science-based grazing management is crucial to preserving and improving rangeland productivity and sagebrush ecosystem health. We developed a grazing planning tool (GPT) that operationalizes the science around grazing to guide planning and adaptive management and to help producers and managers plan grazing logistics within a pasture or allotment and support operations while protecting or improving ecological resilience. The tool centralizes several spatial datasets integral to grazing planning and management, including vegetation cover, biomass, water features, wildfires, ecological monitoring, sensitive wildlife habitat, and ecological resilience. Within the tool, users can query and interact with the data to address objectives at the pasture or allotment level, such as: where biomass is available to cattle, how water or fences can be used to change availability, what areas are suited for targeted or prescribed grazing, and what areas would benefit from rotational grazing to avoid wildlife conflicts. The tool can be used as a map viewer, allowing users to visualize pasture and allotment conditions through time. The tool aims to provide an interactive and easy-to-use framework, to support common goals for all stakeholder groups working toward productive and resilient rangelands. Information is preliminary and provided for best timely science.

Public Policy and Wildlife Management
Thursday 8:05 AM

CONSERVATION LANDS - MAXIMIZING MANAGEMENT OBJECTIVES WITH EASEMENTS

Cynthia G Perrine; Northern California Regional Land Trust; exec@landconservation.org; Hannah Espinosa, Noelle Ferdon-Brimlow

Throughout California, wildlife and their habitats occur on a mosaic of public and private lands. Public agency operations on fee title (owned) lands received as gifts or acquired as mitigation are guided by mandates and regional priorities. However, adequate personnel and infrastructure is often insufficient on agency properties, making progress toward management objectives challenging, delayed, and ineffective at times. Private land conservation tools such as conservation easements are well-accepted as effectively protecting key properties' natural resources activities, while eliminating threats of land conversion and sub-division in perpetuity. This talk explores the various alternatives an agency has when receiving a property in fee-title, and makes a case for selecting a local land trust or sovereign tribe as suitable fee-title holder and land steward, while still achieving regional priorities and agency mandates related to wildlife, habitats, and ecological processes. Land Trusts and Sovereign tribes promote community-led conservation, outreach and education, and ecological restoration. A new tool related to water rights easements for conservation is also introduced.

Public Policy and Wildlife Management
Thursday 8:25 AM

MEGADISTURBANCES AND THE DECLINING EFFICACY OF PROTECTED AREAS

Gavin M Jones; USDA Forest Service, Rocky Mountain Research Station; gavin.jones@usda.gov; Sarah C. Sawyer

Protected areas, which restrict activities perceived to be harmful for resources of interest, are a central element of Western conservation thought. Since the late 1800s, protected areas in the western US have served an essential role in safeguarding sensitive and culturally important resources and landscapes from destruction by their primary threats: urban/suburban development and natural resource extraction. However, the primary threat to western US landscapes is now uncharacteristic landscape disturbances, including megafires and megadroughts, that can erase protected areas and the sensitive resources they contain from the map in one fell swoop. This raises the question: are protected areas still working in the era of mega-disturbance? In this talk, I will discuss the unintended consequences of well-meaning protectionism in California and in the Northwest Forest Plan area, and specifically as it relates to the conservation of old-forest habitats of the California spotted owl and the southern Sierra Nevada fisher. Recent empirical evidence suggests that habitat loss for these species may be occurring more rapidly in protected areas than in unprotected areas, warranting a re-evaluation of traditional static models of conservation to more dynamic models that seek to conserve natural dynamics as opposed to static desired conditions.

Public Policy and Wildlife Management
Thursday 8:45 AM

WILDLIFE IN THE WEEDS: A FEDERAL PROGRAM ADDRESSING THE ECOLOGICAL CONSEQUENCES OF CANNABIS CULTIVATION ON NATIONAL FOREST LANDS

Mourad W Gabriel; US Forest Service, Law Enforcement and Investigations; mourad.gabriel@usda.gov;

The U.S. Forest Service has launched the Trespass Cultivation Ecology, Safety, and Reclamation (TCESR) program to address the impacts of illicit cannabis cultivation on National Forest System lands. The TCESR program aims to mitigate the environmental damage caused by cannabis cultivation on federal public lands, protect wildlife and humans, conserve National Forest Lands from hazardous materials left behind, and ensure the safety of those tasked with monitoring and reclaiming these sites. This initiative represents a significant step towards preserving the integrity of our National Forests in alignment with the intent of these lands to be set aside for public use. In addition to the objectives above, the TCESR program will also establish prioritization criteria for research, monitoring projects, and reclamation of cultivation sites. These criteria will focus on areas with endangered species, their critical habitats, regions of environmental significance, and corridors crucial for wildlife conservation efforts. This multifaceted strategy ensures that resources are allocated and applied effectively to protect and conserve the most vulnerable and significant areas within our National Forests. The talk will focus on the TCESR overview, examples of TCESR efforts to conserve wildlife populations, and the applied management techniques to conserve wildlife and their habitats.

Public Policy and Wildlife Management
Thursday 9:05 AM

EVALUATION OF RISK TO MOUNTAIN LION HEALTH AND MOVEMENT FROM ILLICIT CANNABIS CULTIVATION IN NORTHWESTERN CALIFORNIA

Greta M Wengert; Integral Ecology Research Center; gwengert@iercecology.org; J. Mark Higley, Mourad W. Gabriel, Phil Johnston

It is now well-known that illicit cannabis cultivation impacts many species of forest wildlife, either by direct mortality or indirectly through sublethal exposure to pesticides, water theft, and habitat manipulation. Given the rampant spread of illegal cultivation in northwestern California over the past two decades and our lack of knowledge about how these activities impact mountain lions (*Puma concolor*) and the species they rely on for food, we studied the risks to mountain lions from illegal cannabis cultivation and the pesticides associated with this activity. For the first phase of this project, our objectives were to: 1) analyze prey selection and spatial foraging patterns of lions in northwestern California; 2) visit kill sites to determine diet and exposure of prey to anticoagulant rodenticides and other toxicants found at trespass cannabis grow sites; and 3) analyze lion movement and home ranges in relation to the distribution of both public land cannabis cultivation sites and private land, unlicensed sites on the National Forests and private lands adjacent to the Hoopa Valley Reservation in northwestern California.

Public Policy and Wildlife Management
Thursday 9:25 AM

INTEGRATING EXISTING DATA TO ASSESS THE RISK OF AN EXPANDING LAND USE CHANGE ON MAMMALS

Lindsey N Rich; California Department of Fish and Wildlife; lindsey.rich@wildlife.ca.gov; Ivan Medel, Sara Bangen, Greta Wengert, Matt Toenies, Jody Tucker, Mourad Gabriel, Courtney Davis

Land-use change, including agricultural expansion, is one of the major drivers of biodiversity loss globally. Given the rapid pace of land-use change, data-driven, strategic, and dynamic conservation planning is imperative. We present an exemplar application of using existing data to inform conservation planning. Specifically, we developed a systematic approach for identifying areas of conservation concern due to cannabis cultivation in California, USA. We used three existing datasets: 1) camera trap data from ten projects (n = 1,186); 2) the locations of cannabis cultivation sites eradicated by law enforcement (n = 834); and 3) the locations of cultivation licenses (n = 4,366). We analyzed this data using multi-species occupancy models to estimate the occupancy and richness of 30 species, and maximum entropy models to estimate the risk of unlicensed and trespass cultivation. We then identified areas of overlap and determined the percent of suitable habitat potentially impacted by cannabis cultivation. Our results can be used to prioritize eradication, restoration, and remediation activities and to target mitigation efforts and grant funded activities. Further, our study demonstrates the utility of aggregating existing biological and socioeconomic data to inform conservation planning.

Public Policy and Wildlife Management
Thursday 9:45 AM

Poster Session

(sorted alphabetically by author's last name)

AN INSTANCE OF SUCCESSFUL RELOCATIONS OF RAVEN AND RED-TAILED HAWK NESTS

Sabrina Alaniz; Pacific Gas and Electric; sabrina.alaniz@pge.com; Jennifer Litteral

In the spring of 2023, record rainfall and snowmelt levels resulted in the flooding of the historic Tulare Lake Basin. In April of 2023, approximately 178 square miles of agricultural land was inundated. During emergency response, PG&E removed all oil filled electrical equipment that was either under or over the water to eliminate the chance of a spill or leak contaminating the Lake. Fifteen active raven and red-tailed hawk nests were observed on this equipment. Working under PG&E's USFWS SPUTE Permit, 10 nests were relocated to nest platforms bolted to the same pole from which equipment was removed. Relocations were performed by trained linemen using bucket airboats. For the remainder (five nests), personnel were able to drain the oil from the equipment bearing the nests and leave the nests in place. PG&E biologists made follow up visits to each nest to confirm that adults had returned to the nests and observed live nestlings and fledglings, as well as adult behavior suggesting nest success for all relocated and temporarily disturbed nests. These observations provide insight into the resilience of these two species to disturbance and provide an example of how we can respond to unprecedented weather events while protecting wildlife.

Poster Session

REVOLUTIONIZING CONSERVATION: ECOSNAP - TRANSFORMING HABITAT RESTORATION ALONG THE SANTA ANA RIVER

Varren Anacleto; EcoAnalytics; vanacleto@ecoanalytics.com; AJ Fox, Haley Fox, Karina Nguyen

ecoSnap is a state-of-the-art mobile application designed for meticulous site monitoring. Rooted in the essence of tracking environmental and structural transformations, ecoSnap ensures continuity and consistency in photographic records over the years. Features include: Augmented Reality Mode: Enables users to return to their original photo stations, ensuring photos are taken from identical positions across different time frames. Assisted Photo Mode: Seamlessly guides users to capture images at all cardinal directions, aligning them perfectly with past snapshots. This ensures a precise year-by-year comparison. Interactive Gallery: Displays a curated collection of photos from various projects, offering a comparative view of changes throughout the years. Uploading Modes: Simplifies the process of adding photos to stations, whether in-field or remotely. Map Mode: A user-friendly interface pinning the precise location of photo stations across the project site, making navigation effortless. Export Mode: Allows users to preview and generate a comprehensive photo plate in a formatted PDF. EcoSnap is not just an app; it's a reliable companion for professionals who value precision and continuity in their monitoring projects. Emphasizing its efficacy, this poster showcases its value in a prolonged habitat restoration endeavor along the Santa Ana River in Riverside, CA for the Army Corps of Engineers.

Poster Session

AVIAN BIOMASS AND MICROCLIMATE

Jess N Angulo; Cal Poly Humboldt; jna37@humboldt.edu; Frank Fogarty, Madison Sutton, Nina Ferrari, Matthew Betts

Understanding the factors influencing changes in bird biomass and species richness is essential for effective conservation and management efforts. Climate change is often cited as one of these potential factors, yet the degree to which microclimate influences bird biomass remains largely unexplored. We used data from the HJ Andrews Experimental Forest in central Oregon from the years 2014 to 2018 to calculate average biomass and species richness of birds, as well as average air temperatures using long-term data loggers. Through a multiple regression analysis, I examined the relationship of both bird biomass and species richness with air temperature. Using Geographic Information System software, I visualized these data and the relationship with the average annual microclimate from each respective site across the HJ Andrews. These data can further aid managers and scientists in the monitoring of bird biomass, species diversity, and their relationships with microclimates over time.

Poster Session ***Student Paper***

MEGAFIRES IN CALIFORNIA: HOW HAVE THEY IMPACTED WILDLIFE HABITAT?

Jessalyn Ayars; University of New Mexico/Rocky Mountain Research Station; jessalyn.ayars@gmail.com; H. Anu Kramer, Gavin M. Jones

Fire activity during 2020-2021 in California, USA was unprecedented in the modern record. More than 19,000 km2 of forest vegetation burned (10× more than the historical average), potentially affecting the habitat of 508 vertebrate species. Of the >9,000 km2 that burned at high severity, 87% occurred in very large patches that exceeded historical estimates of maximum high-severity patch size. In this two-year period, 100 vertebrate species experienced fire across >10% of their geographic range, 16 of which were species of conservation concern. These 100 species experienced high-severity fire across 5-14% of their ranges, underscoring potentially important changes to habitat structure. Species in this region are not adapted to high-severity megafires. Management actions, such as prescribed fires and mechanical thinning, can curb severe fire behavior and reduce the potential negative impacts of uncharacteristic fires on wildlife.

Poster Session

THE HISTORY AND CURRENT IMPACT OF THE *CALIFORNIA FISH AND WILDLIFE JOURNAL*, CALIFORNIA'S LONGEST-RUNNING SCIENTIFIC JOURNAL

Ange D Baker; California Department of Fish and Wildlife; angela.baker@wildlife.ca.gov;

The *California Fish and Wildlife Journal*, formerly *California Fish and Game*, is California's longest-running, continuously published scientific journal. Over its 110-year history, the Journal has been a well-regarded and rigorous scientific journal that has undergone numerous changes over the years. Following a shift to online, open-source publishing in 2014, the Journal is now easily accessible to researchers, resource managers, and other interested parties around the world. Other recent changes include the publication of special issues on current topics, publication directly in HTML (to increase accessibility, navigability, and translatability), and updating of the Journal's title and cover. Due to these improvements and the implementation of permanent object identifiers (DOIs), the Journal's impact factor has increased by over 400% in the last five years and is now higher than many other journals of similar scope. As a result of these changes, the Journal is now indexed among other scholarly works (e.g., Google Scholar, Web of Science). This poster will provide an overview of the Journal's changes and include metrics on its 110-year history, including changes in the representation of different taxonomic groups, game vs. nongame species, and the numbers and types of papers published.

Poster Session

TIME-TO-OCCUPANCY MODELS INFORM CAMERA SURVEY DURATION REQUIREMENTS FOR COMMUNITIES AND RARE SNAKE SPECIES

Philip Gould; USGS Western Ecological Research Center; pgould@usgs.gov; Robert Fisher, **Wendy Bear**

Survey protocols that maximize species detection are critical to successful wildlife inventories and monitoring. We surveyed riparian scrub habitats along the Santa Margarita River on Marine Corps Base Camp Pendleton, California; with emphasis on suitable habitat for two rare snake species, the California glossy snake and California red-sided garter snake. We monitored 14 specialized active-infrared cameras in 7 paired arrays from May – October 2023. Although we only detected 1 California glossy snake and 0 California red-sided garter snakes, the cameras were successful at detecting 32 reptile, amphibian, and small mammal species. Time-to-detection occupancy models for the small animal community revealed high variability in community detection rates, with species falling into 3 broad categories: Readily detectable and common, moderately detectable and moderately common, and poorly detectable and rare. Using data-augmentation, the cumulative detection probability for California red-sided garter snakes was 0.44, indicating longer camera surveys are required to indicate absence across their area of inference. Overall, we found the cameras documented more species than active searches, road surveys, and coverboard surveys, however, a combination of techniques for rare species is warranted. Time-to-detection occupancy models inform the duration needed for camera surveys and enhance our understanding of probability that rare species persist.

Poster Session

JAGUAR (*PANTHERA ONCA*) POPULATION DENSITY AND CONSERVATION STATUS IN PANAM&AACUTE;.

Rebeca E Becdach; Cal Poly Humboldt; reb103@humboldt.edu; Kimberly Craighead, Ho Yi Wan

Jaguars (*Panthera onca*) are key predators and the largest felid in the Americas. The species is listed as near threatened globally due to habitat loss and population decline. Jaguar population decline can have negative consequences for the structure and functioning of the ecosystems they inhabit. Panamá is a narrow land bridge connecting Central and South America, making it integral to the movement and conservation of jaguars across both land masses. We apply spatial models to evaluate the movement and conservation status of the jaguar population in Panamá. To monitor the presence of jaguars, we installed 48 camera trap stations in three ecologically important protected areas in Eastern Panamá: Narganá Protected Wildlands, Chagres National Park, and Mamoní Valley Preserve. The cameras functioned year-round from 2016-2022, collecting over 1,700 photos and videos of jaguars. We visually examined each photo and video from the camera traps, identifying individual jaguars using unique markings and spot patterns. To contribute to our understanding of jaguars in Panamá, we use these data to estimate jaguar population density with spatially-explicit capture and recapture models. Our findings suggest the dire need for immediate actions to increase conservation efforts and protection for jaguars and their habitat in Panamá.

Poster Session ***Student Paper***

QUANTIFYING CORTICOSTERONE IN BLUNT-NOSED LEOPARD LIZARDS

Emily E Bergman; Fresno Chaffee Zoo; ebergman@fresnochaffeezoo.org; Steven Sharp, Kathryn Ramirez, Rory S. Telemeco

Glucocorticoid hormones, such as corticosterone and cortisol (CORT), are commonly used indicators of physiological stress in vertebrate animals. Despite being listed as an endangered species for over 50y and substantial research on decline of native habitat, response to environmental stressors, and physiology of other lizard species, no information is currently available on CORT physiology in blunt-nosed leopard lizards, Gambelia sila. This gap in knowledge limits our ability to assess relative stress levels among extant populations of G. sila or in response to captivity. We quantified corticosterone metabolites in opportunistically-collected fecal samples to assess baselines and natural variation in CORT throughout the active season. We also compared these CORT concentrations between a wild-reared population from the Panoche Hills Valley and a captive-reared population collected from the Panoche Hills Plateau and bred at the Fresno Chaffee Zoo. We validated and used a commercially-available corticosterone competitive enzyme immunoassay (EIA) to quantify the concentration of CORT metabolites in fecal samples. This provides an indication of the average amount of CORT circulating in the plasma during the period that the feces was produced. Our results provide an important baseline for future studies and repatriation efforts in this endangered lizard.

Poster Session ***Student Paper***

WHAT'S CRACKING: INVESTIGATING GULL PREDATION ON PISMO CLAM POPULATIONS AT PISMO BEACH

Ryan N Bloom; Cal Poly, San Luis Obispo; rbloom127@gmail.com; Marissa Bills, Ben I. Ruttenberg

Pismo Clams (*Tivela stultorum*) were once abundant on Pismo Beach until the 1980s when populations declined. However, recent years have seen a notable increase in their numbers. With the potential return of these clam populations to their legal size, we sought to investigate the factors that contribute to their predation, such as humans, otters, and shorebirds. This study focused on quantifying the extent of shorebird predation. We observed a specific clam-dropping predation behavior, where shorebirds dropped clams onto compact sand to crack them open, allowing them to feed on the clam. Our research aimed to identify the species of shorebirds involved, the size of clams they targeted, and the spatial distribution of predation on the beach. Through surveys on Pismo Beach, we found that Western Gulls (*Larus occidentalis*) were the sole shorebirds engaging in this behavior. The median clam size targeted was 71 millimeters, and predation almost entirely occurred in areas of the beach in which cars weren’t allowed. Based on this spatial trend, we hypothesize that anthropogenic disturbance from vehicles is a major factor influencing predation frequency. Future work will further explore the impact of Off-Highway Vehicles and other environmental factors on gull predation.

Poster Session ***Student Paper***

EXPANDING WILDLIFE TRACKING CAPABILITIES WITH MOTUS IN CALIFORNIA AND WESTERN NORTH AMERICA

Ryan Bourbour; California Department of Fish & Wildlife; ryan.bourbour@wildlife.ca.gov; Levi Souza, Nicole Cornelius, Phillip Smith, Shannon Skalos, Hillary Sardinas, Katrina Smith, Whitney Albright, Michelle Selmon

Understanding how animals move across broad geographic areas can inform management, conservation, and research needs in the 21st Century. Since 2021, the California Department of Fish and Wildlife (CDFW) has been leading efforts across the state of California to facilitate the tracking of animal movement using the Motus Wildlife Tracking System (Motus). Motus is a worldwide network of stationary radio telemetry receivers used to track the movement of various taxa. Transmitters that communicate with Motus receiver stations are relatively inexpensive and small, providing researchers previously unavailable opportunities to study the movements of highly mobile small-bodied animals, like

shorebirds, songbirds, bats, and insects. To date, CDFW has installed 15 Motus stations on CDFW lands and through collaborations have supported the deployment of over 200 Motus tags covering a diverse array of ecoregions and species. CDFW Motus stations have resulted in over 600 tag detections, comprised of over 140 individuals, 2 bat species, and 18 bird species across 8 orders. CDFW plans to continue expanding Motus substantially to complement the ongoing establishment of CDFW's Climate-Biodiversity Sentinel Site Network. The collaborative nature of Motus leverages the capabilities of a broad spectrum of organizations and is a model for cutting-edge wildlife research and conservation.

Poster Session

CHARACTERIZATION OF AMERICAN PIKA (*OCHOTONA PRINCEPS*) DIETS USING DNA METABARCODING

Jazmine O Camacho Servin; San Jose State University; jazmine.camachoservin@sjsu.edu; Michael Hernandez, Emily Hadjes, Jane Van Gunst, Muhammad Rashid, Jessica Castillo Vardaro

The American pika (*Ochotona princeps*) is a small, herbivorous mammal native to western North America. While there have been recent population declines across the species range, population trajectories vary considerably. Within the Sierra Nevada (SN) subspecies (O. p. schisticeps), Great Basin (GB) populations have experienced declines at a much faster rate than populations in the SN mountain range. Differences in habitat quality between the ecoregions likely plays an important role in this difference. Various factors shape habitat quality. In this study we characterize diet as one proxy for habitat quality. GB populations are declining more quickly, therefore we hypothesized that habitat quality would be lower in the GB as compared to the SN populations. Specifically, we predicted that the SN samples would have greater taxonomic diversity and higher nutritional value. We used a DNA metabarcoding approach to characterize diets of pika populations throughout California and Nevada. We analyzed 384 pika fecal samples and identified more than 90 plant genera. There was no significant difference between the SN and GB pika diets in terms of taxonomic diversity. However, diet composition was distinct with few genera shared between the regions. Analysis of whether diets vary in terms of nutritional quality is ongoing.

Poster Session ***Student Paper***

EVALUATION OF SAN FRANCISCO BAY AREA NETWORK JUVENILE COHO MONITORING PROGRAM

Brian R Hudgens; Institute for Wildlife Studies; hudgens@iws.org; Michael L. Reichmuth, Brentley D. McNeill, Jena R. Hickey, **Mariya H Chisholm**

The National Park Service monitors coho (*Oncorhynchus kisutch*) to detect population trends within the Golden Gate National Recreation Area, Muir Woods National Monument, and Point Reyes National Seashore. Coho have a complex life cycle: early life stages inhabit park streams while adults inhabit open ocean, returning to spawn. They are semelparous and typically have a three-year lifespan. Juvenile data are particularly useful for understanding how coho are influenced by environmental factors occurring within the parks, but current protocols require relatively intensive effort. We evaluated three methods for estimating juvenile abundance: the current method, which uses a stream-wide correction factor to account for imperfect detection, and two alternatives, which incorporate environmental covariates to estimate spatially explicit detection rates and coho densities within streams. We found that the two methods incorporating environmental covariates yielded similar results, and produced significantly more precise estimates of streamwide abundance than the current method. The two alternative methods, but not the current method, allowed us to detect a climate effect on juvenile recruitment at one of the two watersheds. Our analyses demonstrated that investing in understanding environmental influences on detection and abundance at finer spatial scales can lead to a more efficient and robust watershed monitoring program.

Poster Session

RESOURCE USE, BEHAVIOR, AND DIET OF A SYNANTHROPIC PREDATOR, THE COMMON RAVEN, AND IMPLICATIONS FOR CONSERVATION OF A THREATENED SHOREBIRD

Janelle Chojnacki; Cal Poly Humboldt; janelle.choj@gmail.com;

Common ravens (*Corvus corax*) are intelligent, synanthropic predators with populations increasing throughout their North American range. Growing raven numbers and densities has intensified predation risk for many protected species, including the federally Western snowy plover (WSP, *Charadrius nivosus nivosus*). The breeding population of WSP in Northwestern California has continued to fall below recovery goals, and nest predation by ravens is the dominant direct cause of WSP reproductive failure. Using GPS units to track raven movement and resource use, behavioral surveys of beach-going ravens, and stable isotope analysis to examine raven diet, we are seeking to inform raven management strategies around WSP nesting areas. Results from GPS data reveal a multitude of small and large-scale food resources accessed by beach-going ravens, suggesting strategies utilizing outreach and education and assisting agricultural operations with raven deterrence may be beneficial in reducing raven density locally. Behavioral surveys indicate a lack of correlation between raven numbers and risk of WSP nest predation, suggesting that a few specialized ravens are responsible for WSP nest predation and indicating a targeted raven hazing approach may be most effective where appropriate. The impact of avian influenza which began in Fall, 2022 and served as a sort of natural removal experiment will also be discussed.

Poster Session ***Student Paper***

WHO MOVED IN NEXT DOOR: NON-INVASIVE ANALYSIS OF GIANT KANGAROO RATS (*DIPODOMYS INGENS*) DISPERSAL AND POPULATION STRUCTURING

William B. Claflin; Mammalian Ecology and Conservation Unit; wbclaflin@ucdavis.edu; William T. Bean, Benjamin N. Sacks, Mark J. Statham

California's Central Valley has undergone large-scale agricultural development fragmenting the desert ecosystem and putting many species, such as the giant kangaroo rat (*Dipodomys ingens*), at risk of extinction. Dispersal and population structuring must be considered when designing and implementing conservation efforts. We aimed to noninvasively identify potential dispersal behaviors that may affect mate choice. Fecal samples were collected from the Carrizo Plain in the southern Central Valley from two trapping grids approximately 100 meters apart. We genotyped samples at 15 microsatellite loci and a newly developed sex marker. We recovered genotypes from 145 (of 200) samples and identified 83 distinct individuals. Next, we examined individuals' relatedness and geographic position to determine the species' population structure. The mean distance between 1st, 2nd, and 3rd order relatives were 77, 52, and 132 meters respectively with a significant difference only between 2nd and 3rd order pairings. 1st order pairings followed a bimodal distribution with relatives being either near (~10-20m) or far (~200m) apart. We examined the sex of individuals in 1st order pairings to assess if sex bias explains the bimodal dispersal distance. Male-male 1st order pairings were found both near and far, suggesting that male offspring do not uniformly disperse long distances.

Poster Session ***Student Paper***

MESOCARNIVORE USE OF A POST-FIRE LANDSCAPE: IMPACTS OF THE DIXIE FIRE IN LASSEN AND PLUMAS NATIONAL FORESTS, CALIFORNIA

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The consumption of an astounding one million acres resulted in California's largest single fire to date, the 2021 Dixie Fire. The social and economic losses associated with the fire were immediately apparent, but the effects on wildlife remained unknown. While previous research has suggested mixed or low severity fire may be beneficial to certain wildlife species, the responses to megafires are poorly understood for many carnivores. To better understand these responses to severe fire, we used a random sampling design stratified by burn severity to survey in and around the Dixie Fire footprint using baited camera stations. This allowed us to determine the occurrence of mesocarnivores including Pacific marten (*Martes caurina*) and fisher (*Pekania pennanti*) in a post-fire landscape. We estimated occupancy at multiple scales using forest structure metrics related to burn severity, basal area, and prey availability. Our results provide insight into whether and how mesocarnivores adapt to high severity fires. We equip land managers with applicable information for restoration and future conservation of forest-obligate species.

Poster Session ***Student Paper***

ANURAN DISTRIBUTION AND RICHNESS IN A TROPICAL MONTANE FOREST IN MONTEVERDE, COSTA RICA - AN UPDATED SURVEY

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Montane ecosystems support high endemism and biodiversity. As Neotropical communities encounter climactic pressures, measuring species richness and abundance across an elevational gradient provides insight into their responses. Amphibians (Order: Anura) are uniquely sensitive to environmental change and are experiencing severe declines globally. In this study, Anuran surveys were conducted across four distinct Holdridge life zones in Monteverde, Costa Rica, to compare with a corresponding study in 2019. Visual encounter surveys (VES) and audio encounter surveys (AES) methodologies were used at five non-continuous locations. Data from 134 individuals across 17 species was collected during May 2023. Fewer species were encountered as elevation increased, as expected. An analysis of observed species' zonal distributions revealed two species (*C. bransfordii*, *C. stejnegerianus*) outside and upslope of their expected Holdridge life-zones based on recent species distribution guides. A high variability in precipitation was observed, consistent with decades of climate change data. Our results did not indicate a significant difference in Anuran community composition related to precipitation. This study demonstrates the necessity for sustained, long-term collection of amphibian data in biodiversity hotspots. In turn, a cohesive understanding of community responses can inform conservation efforts.

Poster Session ***Student Paper***

WINTER DIET OF THE MEXICAN FREE-TAILED BAT (*TADARIDA BRASILIENSIS MEXICANA*) IN NORTHERN CALIFORNIA.

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Insectivorous bats are known to consume arthropods from several orders, and have a significant impact on agricultural ecosystems by reducing crop pests. However, information is still lacking about geographic and seasonal variation in diet. Although studies of Mexican free-tailed bats (*Tadarida brasiliensis mexicana*) in Texas demonstrate the importance of this species on agricultural pests like the corn earworm (*Helicoverpa*

zea), less is known about the diet of the species towards the edge of its range. This study investigates the dietary preferences of bats by analyzing genomic information found in their guano. We examined the diet of *T. b. mexicana* in Butte County, California by collecting guano from 20 bat houses during the winter of 2020-2021 and used DNA metabarcoding to identify prey. Thirty-one species, twenty-seven families and eleven orders were identified, with Diptera representing 54% of all reads. Although Coleoptera (22%) and Hemiptera (11%) were also common, Lepidoptera only accounted for 8% of their winter diet. The most common species in the diet were moth flies (*Psychoda albipennis*), ground beetles (*Tanystoma cuyama*) and pine-needle aphids (*Essigella californica*). We plan to continue this study throughout an entire year to examine seasonal variation in diet.

Poster Session ***Student Paper***

NEON IN THE GREAT BASIN & PACIFIC SOUTHWEST: EXPANDING THE SCOPE OF ECOLOGICAL SCIENCE THROUGH LONG-TERM, OPEN ACCESS ECOLOGICAL DATA

Alison R Dernbach; National Ecological Observatory Network; dernbach@battelleecology.org;

The National Ecological Observatory Network (NEON) is a continental-scale observation facility that collects long-term, open access ecological data to better understand how ecosystems are changing across the United States. NEON will provide 30 years of data from 81 terrestrial and aquatic field sites, including seven sites within the Great Basin and Pacific Southwest. NEON data cover a range of subject areas within ecology, including organismal observations, biogeochemistry, hyperspectral imagery, and micrometeorology. NEON's observational wildlife data assesses the pathogen status, abundance, diversity, and phenology of organisms across the US. All samples and data collected by NEON are publicly available and can be accessed digitally through the NEON website. This poster will provide an introduction to NEON as well as an overview of NEON's observational wildlife data collection systems. Additionally, it will highlight research using NEON data with implications for our understanding of climate change impacts on wildlife communities. Lastly, it will highlight the Observatory's Assignable Assets program, which makes available components of NEON's infrastructure to outside researchers and community members to support their research or other activities.

Poster Session

HAZING & DETERRENTS FOR HUMAN WILDLIFE CONFLICT & MORE

Doris M Duncan; Sonoma County Wildlife Rescue; scwrdoris@scwildliferescue.org;

Having worked in a wildlife center for 25 years where human wildlife conflict is the main reason for intakes and intervention of wildlife patients, we've had to find ways to resolve the issues through education and creating practices that would prevent the need for an animal to be admitted to our wildlife hospital. The main reason for intakes were the results of a parent animal being trapped and relocated, euthanized or poisoned, leaving orphaned wildlife behind. Issues with other wildlife considered by humans as a potential threat, presented the same tragic results for patient intakes and calls for help. We also look at wildlife populations that don't have the typical fears of animals that live in more remote habitats, compared to the species that live and dwell in urban settings and are very comfortable living in close proximity to humans. Much of our education is focused on the value of a species which is the focus of conflict, and how hazing and deterrents are a significant reason conflicts can be resolved. This presentation will discuss how hazing and deterrents are defined for use when humans and wildlife are experiencing conflict. Understanding the history before and what led up to the conflict from the human and wildlife perspective, so the best plan and methods can be determined. Having learned from trial and error and with new and challenging conflicts always emerging, we will look at how networking, training and preparation are key to resolving human wildlife conflicts. Since so much time and effort goes into the practice of

hazing and deterrent use, we will look at what works and what doesn't work. Different scenarios in human wildlife conflict will be presented with what hazing or deterrent was used and how the methods were planned and executed. We will focus on the challenge of making those methods successful. In conclusion, we will look at how emerging conflicts between humans and wildlife will always be present and how our use of hazing and deterrents could help with these issues. Future networking and training can provide relief to those who work in the fields of wildlife and are often challenged with the task of how to resolve human wildlife conflicts.

Poster Session

MANAGING FOR HIGHLY PATHOGENIC AVIAN INFLUENZA IN THE CENTRAL CALIFORNIA CONDOR FLOCK

Kara Fadden; Ventana Wildlife Society; karafadden@ventanaws.org; Danae Mouton, Darren Gross, Joe Burnett, Evan McWreath, Mike Stake

Highly Pathogenic Avian Influenza (HPAI) was first detected in the US in 1996 with new variant outbreaks occurring every few years. When a new variant emerged in January 2022, the California Condor Recovery Program implemented protocols to prevent its potential spread to these critically-endangered birds. Condors evaded the virus until 2023, when an outbreak in Arizona killed 21 condors in 18 days. Many feared HPAI might spread outside of Arizona, because of the condors' social proclivity to feed and roost together. In response, Ventana Wildlife Society, who co-manages the Central California Condor population with Pinnacles National Park, retrofitted flight pens and began construction of a quarantine facility in the event of a future outbreak. USFWS, in collaboration with USDA, conducted vaccine trials in hopes of protecting Condors against the deadly virus. Lead poisoning remains the leading cause of death for Condors, and while HPAI symptoms are nearly identical to those of lead poisoning, their management differs significantly. The emergence of HPAI as a novel threat to condor survival highlights the need for an adaptive management response, one which allows for the flexibility and ingenuity necessary to overcome the many obstacles condors face to recovery.

Poster Session

SMALL MAMMALS USE TRANSPORTED EMERGENT MACROPHYTES IN AN ACCRETING TIDAL WETLAND

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In tidal wetlands, hardstem bulrush (or tule; *Schoenoplectus acutus*) may break off in rooted masses and float with the tide, relocating on mudflats and shorelines as the tide recedes. In newly constructed tidal wetlands, where vegetation can sometimes take years or decades to successfully colonize, these clumps can develop roots and rapidly become established. During this process, sediment is attracted to these clumps and mounds will form where other plants can establish and climb up the tules themselves. Using camera traps, we documented use of these mounds as high tide refugia by small mammals at a newly restored marsh located on the Hill Slough Wildlife Area, Suisun Marsh, where salt marsh harvest mice (*Reithrodontomys raviventris*) are known to occur. Even as the tules themselves senesce, vegetated mounds remain and are still used by wildlife. Other emergent macrophytes can serve the same purpose through different modes of establishment. Tule masses can be transported artificially into newly constructed wetlands to accelerate sedimentation and provide habitat for small mammals. This method could be an effective but inexpensive and easy habitat management strategy that could be incorporated into restoration projects at the planning phase.

Poster Session

HOW TO MEASURE 'ENOUGH?' AMERICAN BULLFROG (*LITHOBATES CATESBEIANUS*) CONTROL FOLLOWING WETLAND ENHANCEMENT AND RECOMMENDATIONS FOR ADAPTIVE MANAGEMENT

Brett A Hanshew; Sequoia Ecological Consulting; bhanshew@sequoiaeco.com; Alex Hirth

American bullfrogs (*Lithobates catesbeianus*) are a prolific invasive species worldwide, and one of increasing regulatory and management interest in California. Valley Water, as part of the Upper Llagas Creek Flood Protection Project, was required to perform bullfrog control in accordance with permit conditions following wetland restoration at Lake Silveira in southern Santa Clara County. As part of the comprehensive habitat mitigation and monitoring plan Valley Water implemented, Sequoia conducted bullfrog control at Lake Silveira in 2022 and 2023. Field efforts consisted of a reconnaissance survey to identify life stages present and appropriate methods of control. Control efforts consisted of three nights of removal in September, in both 2022 and 2023. In 2022, a total of 203 post-metamorphic bullfrogs were culled during shoreline-based surveys using gig and air rifle techniques. In 2023, a total of 210 post-metamorphic bullfrogs were culled during a mix of shoreline- and boat-based surveys, using air rifle techniques almost exclusively. Between 2022 and 2023, strong regrowth of shoreline riparian vegetation necessitated the introduction of boat-based surveys to effectively approach bullfrogs. This poster presents preliminary results in demographics, catch-per-unit-effort (CPUE; frogs/person-minute) data by year and encounter type, field method efficacy, and recommendations for future work.

Poster Session

CHYTRIDIOMYCOSIS IMMUNE PRIMING AS A TOOL FOR *RANA SIERRAE* POPULATION RECOVERY?

Rachel Bauer; US Forest Service; rachel.bauer@usda.gov; Grace Henke, Colin Dillingham, Abigail Marshall, Sandra Mayne, **Grace Henke**

The chytrid fungus *Batrachochytrium dendrobatidis* (Bd), and related chytridiomycosis disease, has led to dramatic population declines and extinction of amphibian species worldwide. The Sierra Nevada yellow-legged frog (*Rana sierrae*) is highly susceptible to Bd and natural recovery of populations where Bd has become established in the ecosystem is limited. Currently, Bd-related disease mitigation strategies primarily focus on preventing spread of the pathogen. There is a need to better understand the dynamics of amphibian responses to the pathogen and increase the tools available to managers to assist population recovery. Here we explore the idea of immune priming as a tool for increasing the resilience of *R. sierrae* to Bd. In 2022, the US Forest Service in collaboration with the San Franscisco Zoo, utilized captive-reared *R. sierrae* to apply experimental immune priming for chytridiomycosis. Zoo-reared frogs were inoculated with Bd and then treated with the antifungal medication itraconazole prior to being released back into their wild habitat where Bd is present. Preliminary results of monitoring chytrid infection levels for individuals recaptured during surveys found similar infection levels of Bd between the experimental and control group in the first year. Ongoing monitoring will explore potential longer-term effects of immune priming.

Poster Session

USING MULTISPECTRAL IMAGERY TO GENERATE WILDLIFE HABITAT MAPS IN THE CENTRAL VALLEY VIA ALGORITHMIC METHODS

Alex J Hirth; Sequoia Ecological Consulting; ahirth@sequoiaeco.com; Brett Hanshew

Alliance-level vegetation classification methods are typically used for landscape scale assessments and accordingly may not represent the exact species composition of the ground cover on a fine scale. This methodology contains opportunity for error related to human influence, field limitations, and/or recording of spatial data. Human-related error may include inadvertent biases or subjectivity, such as differences in classification methods or measurements between surveyors. By leveraging emerging technologies such as artificial intelligence (AI), sources of human error and survey area constraints may be largely eliminated. In 2022, Understory (formerly Comon Solutions) contracted Sequoia Ecological Consulting, Inc. (Sequoia) to provide field services and data analysis in support of the Doty Ravine Pilot Study, an effort to train Understory's AI algorithm on plant species identification as well as vegetation classification across a landscape. Sequoia collected full-coverage vegetation classification using typical, standardized field techniques; captured near-simultaneous, high-resolution aerial imagery with small, unmanned aerial systems (sUAS); compared the results of different data capture methods; and provided recommendations for integration of future sampling efforts to continue refinement of training methods and the algorithm itself. Algorithmic data showed agreement with botanist-defined alliance polygons, and the study results provided insight on improving validation methods.

Poster Session

GEOGRAPHIC AND TEMPORAL TRENDS IN LAGOMORPH MORTALITY REPORTS DURING THE EMERGENCE OF RABBIT HEMORRHAGIC DISEASE IN CALIFORNIA

Melinda R Houtman; Wildlife Health Laboratory, CA Dept. of Fish and Wildlife; melinda.houtman@wildlife.ca.gov; Deana Clifford, Jaime Rudd, Megan Moriarty, Beate Crossley

Rabbit hemorrhagic disease virus serotype-2 (RHDV2), the cause of a highly contagious and frequently fatal disease in lagomorphs, was first detected in the United States in March 2020. After a confirmed wild black-tailed jackrabbit (*Lepus californicus*) RHDV2 mortality from Riverside County in May 2020, the California Department of Fish and Wildlife established a website for the public, wildlife rehabilitators, and biologists to report dead lagomorphs. For reports that raised suspicion of RHDV2, whenever feasible at least one carcass was tested for RHDV2 using RT-PCR. Herein we summarize the geographic, temporal, and species distribution of 1,074 mortality reports collected from May 2020 through September 2023 and examine which reports were more predictive of confirmed RHDV2 cases. Public reports of dead lagomorphs had a seasonal pattern: reports increased in spring, peaked in summer, then declined through fall and winter. The likelihood of an RHDV2 positive detection was highest after reports of 10 or more dead lagomorphs. Of tested animals, a higher proportion of black-tailed jackrabbits were positive for RHDV2 than desert cottontails (*Sylvilagus audubonii*). Public reporting of wildlife mortalities can be useful for disease detection and increasing public awareness of wildlife disease.

Poster Session

WINTER GPS TAGGING REVEALS SPATIAL ECOLOGY AND LARGE HOME RANGES FOR A BOREAL-NESTING SONGBIRD, THE GOLDEN-CROWNED SPARROW

Autumn R Iverson; Point Blue Conservation Science; aiverson@pointblue.org; Diana L. Humple, Renee L. Cormier, Thomas P. Hahn, Theadora A. Block, Daizaburo Shizuka, Bruce E. Lyon, Alexis S. Chaine, Emily J. Hudson, Elisha M. Hull

Determining space use for species is fundamental to understanding their ecology. We tested whether miniaturized GPS tags can allow us to understand space use of migratory birds away from their capture sites. We used GPS tags to characterize home ranges on the breeding grounds for a migratory songbird

with limited available breeding information, the Golden-crowned Sparrow (*Zonotrichia atricapilla*). Using GPS points from 23 individuals across 26 tags (three birds tagged twice), we found home ranges in Alaska and British Columbia were on average 44.1 ha (95% Kernel Density Estimate). In addition, estimates of territory sizes based on field observations (mean 2.1 ha, 95% Minimum Convex Polygon [MCP]) were three times smaller than 95% MCPs created using GPS tags (mean 6.5 ha). Home ranges included a variety of land cover classes, with shrubland particularly dominant (64-100% of home range cover for all but one bird). Three birds tracked twice returned to the same breeding area each year, supporting high breeding site fidelity for this species. We found reverse spring migration for five birds that flew up to 154 km past breeding destinations before returning. GPS-tracking technology allowed for critical ecological insights into this migratory species that breeds in very remote locations.

Poster Session

REMOTE CAMERAS SHOW THAT TRESPASS CANNABIS GROWS ON PUBLIC LAND POSE THREATS TO WILDLIFE, BUT GROW RECLAMATION IS AN EFFECTIVE MITIGATION STRATEGY

Vitek Jirinec; Integral Ecology Research Center; vjirinec@iercecology.org; Mourad Gabriel, Deana Clifford, Ivan Medel, Greta Wengert

Conservation of ecosystems in western North America relies fundamentally on conservation of wildlands on public land. However, these areas often contain trespass cannabis grows where threats from pesticides and other deleterious factors pose both direct and indirect threats to wildlife. Using camera traps, we monitored wildlife visitation at 5 trespass cannabis grows under a Before-After-Control-Impact (BACI) design framework (approach A), and at 89 trespass cannabis grows under a Before-After design framework (approach B), on public land across California. We aimed to quantify the visitation rates of several wildlife guilds to cannabis grows and determine whether reclamation of all infrastructure and hazards reduced visitation rates and thus risks to wildlife. Results for approach A show that overall wildlife visitation rate averaged >2x at impact relative to control locations (Fig. 2). Three of five foraging guilds preferred cannabis grows: visitation rate was 2.0x higher for herbivores (non-deer), 3.2x for omnivores (non-bear), and 4.1x for omnivores (bear). Grow reclamation did not remove preference within the study interval. In approach B, wildlife visitation dropped slightly following reclamation and peaked 1.5 yrs since grow eradication and around August. Overall, our findings support previous literature that illicit cannabis grows pose direct and indirect threats to wildlife by attracting them to contaminated areas, but also highlight an effective mitigation and restoration strategy.

Poster Session

UNDERSTANDING THE ROLE OF WESTERN BLUEBIRDS & TREE SWALLOWS IN WINEGRAPE VINEYARDS

Matt Johnson; Dept of Wildlife, Cal Poly Humboldt; mdj6@humboldt.edu; Breanna Martinico Dept., Cody Pham, Daniel Karp

Integrated pest management (IPM) often focuses on enhancing the control of pests by arthropod natural enemies (i.e., predators/parasitoids), but less work has focused on vertebrate predators of pests. In California, winegrapes are a key crop that may benefit from bird-mediated pest control of insect pests (e.g. sharpshooters carrying Pierce's disease). Insecticide use by California winegrape growers has increased over time, with ~45M lbs applied in 2018. Birds could provide growers with an alternative, especially on organic fields where fewer insecticides can be applied. Despite the potential for birds to contribute to IPM, more research is needed to understand and harness their benefits for winegrape growers. Here, we report on the use of nest boxes to attract Western Bluebirds (*Sialia mexicana*) and Tree Swallows (*Tachycineta*

bicolor) to vineyards in Napa Valley, documenting patterns of nest box selection. We found that both species preferred nest boxes in more open areas farther from wooded habitats and fitted with predator guards. Future work will examine the diet of both species, assess their capacity to affect pest numbers, and examine their response to local and landscape habitat features.

Poster Session

DRIVERS OF COLLABORATION IN REGIONAL MANAGEMENT NETWORKS: A CASE STUDY OF WATERFOWL MANAGEMENT AND MIGRATORY BIRD JOINT VENTURES

Aviv Karasov-Olson; karasovolson@ucdavis.edu; Mark W. Schwartz, Mark Lubell

The movement of waterfowl across the Pacific Flyway creates ecological interdependencies across the entire landscape. However, management of waterfowl is fragmented between organizations operating at various scales, in different sectors, and within multiple jurisdictions creating a need for cross-boundary collaboration. We aim to evaluate drivers of collaboration nested within regional Migratory Bird Joint Venture partnerships. Based on 221 survey responses (34% response rate), we created a governance network of 1,153 organizations. We analyzed the waterfowl management network using valued exponential random graph models based on types of collaborative activities in which organizations engage. Results show that collaboration is particularly driven by state agencies and organizations operating at a regional scale. Involvement in Joint Ventures significantly increases the likelihood that any organization will collaborate in the broader management network. There are also significant differences between collaboration within each Joint Venture region. Organizations working within the Central Valley and California Central Coast regions are significantly more likely to engage in collaboration. These patterns reflect both ecological patterns of waterfowl as well as institutional dynamics of regional management structures. This work reveals a more complex picture of social-ecological alignment, necessitating future research of nuanced ecological patterns and regional differences in management.

Poster Session

WILD UNGULATE IMPACTS ON RANCHLANDS IN HAWAIʻI

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Introduced wild ungulates such as sheep, goats, and deer disturb native ecosystems where large-mammal herbivory is non-native. Islands often lack large predators to help control these ungulate populations, resulting in adverse environmental effects by overgrazing and sometimes proliferation and spread of disease on native and naturalized landscapes alike. In Hawaii, around one million acres are designated as pasture for livestock production, but in recent years, ranchers have been forced to reduce stocking rates by 25-30% due to competition for forage with axis deer, mouflon sheep, and feral goats. Impacts have also become exacerbated with an increased frequency of drought. This study aimed to understand the relationship between wild ungulate populations and pasture forage biomass on Hawaiian ranchlands using game cameras, grazing exclusion cages, and line-transect sampling. Preliminary findings show wild ungulates significantly reduce forage biomass and alter plant community composition. The results will inform a multi-criteria decision analysis for ranchers that will help determine sustainable wild ungulate populations for their lands and effective methods for management. This research contributes to the growing body of literature addressing the global impact of introduced ungulates and offers potential solutions to mitigate impacts while promoting thriving native ecosystems and sustainable food production.

Poster Session ***Student Paper***

USING SINGLE NUCLEOTIDE POLYMORPHISM LOCI TO DIFFERENTIATE GREATER WHITE-FRONTED GEESE (*ANSER ALBIFRONS*) SUBSPECIES IN CALIFORNIA

Alicia E Kubicki; Wildlife Genetics Research Unit, CDFW; alicia.kubicki@wildlife.ca.gov; Kristen D. Ahrens, Dan Skalos, Melanie Weaver, Michael R. Buchalski

Wildlife conservation and management efforts often rely on accurate differentiation of morphologically similar taxa. While effective management of a single taxon is dependent on accurate harvest estimates, subtle morphological differences can make subspecies determination error-prone and time consuming for even experienced field biologists. Here we demonstrate that genetic approaches to identification can provide accurate subspecies typing results while remaining cost effective. The Tule Goose (*Anser albifrons elgasi*) is a demographically vulnerable subspecies of the Greater White-fronted Goose (*A. albifrons*, GWFG), that overwinters in the Sacramento Valley and Bay-Delta regions of California alongside the more abundant Pacific GWFG (*A. a. sponsa*). This sympatry creates a management challenge for estimating and limiting seasonal Tule Goose harvest. Using a panel of 83 single nucleotide polymorphisms (SNP) we can efficiently and accurately distinguish Tule Geese from Pacific GWFG from samples easily obtained at hunter check stations. SNP genotypes show clear differentiation through principal component analysis and estimation of STRUCTURE ancestry coefficients. Multi-year analyses suggest Tule Geese typically average 5% of the GWFG harvest at designated check stations. Yet during 2021-2022 drought conditions, genetic typing discovered Tule Goose harvest increased to 29% of GWFG harvest, providing robust support for the management decision to limit duration of the hunting season.

Poster Session

PREDATOR-PREY DYNAMICS AFFECT BARN OWL ECOSYSTEM SERVICES

Katherine C Larson; Cal Poly Humboldt State University; kcl41@humboldt.edu; Roger A. Baldwin, Matthew D. Johnson

Pest management is a foremost challenge of California's winegrape growers. Common methods to reduce rodent pests are expensive, labor intensive, and harmful to the environment. Barn owls (Tyto furcata) provide a promising alternative, though their effectiveness for pest control has received little ecological research. To help fill this gap, we deployed rodent chew blocks, trays mixed with seed and sand to measure giving up density (GUD), and remote cameras on three vineyards with and three without barn owl boxes in Napa Valley in February through July 2023. We found that the effect of owl nest boxes on rodent activity, as measured by chew blocks and camera traps, was mediated by vegetation cover. Likewise, the effect of expected barn owl hunting pressure on rodents' perceived predation risk, as measured by GUD, also varied with vegetation cover. Specifically, vegetative cover dampened the effect of the presence of owl nest boxes, and rodents exhibited less response to owl hunting pressure in areas with high vegetative cover. These results help reveal where and when barn owls can meaningfully affect rodent pests in vineyards, and they also highlight how spatial and temporal variation in vegetation adds complexity to predator-prey dynamics for barn owls and their prey.

Poster Session

PLACE A BETTER RAT TRAP: USING GLMMS TO MODEL EFFECTS OF MICROHABITAT ON TRAP SUCCESS

Grantham R Lewis; Institute for Wildlife Studies; glewis@iws.org; Hunter J. Cole

Rats have contributed to a large number of passerine extinctions after introduction on island ecosystems. Black rats (*Rattus rattus*) are a prominent nest predator of the endangered San Clemente Loggerhead Shrike (*Lanius ludovicianus mearnsi*; SCLS) on San Clemente Island. Efforts have been made to reduce rat predation of SCLS nests for decades using rodenticides and trapping. Since 2019, rat trapping efforts in excess of 5,000 trap nights per year have been used to reduce rat densities in passerine nesting habitat. In an effort to improve efficacy in our rat removal efforts, we collected microhabitat and trap placement data for 278 rat traps placed on 28 trap lines between April and September of 2023. This dataset includes variables such as overhead vegetation height, and surrounding vegetation and substrate type. We analyzed this data alongside remotely-sensed macrohabitat data (e.g., vegetation community, NDVI) and rat capture data using a generalized linear mixed model (GLMM) to assess what factors play the largest roles in a trap's capture probability. The results may allow us to maximize our removal rates by targeting microhabitat with a comparatively high likelihood of trap success.

Poster Session

BEHAVIORAL ANALYSIS OF CONSPECIFIC CACHING COMPETITION IN *PEROGNATHUS LONGIMEMBRIS PACIFICUS*

Sarah M Lord; Cal Poly SLO; smlord@calpoly.edu; Alison L. Greggor, Debra M. Shier, Shauna N. D. King

Foraging is a critical survival skill to consider when reintroducing endangered species to the wild. The endangered Pacific pocket mouse, *Perognathus longimembris pacificus*, is being reintroduced to parts of its historic range where multiple species of native rodents have high dietary overlap. These species are nocturnal, solitary and granivorous, and to varying degrees store seasonally available seeds in caches, either in shallow pits (scatter-hoards) or inside the burrow (larder hoards). Although wild pocket mouse caches are subject to pilfer, they have also been shown to steal from caches of other species. Pocket mice raised in captivity have not experienced this same competition, which could put them at a disadvantage following release to the wild. We investigated if captive pocket mice (N = 56) pilfer from the caches of conspecifics when given access, and whether pocket mice that are pilfered from adjust their caching behavior. Experimental trials were conducted in pairs of two across 3 treatment stages. Our results suggest that captive pocket mice may pilfer from caches of conspecifics, but mice that are pilfered from do not make observable adjustments to their caching behavior. We place these results in the context of larger efforts to promote post-release survival.

Poster Session ***Student Paper***

A BUNCH OF FEMALE BIOLOGISTS LOG INTO ZOOM... THE IMPORTANCE OF DEDICATED SPACES FOR MARGINALIZED GROUPS IN WILDLIFE

Vanessa I Lozano; TWS Western Section member; nessloz22@gmail.com; Trinity Pineda, Alex Lyon, Megan Metcalf, Carolyn Buesch, Jessica Angulo, Madilyne Von Rotz, Laura Coatney, Vanessa Danielson, Carla Angulo, Aviva Rossi, Katie Smith

Wildlife conservation, historically a white male dominated field, has in recent years shifted demographically. At the early career level Women are now the majority, but the perspectives and logistics of the field have not caught up with this shift. During a virtual Western Section Women of Wildlife mixer in 2021 it became clear that there was a need for a dedicated event where the Women+ of the section could gather and address their needs and challenges. In response the Western Section hosted the Resource Retreat for Women+ of Wildlife in 2022 and 2023. At these retreats Women were able to entrust each other with the obstacles, struggles, and grievances they've encountered while working in this industry. Participants especially appreciated the support, resources, and networking that resulted from the events.

The retreat inspired others to create their own opportunities and grow as professionals and individuals. What has resulted is a new community where Women are supported by other Women as well as similar events being hosted at the local level. The importance of events like this cannot be overstated and should be provided for all marginalized groups within wildlife organizations (e.g., BIPOC, LGBTQ).

Poster Session

BAT COMMUNITY SHIFTS POST-FIRE IN THE SIERRA NEVADA

Abigail Marshall; US Forest Service; abigail.marshall@usda.gov; Rachel Bauer, Sandra Mayne, Grace Henke

Large-scale and high severity fires are increasing in frequency across the Sierra Nevada mountains, leading to shifts in the habitat elements available for different bat species across the landscape. Wildfire can affect individual bat species occupancy both positively and negatively and is predicted to favor species adapted to foraging in open habitats. In 2021, the Dixie Fire burned throughout a large portion of the Plumas National Forest, creating a unique opportunity to revisit sites sampled prior to the fire (2015-2021) and examine changes in bat communities post-fire. In 2022 and 2023, we resurveyed 10 study sites, 7 within the Dixie Fire footprint and 3 in unburned forests, using Pettersson 500x bat detectors to record ultrasonic echolocation calls and Sonobat software to analyze recordings. Species presence-absence was then compared between the pre- and post-fire sampling results. Preliminary analysis indicates a shift in bat communities post-fire. These results further support the importance of managing for pyrodiversity in coniferous forests of the Sierra Nevada.

Poster Session

FROM COASTLINES TO MOUNTAIN CRESTS - REGIONAL FORAGING PATTERNS OF A SMALL CARNIVORE

Marie E Martin; marie.martin@oregonstate.edu; Matthew S. Delheimer, Alyssa M. Roddy, Katie M. Moriarty, Charlotte Eriksson, Micaela Szykman Gunther, Jennifer Allen, Jennifer Hartman, Heath Smith, Taal Levi

Dietary plasticity can reveal species' responses to changes in resource availability due to changes in competition and landscape structure. Small-bodied carnivores occupy a unique trophic position, needing to consume relatively large amounts of prey to meet energetic requirements while also avoiding intraguild conflict from larger predators. Often, this results in foraging plasticity, with facultative variation among individuals and populations rather than obligate dependence on certain prey. Pacific martens (*Martes caurina*) are small-bodied carnivores who occupy a subordinate trophic role and are considered sensitive to changes in land use, cover, and climate. Despite their perceived sensitivity to change, they are considered dietary generalists that meet energetic needs from varied prey. Here, we examined the foraging patterns of martens in four sampling areas in the coastal and montane forests of western Oregon and northern California. Using DNA metabarcoding, we detected 59 prey species in 400 scats. Coastal sites exhibited marginally higher prey richness than montane sites, but several prey items, including red-backed voles (*Myodes californicus*), deer mice (*Peromyscus* spp.), and chipmunks (*Tamias* spp.) were consistently observed across sampling areas. Preliminary results suggest foraging patterns were associated with land cover composition and sampling location, with potential implications for effects of future landscape change.

Poster Session

SEA OTTER FORAGING ON PISMO BEACH: INTERACTIONS BETWEEN SOUTHERN SEA OTTERS AND PISMO CLAMS

Isa M Mattioli; Cal Poly SLO; imattiol@calpoly.edu; Marissa Bills, Benjamin I. Ruttenberg

Pismo clam (*Tivela stultorum*) populations were previously abundant on the California central coast before declining dramatically in the late 1970s and 1980s. However, recently their population has been increasing. The southern sea otter (*Enhydra lutris nereis*) was hunted to near extinction in the 1800s, leading to a dramatic reduction of their range, including their extirpation from Pismo Beach. Their population has since been recovering, and they are repopulating historic range locations including Pismo Beach in the 1970s, which coincided with the decline in clam populations locally. Since sea otters are an important predator of Pismo clams, we sought to explore the potential impact of sea otter predation on Pismo clam population abundance and recovery by conducting otter foraging surveys on three local beaches. Our preliminary results found that sea otters are commonly seen at the north-most end of Pismo State Beach, and their diet consists of primarily Pismo clams. This data will help illuminate the impact of sea otter predation on Pismo clam populations, and we hope it can help inform management practices to support both species' recoveries on the Central Coast.

Poster Session ***Student Paper***

GROWTH RATE OF WILD AND CAPTIVE-REARED SIERRA NEVADA YELLOW-LEGGED FROGS IN LAKES BASIN, PLUMAS NATIONAL FOREST

Sandra Mayne; US Forest Service; sandra.mayne@usda.gov; Rachel Bauer, Abigail Marshall, Grace Henke

Captive breeding and reintroduction programs of threatened amphibian populations is an important conservation management strategy. These programs have the potential to prevent extinction of at-risk species and to help maintain genetic diversity. However, frogs reared in captivity develop in an aqueous environment that differs microbially and chemically from natural systems and may consume atypical food compared to natural resources available at release sites. It is unclear how or if this captive environment influences the fitness and survival of these individuals when they are reintroduced into the wild. The Sierra Nevada yellow-legged frog (*Rana sierrae*) is an endangered species endemic to California. In 2022, the US Forest Service in collaboration with the San Franscisco Zoo, released 164 captive-reared frogs into known critical habitat for a population of *R. sierrae* as part of a long-term monitoring and mark recapture study. One year post-release, we use size, weight, and conditional indices of recaptured individuals to compare wild and zoo-reared frogs.

Poster Session

DRIVERS OF BARRED OWL SETTLEMENT PATTERNS IN NORTHERN CALIFORNIA

Kaitlin R. McGee; California Department of Fish and Wildlife; kaitlin.mcgee@colostate.edu; Alan B. Franklin, Paul Doherty, Jr., Mark Higley, Peter Carlson, Angela Rex

Barred owls (Strix varia) are an invasive species that have rapidly expanded from their native range in the eastern U.S. into the Pacific Northwest, threatening native wildlife populations including the threatened northern spotted owl (Strix occidentalis caurina). Understanding occupancy dynamics of barred owls is increasingly important to manage the negative impacts of invasive barred owls on spotted owls. Our study aimed to identify the key drivers of barred owl settlement patterns in northern California using 2

approaches - regression models of spatial barred owl removal data and 2-species robust design occupancy models on 30 years of barred and spotted owl occupancy data in northern California. We analyzed data on vegetation, topography, and biological factors to identify factors associated with areas of high colonization by barred owls. We found that barred owls within a landscape historically occupied by northern spotted owls are associated with wetter areas of larger trees and less open forest, with old conifer and hardwood trees, tree size, and wetness as the primary drivers of barred owl settlement patterns. Our study provides valuable insights that can help inform management strategies aimed at mitigating the impact of this invasive species on native wildlife.

Poster Session ***Student Paper***

FOREST OWL ASSEMBLAGE THREATENED BY CONTIGUOUS HIGH SEVERITY FIRE

Kate McGinn; University of Wisconsin-Madison; mcginn4@wisc.edu; Benjamin Zuckerberg, Joshua Barry, Stefan Kahl, Holger Klinck, Gavin M. Jones, Connor Wood, Sheila Whitmore, Kevin Kelly, Anu Kramer, Elizabeth Ng, Zachariah Peery

Fire disturbance shapes the structure and composition of faunal communities in many forested ecosystems, but a new era of megafires that result from land use legacies and climate change has led to prolonged negative consequences for some forest specialists. Forest owls in the Sierra Nevada are presumably adapted to shorter-interval fires of mixed severity, but we have yet to quantify the distributions of this assemblage of species and their immediate and persistent responses to disturbance. In this study, we leveraged ecosystem-scale passive acoustic monitoring in the Sierra Nevada and occupancy models to 1) examine species-specific associations with burned habitat and fire legacies and 2) quantify the effect of novel fire disturbance on forest owl populations. Large areas of high-severity fire reduced site occupancy for most species in this assemblage of forest owls, including a mature-forest species for up to 20 years. Low- to moderate-severity fire benefited small cavity-nesting species, while patchy high-severity fire benefited one generalist species. As the climate continues to warm, fires that eliminate large, contiguous areas of live canopy cover could increasingly threaten many of these ecologically important species and the roles they play in ecosystems. Management strategies that reduce fuel loads, restore historical low-moderate severity fire with small patches of high severity fire, and promote a mosaic of forest conditions will likely facilitate the conservation of these nocturnal avian predators.

Poster Session

WHATCHA DRINKING? WATER ACQUISITION AND HYDROREGULATION IN BLUNT-NOSED LEOPARD LIZARDS

Tess McIntyre; San Jose State University; tess.mcintyre@sjsu.edu; Savannah J. Weaver, Zooey A. Sandel, Claire Q. Savage, Zane Warsen, Emily N. Taylor, Michael F. Westphal

Endemic to California's arid Central Valley, endangered Blunt-nosed Leopard Lizards (*Gambelia sila*) have adapted to xeric conditions but like many desert lizards remain at-risk to extinction. Understanding how G. sila maintains water balance through cutaneous evaporative water loss (CEWL) and water intake from prey can help inform endangered reptile conservation strategies in warmer, drier environments. We hypothesized that seasonal changes in climate drive variation in prey water quantity and water loss across the skin, and thus hydration for insectivorous G. sila. To study the lizards' osmoregulation, we measured CEWL and plasma osmolality of the same individuals throughout the field season. We also collected invertebrate specimens and quantified water content. We found great variability in lizard hydration during the field season. Meanwhile, prey species exhibit variable water content throughout the lizards' active season, but their average water content remains consistent between wet and dry years. As the effects of climate change intensify, megadroughts may increase hydric pressure on G. sila and other sensitive

species, so it will be important to identify which prey species contain the most water — making them integral to survival.

Poster Session ***Student Paper***

CALIFORNIA QUAIL (*CALLIPEPLA CALIFORNICA*) DENSITY AND OCCURRENCE COMPARED TO LAND USE AND LAND COVER ON THE CARRIZO PLAINS ECOLOGICAL RESERVE

Katherine S Miller; California Department of Fish and Wildlife; katherine.miller@wildlife.ca.gov; Levi Souza, Matt G. Meshriy, Bob Stafford

Management must consider landscape characteristics at multiple scales. We evaluated presence and density for California quail (*Callipepla californica*) on the Carrizo Plains Ecological Reserve using Distance point count data (2007, 2016, and 2018). We compared quail locations to the landscape across Carrizo with National Land Cover data, and at the home range scale using VegCAMP data (CDFW). We determined percent land cover by class on occupied and unoccupied areas of Carrizo. At the home range level we used class level landscape characteristics to evaluate habitat. California quail density for 2018, following the wettest winter, was 35 birds/km^2. Occupied sites had more shrub-scrub (54.42%) and less herbaceous vegetation (36.35%) than unoccupied areas (21.73%, 63.52%). At the home-range scale, quail occupied sites with more shrub/scrub, more forest, and less herbaceous vegetation than random points. Patches of moderate heterogeneity were larger at quail sites (46.07 ± 2.10), compared to random points (32.11 ± 2.92). This research provides empirical evidence that California quail need for large patches of shrub-scrub vegetation, with adequate edge to bare ground and forbs, and moderate heterogeneity for California quail populations. Little is known about California quail movements, but land managers must also consider the importance of corridors for dispersal.

Poster Session

CANCELLED IMPACT OF HIGH SUMMER TEMPERATURES ON BAT ACTIVITY AND BAT HOUSE OCCUPANCY

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Bat houses are known to experience temperatures that can exceed suitable levels. For example, 40°C is considered an upper threshold for bat houses, and *Tadarida brasiliensis* can exhibit increased mortality above 45°C. Thus, artificial roosts could possibly become heat traps for bats and reduce survival. Yet, little is known about how bats adapt to environs that normally experience high temperatures, often exceeding 40°C. We monitored bat activity in northern California along the Sierra foothills. Twenty bat houses and the surrounding habitat were censused by guano counts and by acoustic recorders. We compared the daily temperature inside the bat house with ambient during 2023. For 51 days between April and September, the maximum roost temperature was above 40°C (42.55±0.28) and the ambient temperature averaged 38.31±0.42. The bat houses were on average 4.24° warmer than ambient. Bat activity decreased during the peak summer temperatures, indicating that the bat houses may be too warm for the bats. However, the decrease of bat house activity was also mirrored in some of the acoustic data, suggesting that this may be in response to the high ambient temperatures, and species may adapt by migrating into the foothills.

Poster Session

SAVING A DESERT GIANT: WESTERN JOSHUA TREE CONSERVATION ACT PERMITTING EXPLAINED

Ekaterina Morozova; California Department of Fish and Wildlife; ekaterina.morozova@wildlife.ca.gov; Madeleine Wieland

The bizarre, spiked profile of the western Joshua tree (*Yucca brevifolia*) is a quintessential part of the Southern California desert ecosystem. Moreso, the western Joshua tree is central to the desert community both ecologically and culturally. However, the species' future is uncertain, primarily due to habitat loss to human development in its range and effects of climate change. To protect this iconic species, on July 10, 2023, the California legislature passed the Western Joshua Tree Conservation Act (WJTCA), which protects western Joshua tree from take, offers new permitting pathways to legally remove trees and creates a fund for the conservation of the species. The Act also requires the California Department of Fish and Wildlife to develop and implement a conservation plan. The multiple permitting pathways include incidental take permit options, which allows the applicant to pay a fee in lieu of traditional mitigation methods like land conservation, and a hazard management permit option, which allow homeowners to remove or trim trees that have fallen on or are close to a structure and constitute a hazard. This poster will summarize the new permitting options created by WJTCA and applicant resources associated with these options.

Poster Session

USING AERIAL TELEMETRY TO LOCATE MISSING CALIFORNIA CONDORS

Danaé C Mouton; Ventana Wildlife Society; danaemouton@ventanaws.org; Evan McWreath, Brooke George, Joe Burnett, Kara Fadden, Darren Gross, Mike Stake

Ventana Wildlife Society (VWS), in collaboration with Pinnacles National Park, monitors a population of 94 critically-endangered California Condors in central California. Determining causes of condor mortality by recovering dead or injured condors from the wild remains a top management priority. To track condor movements, each bird carries a VHF radio transmitter, while only approximately 30% of the flock is also equipped with more costly GPS transmitters. Since 2014, VWS has partnered with volunteer pilot group LightHawk to locate missing condors using aerial telemetry. When sick, condors self-isolate from the flock in remote areas, which complicates tracking and rescue efforts. To quickly locate these birds, LightHawk's pilots have conducted 42 aerial surveys to date, contributing 119 total pilot hours. These flights enable biologists to recover condors that otherwise would have remained missing, providing invaluable data on condor mortality and allowing birds to receive life-saving care. Pilots also provide critical detection data when natural disasters like wildfire and severe rainfall prevent access to management sites. As the condor population continues to expand, requiring more efficient monitoring, aerial telemetry becomes an increasingly important tool to monitor this wide-ranging species.

Poster Session

CRISPR-BASED SHERLOCK ASSAY FOR RAPID DETECTION OF CHYTRID FUNGUS EDNA

Diana A Munoz; UC Davis and US Geological Survey; damunoz@ucdavis.edu; Andrea Schreier, Raman Nagarajan, Emily Funk, Brian Halstead, Patrick Kleeman, Thomas Jenkinson

Chytridiomycosis, caused by the fungal pathogen *Batrachochytrium dendrobatidis* ("Bd"), has been associated with amphibian declines worldwide. While Bd infection can be visually identified at amphibian larval stages, diagnoses for adults often rely on swabbing and quantitative PCR (qPCR) assays. However, processing samples via qPCR requires expensive instrumentation, molecular biology experience, and

several hours of benchwork to produce results. Outsourcing to laboratories with the necessary equipment can further increase project costs and waiting times for results. Advances in CRISPR-based diagnostics have enabled the development of novel methods for pathogen detection. Specific High-sensitivity Enzymatic Reporter unLOCKing (SHERLOCK) assays use the CRISPR-Cas13a enzyme complex to detect target nucleic acids and produce a measurable fluorescent signal. These assays are rapid (< 1 hr), sensitive at low DNA concentrations, and can be performed by non-experts under field conditions. We developed a SHERLOCK assay to detect genome fragments of the Global Panzootic Lineage of Bd ("BdGPL") on swabs and eDNA samples. Our assay detected culture derived BdGPL DNA within 20 minutes of SHERLOCK reaction initiation in the laboratory. Field trials are in-progress. Findings are preliminary and provided for timely best science.

Poster Session ***Student Paper***

ANALYZING DRIVERS FOR MOVEMENT OF GPS COLLARED AXIS DEER IN MAUI, HAWAII

Wade H Naguwa; University of Hawaii at Manoa; naguwaw@hawaii.edu; Melissa R. Price, Derek R. Risch, John S. Medeiros, Lance K. Desilva, Scott Fretz

Axis deer (*Axis axis*), native to the Indian subcontinent, have been introduced to regions throughout North and South America, Asia, and the Pacific as prized game mammals for hunting. However, beyond their native range, they pose a substantial threat to native flora, ecosystem health, and food security through prolific grazing and habitat degradation. Recent population growth in the Hawaiian Islands has increased public recognition of impacts to agricultural production and native ecosystems, but their population size and movement patterns remain largely unknown, hampering management responses. In this study we aimed to identify drivers that influence movement patterns and home range size utilizing 30 GPS collared deer. Preliminary results suggest movement patterns are correlated with rainfall and elevation while anthropogenic factors serve as major barriers to movement with limited dispersal between areas segmented by these features. Further, Axis deer had relatively small home ranges and dispersal events are largely associated with herds reaching carrying capacity. These results are consistent with movement patterns in their native range and suggest that targeted management aimed at isolating axis deer herds within controllable units may serve as an effective management tool to minimize both the economic and ecological impact of deer in the Hawaiian Islands.

Poster Session ***Student Paper***

ONTO GREENER PASTURES: UNDERSTANDING THE GROWTH OF TARGETED GRAZING AND THE CHANGING CULTURE OF PREDATOR MANAGEMENT IN THE SHEEP INDUSTRY

Tricia T Nguyen; California Polytechnic State University, San Luis Obispo; tnguy705@calpoly.edu; Nicholas E. Williams, William T. Bean

Ranchers and predators have been at odds since the domestication of livestock began thousands of years ago. In present-day California, sheep ranchers remain in conflict with coyotes despite there existing effective nonlethal predator management tools. There is limited understanding of the social factors driving how ranchers make decisions about which predator management strategies to implement in their operations. With targeted grazing taking on a growing role in the California sheep industry, I aim to explore these sheep ranchers' perspectives and attitudes towards coyotes and other predator management to understand how support for nonlethal methods might be increased among producers. Using a qualitative study design, I conducted semi-structured interviews with sheep ranchers whose main product was grazing services and analyzed the interview transcripts using an inductive coding process. Here, I will present my

preliminary results. This research may provide insight on future directions of the sheep industry, providing pathways for increasing tolerance of wild predators among livestock producers and facilitating the success of management efforts, particularly nonlethal control tools.

Poster Session ***Student Paper***

THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE'S CUTTING THE GREEN TAPE PROGRAM: REGULATORY EFFICIENCIES TO INCREASE THE PACE AND SCALE OF RESTORATION

Jennifer L. Olson; CDFW; jennifer.olson@wildlife.ca.gov;

California has strong regulations in place to protect natural resources from impacts of development and resource extraction. Unfortunately, beneficial habitat restoration can be slowed by these regulations. Historically, the pace and scale of environmental restoration has been insufficient to address threats to California's biodiversity from anthropogenic stressors such as habitat loss and climate change. Complex and overlapping permitting processes can result in fewer and smaller restoration actions at a slower pace and greater expense. In response, the state of California has identified "Cutting the Green Tape" as a priority initiative to increase the pace and scale of environmental restoration. Many are familiar with the concept of "red tape," and in this context, "green tape" represents the extra time, money, and effort required to implement restoration projects because of inefficiencies in environmental review, permitting, and granting processes. Cutting the Green Tape means improving regulatory processes and policies so that habitat restoration can occur more quickly, simply, and cost-effectively. This presentation provides an overview of the California Department of Fish and Wildlife's Cutting the Green Tape Program, and the specific permitting and regulatory tools that are in use or under development for increasing the pace and scale of restoration in California.

Poster Session

CDFW STATEWIDE BOBCAT POPULATION MONITORING PROJECT

Kathryn A Olstad; California Department of Fish and Wildlife; Kathryn.Olstad@Wildlife.ca.gov; Rachel A. Roberts - Senior Environmental Scientist CDFW, John M. Nettles - Environmental Scientist CDFW, Pete Figura - Environmental Program Manager CDFW

California Assembly Bill 1254 tasked the California Department of Fish and Wildlife with developing a statewide bobcat management plan which will include 1) a statewide bobcat population estimate, 2) an assessment of population health, 3) a comprehensive management strategy, 4) an investigation of nonlethal predation solutions, and 5) recommendations for regulatory or statutory changes. To develop the plan, we collected data at 48 study areas across California, each with a grid of 40 two-camera survey stations and 40 km of scat survey transects. Additionally, we deployed GPS collars on 45 bobcats across 12 different counties. This resulted in over 21 million photos, 3,000 scat samples, and 64,000 GPS locations. With help from Wildlife Insights, an online platform for organizing, and processing camera trap images, and the Veterinary Genetics Laboratory, University of California, Davis, we identified individual bobcats based on pelage patterns and genotypes from fecal DNA. We developed separate spatially explicit capture-recapture (SECR) models for each data source (photos and DNA) to estimate population size and used Kernel Density home range estimates and Resource Selection Probability Functions (RSPFs) to assess individual-level habitat selection. This project is unique due to its scale and its multi-faceted approach to assessing California's bobcat population.

Poster Session

AN EFFECTIVE COST-EFFECTIVE ALTERNATIVE TO MODIFIED RECONYX TRAIL CAMERAS FOR BUENA VISTA LAKE ORNATE SHREW SURVEYS

Russell Sweet; Dudek; rsweet@dudek.com; Brock Ortega, Shelly Amrhein, **Brock Ortega**

The federally endangered and California Species of Special Concern Buena Vista Lake ornate shrew (BVLOS; *Sorex ornatus relictus*) is a focal species of the proposed California Department of Water Resources State Water Project San Joaquin Field Division Habitat Conservation Plan. Initially, protocol-level (USFWS 2012) trapping studies for BVLOS were proposed. Ultimately, based on work performed by Tennant (2020) and Cypher et al (2017), the project team determined that camera studies would be more effective than trapping, and was supported by the wildlife agencies (US Fish and Wildlife Service and California Department of Fish and Wildlife). Per Cypher et al (2017), Reconyx HC600 HyperFire Covert model cameras factory modified to take close focal-length photographs were used. These cameras are expensive, so while the study was performed using the agency required Reconyx cameras, we also performed a supplemental study on a subset of the camera stations where Reconyx cameras were paired with much less expensive Browning Dark Ops trail cameras. The use of acceptable lower-cost cameras could help make larger and longer-term studies more cost effective and provide more data that could be leveraged toward species conservation and monitoring. This poster discusses and depicts the favorable results in support of this approach.

Poster Session

STATEWIDE WILDLIFE CROSSING PLANNING, PERMITTING AND DESIGN

Brock A. Ortega; Dudek; bortega@dudek.com; Fraser Shilling, PhD (Dudek), Sasha Dansky (Mark Thomas)

There are a large number of wildlife crossing planning projects occurring throughout California. Because these facilities are permanent and expensive, it is important to inform location decisions using a wide variety of data. We describe 5 wildlife crossing projects in California at various stages of planning, supported by the Wildlife Conservation Board, Peninsula Open Space Trust, and Santa Clara Valley Habitat Agency, with implementation planned within 5-10 years. In the Bay Area, projects address a city road in an undeveloped valley, another includes SR 152, paralleling the proposed alignment for high-speed rail, and a third includes 2 interstates (I-580 and I-680) and a state highway (SR 84). In southern California, a project along I-8 addresses endangered Peninsular bighorn sheep crossings. In northern California, the fifth project incorporates 2 crossings across US 395. The planning studies generally include informally established lists of focal species, including mountain lion, black bear, elk, mule deer, Peninsular bighorn sheep, wolf, pronghorn, western pond turtle, and other species. All projects follow a general rubric of: 1) existing or new biological data collection, 2) spatial modeling for crossing siting, 3) engineering feasibility, 4) Caltrans/local transportation agency documentation, 5) environmental permitting, and 6) engineering design and cost estimation.

Poster Session

PREDATION RATES OF MESOPREDATORS ON *CHARADRIUS NIVOSUS NIVOSUS* NESTS ALONG A HUMAN-DENSITY GRADIENT

Marina Osechinskaya; Cal Poly Humboldt; mo173@humboldt.edu; Frank Fogarty, Micah Ashford

The Pacific coast distinct population segment (DPS) of western snowy plover (*Charadrius nivosus nivosus*) is a federally threatened small shorebird that nests primarily on ocean-fronting beaches along the Pacific coast. Recovery Unit 2 (RU2) of this DPS includes Del Norte, Humboldt, and Mendocino counties in northwestern California. RU2 was deemed a 'population sink,' which can largely be attributed to the predation risks that corvids and mesopredators such as skunks, opossums, foxes, and raccoons pose on the population. Many questions remain about the relative impact of these predators on snowy plovers, as well as how predator populations are influenced by human activity. We examined whether local human population can have indirect negative consequences on snowy plovers by presenting a comparison of nest predation events due to mesopredators from 2012-2023 to human population density from U.S. Census Bureau data. 42 mesopredator predation events were found from 11 different sites. A generalized linear mixed model found no significant effect on mesopredator predation from human density by census tracts. Further investigation into the effect of human population on mesopredator release throughout the entire range of snowy plovers may help to inform future management decisions.

Poster Session ***Student Paper***

NEST TREE SELECTION BY SWAINSON'S AND RED-TAILED HAWKS IN BUTTE VALLEY, CA

Cristina Portillo; cp334@humboldt.edu; Elizabeth Meisman, Dr. Matthew D. Johnson

Butte Valley, California hosts robust numbers of raptors, including at least a dozen species that breed on the valley floor. However, habitat conversion resulting from large scale agriculture has reduced availability of native habitat, including nest sites. The most common tree species used by nesting raptors in this area is western juniper (*Juniperus occidentalis*), followed by ponderosa pine (*Pinus ponderosa*), as well as occasional deciduous trees (e.g., Fremont's cottonwood [*Populus fremontii*]). Some raptors have also been observed nesting on artificial structures such as platforms on electrical poles and irrigation pivots. We collected microhabitat data at nest trees to determine if Swainson's (*Buteo swainsoni*) and Red-tailed Hawks (*Buteo jamaicensis*) showed a preference for certain tree characteristics. These data were collected from occupied nest trees and the nearest neighbors, alongside long-term population monitoring efforts. Microhabitat data included tree height, nest height, number of primary trunks, diameter at breast height, density of canopy, the presence or absence of lichen, lichen type (macro- versus micro lichens), and local tree density. We used logistic regression to test the expectation that Swainson's and Red-tailed Hawks select older and larger trees relative to local availability. The implications of these results could inform which trees are selected for western juniper removal, which is an anticipated treatment conducted by the U.S. Forest Service in Butte Valley.

Poster Session ***Student Paper***

COOL AIR AT NIGHT, TORTOISE DELIGHT: VALIDATING IBUTTONS FOR CHARACTERIZING NIGHTTIME MICROHABITAT USE IN JUVENILE DESERT TORTOISES DURING A HEATWAVE

Katelyn N Rock; San Diego Zoo Wildlife Alliance; karock@sdzwa.org; Thomas A. Radzio, Talisin T. Hammond, Ronald R. Swaisgood, Melissa J. Merrick

Faced with climatic extremes, desert species may be at increased risk of depleting water and energy reserves in summer, thus, understanding their thermal ecology and microhabitat use is more crucial than

ever to predict responses to climate change. Like many species, desert tortoises (*Gopherus agassizii*) utilize burrows as refugia from high daytime surface temperatures to avoid overheating and conserve energy and water. However, nighttime temperatures are lower at the surface than in burrows, particularly in smaller, less ventilated burrows. This raises the question of whether juvenile tortoises will shift from using burrows at night to overnighting at the surface to reduce energy expenditure in hotter seasons. Cameras can address this question, but they are limited by tortoise movements among burrows and do not provide key information on temperature. In August of 2023, we observed juvenile tortoise activity in the wild using time-lapse cameras and simultaneously recorded tortoise and environmental temperatures using temperature loggers (iButtons) affixed to juveniles and positioned in burrow and surface microhabitats. We will use camera data to assess whether temperature data from tortoises and burrow and surface environments can be used to reliably estimate nighttime microhabitat use and potential activity shifts in response to climate change.

Poster Session

GENOMIC SEQUENCING TO COMPARE PEDIGREE-BASED AND GENOMIC INBREEDING MEASURES FOR A SMALL, ISOLATED MOUNTAIN LION POPULATION

Cassandra R Rodriguez; University of California-Davis; casrodrig@ucdavis.edu; Sophie Preckler-Quisquater, Stevi Vanderzwan, Seth Riley, Jeff Sikich, Ben Sacks

Urban development and roads, especially freeways, can isolate mammal populations, increasing the risk of low genetic diversity through genetic drift and inbreeding (i.e., matings between closely related individuals). This low diversity can result in genetic disorders and a decline in fitness known as inbreeding depression. The mountain lion population in California's Santa Monica Mountains (SMM) has become increasingly isolated due to human activities. To evaluate the effects of isolation, we conducted genotyping-by-sequencing of >100 individual mountain lions collected by the National Park Service from the SMM and adjacent Simi Hills and Santa Susana Mountains (2002–2023), and employed both pedigree-based and direct estimation methods to infer levels of inbreeding. This research has significant conservation implications for this vulnerable population, particularly as ongoing urban expansion threatens habitat connectivity. This study is particularly relevant and timely as the Wallis Annenberg Wildlife Crossing is due for completion in 2025. This wildlife crossing was designed to increase connectivity for this and other populations, and the data generated from this study establishes a critical baseline for assessing this population's future genetic health and fitness, offering insights that are essential for effective conservation planning.

Poster Session ***Student Paper***

MCCOSKER SUB-AREA CREEK RESTORATION AND RECREATIONAL IMPROVEMENTS PROJECT - PRELIMINARY OBSERVATIONS ON HABITAT IMPROVEMENTS AND WILDLIFE USAGE

Ariana (Ari) R Rogers; Sequoia Ecological Consulting, Inc.; arogers@sequoiaeco.com;

East Bay Regional Park District’s McCosker Sub-Area Creek Restoration and Recreational Improvements Project aimed to restore vital habitat for special-status species like rainbow trout and federal- and state-listed California red-legged frog while enhancing recreational opportunities for the public. Active construction on the project spanned from 2020 to 2023, and involved a comprehensive restoration effort, including the daylighting of a once-buried creek through culvert removal, construction of two creek channels (Alder and Leatherwood Creek), and installation of in-stream habitat features and riparian plantings. Preliminary post-construction observations revealed promising outcomes. The once-fragmented habitat saw the immediate return of rainbow trout, indicating improved habitat connectivity and ecological

conditions. Approximately 2,000 healthy riparian plantings have thrived, contributing to the restoration of the habitat and enhancing its overall ecological value. These habitat improvements have also led to increased native vegetation cover, providing important resources for native wildlife such as nesting birds and the San Francisco dusky-footed woodrat, a state species of special concern. This poster highlights the success of the McCosker Project in its initial post-construction monitoring stages, demonstrating its positive impact on both listed species and sensitive habitats, and emphasizing the importance of such ecological restoration initiatives for the community and the environment.

Poster Session

EFFECTS OF INVASIVE RODENT CONTROL ON ISLAND FOREST BIRD DEMOGRAPHY AND HEALTH

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The introduction of rats (*Rattus* spp.) to island ecosystems has resulted in widespread decline and extinction of birds. Rats impact birds by spreading disease, depredating eggs, chicks, and adults, and competing for food, yet the effect of rats on both the demography and health of these species is poorly understood. Our objective was to determine if rodent control can influence physiological effects and demographics of island forest birds. To address this objective, we examined the sex and body condition of four focal Hawaiian forest bird species residing in Kaua'i's Alaka'i Wilderness Preserve in relation to proximity and density of rat traps, as well as topographic variables within their home range. Birds were captured within and around areas that have had active rodent control for the past 5-8 years. Data analysis is currently underway and results of three field seasons of data collection from 2021-2023 will be discussed. Over this period, we collected data from more than 570 focal species captures. This information will be important in prioritizing management actions to protect Hawai'i's ecologically and culturally important avian populations and contribute to a deeper understanding of rat impacts on forest bird health and demography.

Poster Session ***Student Paper***

EGG DEPOSITION PATTERNS USE IN REPSONSE TO ABIOTIC GRADIENTS

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In the Pacific Northwest region of North America, precipitation is predicted to be reduced by climate change (Maurer & Duffy 2005), with trends toward fewer, more extreme rainfall events in the winter and longer, drier, hotter summers (Flint & Flint 2012, Mallakpour 2018). Landscapes in mountainous regions are more vulnerable to these climactic perturbations, as they lose water at higher rates and require more rainfall to replenish groundwater stores in steep terrain (Flint et al 2018). With less water, first order streams are at risk of transforming into a series of intermittent pools (Bogan et al 2019). This has the potential to completely alter the form and function of the stream environment on which amphibian egg and larvae development depend. While much is known about the life histories of terrestrial adult lotic-breeding amphibians, much less is known about their egg and larval phases; those that are completely dependent on the quantity and quality of rainfall and associated streamflow. This study strives to understand at potential small-scale habitat associations between abiotic factors including meso- and micro-habitat structure, substrate type, flow rate, water depth, canopy closure, dissolved oxygen, water temperature and observations of egg mass deposition locations and larvael habitat use by foothill yellow-legged frog (*Rana boylii*) and red-belied newt (*Tarciha rivularis*).

Poster Session ***Student Paper***

PRADO WETLANDS M.A.P.S. STATION

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The Monitoring Avian Productivity and Survivorship (MAPS) program is a continent-wide collaboration facilitated by the Institute for Bird Populations (IBP), which utilizes standardized protocols to research avian populations and ultimately aid in their conservation. In the summer of 2022, during the passerine breeding season, the Institute for Conservation Research & Education collaborated with IBP and the Orange County Water District to establish a new MAPS station within the Prado Wetlands; this station successfully continued its second year of research this past summer. As the largest reconstructed wetland on the United States West Coast, the Prado wetlands provide a unique habitat for various rare and endangered birds -- the least Bell's vireo being one of them. The Prado station's banding efforts focus on passerine activity along a 0.79-mile stretch within riparian woodland. Throughout the past two seasons of operation, 26 passerine species have been banded, with the Song Sparrow and Common Yellowthroat being the most prevalent. Upon capturing individuals, they are banded with a unique ID and assessed for demographic data values such as sex, age, molt, etc. This station intends to run for at least five years, with a long-term plan to analyze survivorship, reproduction, and the prevalence of diseases like avian pox.

Poster Session

DESCRIBING THE ECOLOGY OF URBAN WILDLIFE AND TICKS IN EASTERN LOS ANGELES COUNTY, AND EXPLORING RELATED COMMUNITY PERCEPTIONS

Caleb Sandoval; California State Polytechnic University, Pomona; calebs@cpp.edu; Janel L. Ortiz, PhD, Rhea Hanselmann, DVM, MPVM, PhD

In urbanized landscapes, people, their pets, and wildlife may intersect through potential exposure to ectoparasites, such as hard ticks. This project explores potential risks for tick exposure and interaction with urban-dwelling wildlife along a gradient of urbanization in the San Gabriel Valley in eastern Los Angeles County. Camera traps are used to document urban wildlife species in recreational spaces including hiking areas, city parks, and other open spaces. The drag cloth method is used to collect ticks from vegetation. Tick presence is noted, and collected ticks are identified to species and quantified. Finally, a public survey was developed to gauge public knowledge and perceptions surrounding pet ownership, outdoor recreation, urban wildlife, and ticks in the study area. To date, 7 *Ixodes pacificus* ticks and 43 *Dermacentor occidentalis* ticks have been collected, 130 species of wildlife have been identified, and the survey garnered 105 responses. This information will be synthesized to describe the risk of potential exposure to ticks and interaction with wildlife in urban greenspaces in the San Gabriel Valley.

Poster Session ***Student Paper***

USING MOTUS TO UNDERSTAND MONARCH MOVEMENTS

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The Motus Wildlife Tracking System (Motus) network is increasingly used to track movements of migratory species including monarch butterflies. In addition to their long-distance migraoty movements, western monarchs are also known to move between overwintering sites. We piloted the use of Lotek dataloggers to track lightweight Motus tags attached to western monarchs to examine inter-site movements and butterfly response to tagging. We placed receivers adjacent to and between two overwintering sites that were 1.34 miles apart at Montana de Oro State Park in central California. We affixed Lotek nanopin Motus tags to 18 monarchs using superglue. We determined only one centrally located receiver tower was necessary to pick up between grove movements, therefore only report the data from this location. We collected over 19,000 detections during a 7-day trial. Thirteen monarchs (72%) moved between the sites, though the majority of detections for a given individual were at the site where they were tagged. Four monarchs either departed the study area or their tags stopped working. The datalogger batteries used to power the towers lost power after 7 days, well before the tag batteries died. Using a handheld device, we dected one tag 81 days after deployment, well beyond the tag's predicted 15 day lifespan. Motus tags display promise as a tool that can improve understanding of monarch movements during the overwintering period, a critical part of their multi-generational life cycle.

Poster Session

IMPACT OF HUMAN POPULATION DENSITY AND LOCAL VEGETATION ON WILDLIFE POPULATIONS IN TWO URBAN INDUSTRIAL PARKS IN CALIFORNIA

Brigitte K Scott; San Jose State University; brigitte.scott@sjsu.edu; Giovanni S. Quezada, Yvonne Luong, Sierra L. Sowa, Julia Casio, Monica Rodriguez, Jessica A. Castillo Vardaro

Urbanization is an increasing threat to biodiversity worldwide. In California, the Greater Los Angeles Metropolitan Area and the San Francisco Bay Area exemplify this replacement of wildlife habitat with urban sprawl, displacement of native wildlife and replacement with non-native, urban-tolerant species. In this study, we placed 66 wildlife cameras in two urban industrial parks in California: Venice, Los Angeles County and Mountain View, Santa Clara County. While both sites are in urban areas in close proximity to either the Pacific Ocean or San Francisco Bay, respectively, the human population density is greater in Venice than Mountain View. Additionally, significant effort has been made to replace traditional landscaping with native vegetation at the Mountain View site, as well as maintaining existing natural areas and constructed wetlands. We found that the Venice site was dominated by invasive rodents and non-native species, while the Mountain View site had significantly greater species richness overall and of native species in particular. Of note, canids and native mesocarnivores were abundant in Mountain View and largely absent in Venice. Our results indicate that maintaining native vegetation significantly increases biodiversity, including multiple trophic levels, and that the presence of mammalian predators may significantly reduce invasive rodent populations.

Poster Session ***Student Paper***

CAPTIVE PROPAGATION OF BLUNT-NOSED LEOPARD LIZARDS AT FRESNO CHAFFEE ZOO

Steven Sharp; Fresno Chaffee Zoo; ssharp@fresnochaffeezoo.org; Rory Telemeco, Mark Halvorsen, Lyn Myers, Emily Bergman

The Blunt-nosed leopard lizard (*Gambelia sila*) is an endangered and charismatic lizard species native to California’s Central Valley. The Fresno Chaffee Zoo (FCZ) has maintained a captive assurance colony of *G.sila* since the summer of 2020. The spring and summer of 2023 marks the third breeding season for the colony. We founded the colony with seven lizards captured from Panoche Plateau and the colony has since produced 107 animals and we released 17 back to Panoche Plateau in 2023. Our rapidly growing colony is

now housed in a newly constructed Conservation Action Center building on zoo grounds. In addition to housing the colony, this building will highlight FCZ's local conservation work and will provide literal windows into the conservation science happening at FCZ as we study *G. sila*. We will continue producing, releasing, and monitoring *G. sila* annually until >50 natural born females successfully reproduce on the Panoche Plateau and the population can grow without further captive propagation.

Poster Session

IMPLICATIONS FOR PREDICTING HIGHER MORTALITY RATES OF AMPHIBIAN ROAD KILLS, *TARICHA TOROSA* AND OTHER SPECIES

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Adult migrating newts and metamorphs are at risk of becoming road-kill when they are moving to and from their aquatic breeding waters. Roads that bisect a migration route can accumulate high numbers of mortalities throughout the season. We setup a walking survey of 1.8 kilometers of road in southern Santa Clara County. Over the course of the winter and early spring of 2009 & 2010, we conducted 14 surveys and collected data on 626 Taricha torosa mortalities. The carcasses of other amphibians and reptiles disappeared from the survey area quite quickly, while the carcasses of the newts remained on the road for longer periods of time. With the longevity of the newt carcasses and the locating of new mortalities, hotspots of mortality should be able to be determined and compared to topographical draw features and aid in the placement of suitable amphibian crossing structures.

Poster Session

COMPARING THE DIETS OF URBAN AND NON-URBAN COYOTES IN THE SAN FRANCISCO BAY AREA

Emily Y Sit; Mammalian Ecology and Conservation Unit, UC Davis; eysit@ucdavis.edu; Tali Caspi, Benjamin N. Sacks

Urban environments provide novel resources for urban wildlife. The diets of urban-living animals often shift in response to resource availability, with cascading impacts on population health and behavior, ecosystem processes, and human-wildlife conflict. To better understand how urbanization alters the diet of wildlife, we compared the diets of an urban and non-urban population of coyotes (*Canis latrans*) using stable isotope analysis. We measured δ13C and δ15N of coyote vibrissae from 48 individual coyotes from San Francisco (urban) and Marin (non-urban) counties. We compared δ13C, a proxy for anthropogenic food consumption, and δ15N, a measure of protein assimilation, between the two populations. We also compared the isotopic dietary niche breadths between the two populations. By comparing the diets of urban and non-urban coyote populations, we shed light on how diet composition and breadth are altered by urbanization. Further investigation of the physiological effects of altered urban diets is needed to refine understanding of how urban environments impact wildlife.

Poster Session ***Student Paper***

BEHAVIORAL RESPONSES TO ANTI-PREDATOR TRAINING IN HEAD-STARTED JUVENILE DESERT TORTOISES *(GOPHERUS AGASSIZII)*

Isabelle S Smits; California Polytechnic State University, San Luis Obispo; ismits@calpoly.edu; Talisin T. Hammond, Thomas A. Radzio, Ronald R. Swaisgood, Melissa J. Merrick

Head-started animals often lack natural predator responses, prompting pre-release anti-predator training in conservation head-starting programs to enhance post-release survival. This behavioral conditioning method aims to improve predator recognition and responses. The endangered Mojave desert tortoise (*Gopherus agassizii*) is increasingly involved in head-starting programs but faces high depredation risk, including by subsidized predators like the common raven (*Corvus corax*). This study investigated impacts of anti-predator training on head-started juvenile desert tortoise behavior. Utilizing a before-after, control-impact experimental design, all tortoises were exposed to predator cues (model raven flyover paired with raven calls). The treatment group then received predator cues paired with an aversive experience, while the control group was exposed to predator cues without negative consequences. Tortoises received predator cues again. Behavioral data were collected for 24 hours before and after each predator exposure to quantify changes in predator responses between control and trained tortoises before and after treatment. Preliminary results suggest no significant behavioral changes in trained tortoises. However, our results also reveal notable individual variation in predator responses, which could be related to sources of environmental variation (e.g. air temperature) or to individual behavioral differences ("personality"). Post-release survival measurement will enable further evaluation of this anti-predator training approach.

Poster Session ***Student Paper***

EFFECTS OF DROUGHT ON TULE ELK WEIGHTS IN THE SUISUN MARSH

Dajanae R Stitts; California Department of Fish and Wildlife; Dajanae.stitts@gmail.com; Orlando S. Rocha

Tule elk (*Cervus canadensis nannodes*) – a subspecies of North American elk – are endemic to California. Suisun Marsh, which consists of brackish water tidal and managed wetlands, supports a herd of approximately 280 tule elk. However, increasing salinities, due to increased demand of water in the Delta and climate change, pose a threat to the quality of habitat to support fish and wildlife in Suisun Marsh. It's clear that increased salinity will have a profound effect on aquatic species, but terrestrial mammals may also be affected by various factors, such as a lack of available water within their respective salinity tolerances and decreased quality forage.

We compared the weights of tule elk harvested on Grizzly Island Wildlife Area in the Suisun Marsh between dry and wet years. We looked at the weights 43 tule elk calves, and 63 female subadults collected over a period of nine years. Average weights for calves were generally lower during periods of drought than during wet years. Female subadult weights were less affected. Increased monitoring of reproduction and mortality on tule elk during periods of drought would allow us to better predict how increasing salinity will affect terrestrial species in Suisun Marsh in the future.

Poster Session

DROUGHT INFLUENCES HOME RANGE SIZE AND SPACE USE OF GOLDEN EAGLES IN COASTAL SOUTHERN CALIFORNIA

Sarah K. Thomsen; USGS Western Ecological Research Center; sthomsen@usgs.gov; Peter H. Bloom, Melanie C. Madden, James C. Molden, Jeremy B. Sebes, Adam Duerr, Todd Katzner, Robert N. Fisher

Golden Eagles (*Aquila chrysaetos*) are long-lived, top predators and are vulnerable to a variety of threats. There is increasing concern about the declining population in coastal southern California, which has largely coincided with habitat loss due to urbanization of the region. This Mediterranean-type ecosystem is also experiencing more prolonged and intense droughts. The impact of drought on Golden Eagles is unknown, although drought can reduce populations of their key local prey, such as jackrabbits. Here, we used GPS tracking data to calculate eagle home ranges and hypothesized that home range size would be

influenced by drought such that home ranges would be larger to meet their resource needs with worsening drought severity. Fifty individual eagles were captured over seven breeding seasons, spanning the time both during and after the historic 2012-2016 drought. We found that drought severity predicted Golden Eagle home range size and as drought severity worsened, home range sizes for adults increased in area. Drought-breaking rainfall corresponded with dramatically smaller home ranges compared to home range sizes during drought years. Our results suggest that the frequent and severe drought that is projected for this region could lead to lowered nesting density and an increased risk of further decline.

Poster Session

USING ISLAND FOX AND ISLAND SPOTTED SKUNK TRAP DATA TO MODEL VEGETATION ASSOCIATIONS ON SANTA ROSA ISLAND

Rachel E Toombs; Cal Poly San Luis Obispo; rachel.toombs919@gmail.com; Desirae Thomaier, Tim Bean, PhD

The Island Spotted Skunk, *Spilogale gracilis amphialus*, and the Island Fox, *Urocyon littoralis*, are two mesocarnivores that co-occur on Santa Rosa and Santa Cruz Islands, part of the California Channel Islands archipelago. For almost 20 years, the National Park Service has been laying out grids of traps to monitor the fox population on Santa Rosa Island, and skunks are incidentally caught in the traps as well. Through these monitoring efforts, it was observed that when the fox population declined, the skunk population increased, but has fallen again since the recovery of the foxes. This information suggests that the foxes and the skunks have a competitive relationship. Both species occupy similar niches, but the foxes have a competitive advantage due to their larger size, broader diet, and range of temporal activity. We are investigating the extent to which this competitive relationship is partitioned by the vegetation these animals rely on for habitat and food. Using historical trapping data on Santa Rosa Island, we compared the fox grid locations and trapping success rates to vegetation maps in order to visualize the habitat utilization of each species and ran statistical tests in R to determine if specific vegetation associations were significant.

Poster Session ***Student Paper***

THE IMPACTS OF CLIMATE CHANGE ON *CALYPTE ANNA'S* FORAGING BEHAVIOR

Samantha J Walls; San Francisco State University; swalls9252@yahoo.com; Derrick J.E. Groom, Jesus Ovalle, Sierra Eikman, Le'Ona Eugene, Mary Muriel, Dikshita Germain

Climate change has significantly impacted the phenology of plant/pollinator mutualistic relationships, leading to a timing mismatch. While much research has focused on phenological mismatch, more fine-scale temporal changes may also impact pollinator foraging biology, and thus pollination success. In this study, we evaluate whether hummingbirds prefer to feed from sources with high-quality nectar to maximize energy versus a preference to perch while feeding to conserve energy when given the choice. I predict hummingbirds will display time minimizer behavior and perch to feed in higher temperatures to maintain temperature homeostasis and reduce heat production. Anna’s hummingbirds were subjected to an environment with a low-effort and high-effort feeder containing either a high or low sugar solution in two different temperatures. The hummingbirds displayed an inverse relationship between food consumption and feeding method, preferring to hover feed in high temperatures and perch feed in low temperatures, and demonstrating an energy budget plan of higher food consumption with an increased demand for rest at low temperatures, while consuming less and dedicating less energy towards rest at high temperatures. Based on this information, we can predict that *Calypte annas* may adapt well to extreme heat events associated with climate change due to their increased foraging efficiency at high temperatures.

Poster Session ***Student Paper***

REPRODUCTION AND DISPERSAL OF CALIFORNIA GNATCATCHER AT THE UC IRVINE SAN JOAQUIN MARSH RESERVE

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Coastal California gnatcatcher, *Polioptila californica* (CAGN) numbers have decreased from historical levels due to multiple factors such as the loss of coastal sage scrub habitat, wildfires and invasive plants. However, our team documented a high number of nesting pairs at the University of California Irvine, San Joaquin Marsh, Orange County. We are currently studying the reproduction and dispersal of CAGN by color-banding juvenile birds and re-sighting them after dispersal. Our research will identify the San Joaquin Marsh Reserve, as a source or a sink for CAGN, as well as quantify regional nest survivorship, natal dispersal and inform adaptive management recommendations for local conservation and recovery. In the initial year of our study, 2023, we documented 10 CAGN pairs on breeding territories at the marsh and banded a total of 46 CAGN. In the spring of 2024, we will continue banding at the marsh and start a comprehensive re-sighting effort. The marsh is a managed and restored site and the results of our study will provide insights into long-term management of coastal sage scrub (CSS) for CAGN habitat. In addition, this study is a test of the core and linkage reserve design and will provide information about current dispersal movement.

Poster Session

EXPLORING FORAGE PLANT ASSOCIATIONS OF BUMBLE BEES WITH COMMUNITY SCIENCE

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Bumble bees (genus *Bombus*) are an economically and ecologically important group of pollinators that have been negatively impacted by habitat loss, pesticide use, pathogens and climate change. The California Department of Fish and Wildlife considers six bumble bees Species of Greatest Conservation Need (SGCN), and four of those are candidates for listing under the California Endangered Species Act. Further, there is little available baseline data on the population abundance, distribution, and floral preferences of most species. The California Bumble Bee Atlas (Atlas) community science initiative was launched in 2022 to systematically, non-lethally survey bumble bees in all parts of California. Atlas volunteers have documented over 10,000 bumble bee observations and their associated forage plants. In this poster, using data collected to date through the Atlas, we explore forage plant preferences of California's native bumble bees. We concentrate on plants visited by four bumble bee SGCN, the change in forage plant species from early to late season, and diversity of native forage plants used. By identifying floral associates that bumble bees rely on for nectar and pollen, we can help inform habitat conservation and restoration of these important pollinators.

Poster Session

BENEATH THE ASHES: UNVEILING THE POSITIVE RESURGENCE OF CALIFORNIA'S VERNAL POOLS AND GRASSLANDS POST-FIRE

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California's vernal pools are unique and delicate ecosystems that face growing challenges from climate change including wildfires. In contrast to conventional perceptions, wildfires can be a transformative catalyst for these environments. Recognizing the constructive role of fire is essential for informed conservation strategies, emphasizing the need to integrate fire as a natural ecological process in managing and preserving these dynamic landscapes. In 2022, a wildfire ran through Westervelt Ecological Service's Burke Ranch Conservation Bank located in Solano County. This property contains habitat for many sensitive wildlife and plant species, including California tiger salamander (*Ambystoma californiense*) and San Joaquin spearscale (*Atriplex joaquiniana*). The data shown in this poster will highlight the ecological resilience of vernal pools and grasslands to periodic fires, with a focus on San Joaquin spearscale, how the fire could benefit California tiger salamander migrations, and what that could mean for long-term management of vernal pool properties in the face of evolving environmental challenges.

Poster Session

ENGAGING CALIFORNIA'S PARTNERS IN WILDLIFE DISEASE MANAGEMENT: CDFW'S PROACTIVE CWD SURVEILLANCE PROGRAM

Liberty Wood; CDFW; liberty.wood@wildlife.ca.gov; Brandon Munk, Linell Hansen, Alex Heeren, Brian Leo

Chronic Wasting Disease (CWD) is a fatal neurologic disease of cervids, including mule deer (Odocoileus hemionus) and elk (Cervus canadensis). CWD has not yet been detected in California's mule deer and elk population. To monitor California's herds, the California Department of Fish and Wildlife (CDFW) has developed and implemented a CWD surveillance program. The program seeks to enlist the help of California's deer hunters, meat processors, and taxidermists to monitor for CWD.This voluntary program encourages partners who harvest or handle a harvested deer from California to submit medial retropharyngeal lymph nodes (RPLN) for CWD testing.

Poster Session

UNDERSTANDING THE NORTHERN SAW-WHET OWL MIGRATION IN THE BAY AREA, CALIFORNIA

Julie M Woodruff; Sequoia Ecological Consulting, Inc.; Mt. Diablo Audubon; jwoodruff@sequoiaeco.com; Andrew J. Ford

The northern saw-whet owl (*Aegolius acadicus*) is one of the smallest raptors in North America, and breeds in primarily coniferous forests in the intermountain west, as well as the boreal forest from Alaska to Nova Scotia. In the fall, saw-whet owls migrate to lower elevations and latitudes in large numbers, allowing them to be one of the most banded avian species in North America. Thanks to the efforts of Project Owlnet, a large-scale network of researchers collaborating to understand the species' migration, migration pathways and population trends, these objectives are well understood in the eastern portion of the species range, but less understood in the west. A banding station was established in 2019 in the east Bay Area in partnership with the Mt. Diablo Audubon Society to broaden the collaboration effort in the west, and was run at least four nights a week during peak saw-whet owl migration (October-November) for five years, to determine scale and timing of the owl's movement in the area. Preliminary results suggest the Bay Area provides a critical migration path and stopover area for saw-whet owls, but additional data and regional collaboration is needed to fully understand the species' stopover use and scale of migration.

Poster Session