RESPONSE OF CALIFORNIA RED-LEGGED FROGS TO LARGE-SCALE SILT AND VEGETATION REMOVAL FROM AQUATIC BREEDING HABITAT

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Abstract: As part of mitigation for the construction of the Los Vaqueros Reservoir in the upper Kellogg Creek Watershed, the Contra Costa Water District periodically removed built-up silt loads and excess emergent vegetation from stock ponds and mitigation wetlands that were managed on the watershed. Heavy equipment was used to mechanically remove silt and emergent vegetation (Typha and Scirpus spp.) from 18 ponds over a 8 year period from 1998 to 2006. Monitoring was conducted for special-status amphibians prior to and following silt and vegetation removal. Twenty-seven percent of the ponds had California red-legged frog (Rana draytonii) egg masses 1 year prior to dredging. At the first breeding season after dredging, 75% of the same ponds had California red-legged frog (CRLF) egg masses, with 100% of those ponds showing egg masses by the second year after dredging. During a three year period following pond maintenance, the averaged number of observed CRLF egg masses per pond increased steadily. Large-scale silt and vegetation removal had a positive effect on the observability of CRLF egg masses and may also improve habitat conditions for this species.

INTER-ANNUAL VARIABILITY IN OBSERVATIONS OF BREEDING CALIFORNIA TIGER SALAMANDERS IN ARTIFICIAL PONDS

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Abstract: The biphasic California tiger salamander often colonizes and utilizes artificial water bodies for it’s aquatic breeding phase. We looked at data collected over a 9-year period during mitigation monitoring of cattle stock ponds and created wetlands in eastern Contra Costa County. Among 73 ponds where California tiger salamanders were known to breed during this time, we found that breeding occurred sporadically and unpredictably. At only a single breeding site did breeding occur every year. Among all sites, breeding was detected an average of 2.9 times per pond in a 9-year period. Years when breeding was not detected ranged from 0 years (breeding detected every year), to 6 years where no breeding was observed (n = 3 ponds). Eighteen aquatic breeding sites (25%) had gaps between observed breeding events of 3 years or more. Seventeen aquatic breeding sites (23%) had detected breeding only once in the 9-year period. We contend that the extremely high level of inter-annual variability of detected breeding may result in underestimated rates of site occupancy, may place some populations in jeopardy, and may potentially slow recovery of this threatened species.
CLIMATE CHANGE IN ARID LANDS – PRESERVING THE ECOSYSTEM SHOULD NOT INVOLVE DESTROYING IT.

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Abstract: The development of renewable energy is a critical component of efforts to reduce greenhouse gas emissions, avoid the worst consequences of global warming, and to assist California in meeting emission reductions set by AB 32 and Executive Orders S-03-05 and S-21-09. The Center for Biological Diversity strongly supports the development of renewable energy production, and the generation of electricity from solar power, in particular. However, like any project, proposed renewable energy projects should be thoughtfully planned to minimize impacts to the environment. In particular, they should avoid impacts to sensitive species and habitats, and should be sited in proximity to the areas of electricity end-use in order to reduce the need for extensive new transmission corridors and the efficiency loss associated with extended energy transmission. Only by maintaining the highest environmental standards with regard to local impacts, and effects on species and habitat, can renewable energy production be truly sustainable. Current applications for renewable energy on public lands include over 700,000 acres of primarily undisturbed habitat for a suite of rare species, and development may occur prior to any large-scale planning for effective conservation. Clearly the cumulative impacts could irrevocably alter the last, largest intact ecosystem - the California Desert Conservation Area - in the lower 48 states. The Center’s goals for conservation of this iconic landscape and the rare species that call it home will be discussed.

MANAGEMENT FOR SENSITIVE SPECIES RECOVERY IN THE IRVINE RANCH NATURAL LANDMARKS

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Abstract: The Irvine Ranch Conservancy (IRC) was established to help preserve and restore the natural resources of the historic Irvine Ranch and to ensure people connect with the land in a sustainable way. The wildlands of the historic Irvine Ranch encompass nearly 40,000 acres in Orange County, California and are protected either under the Orange County Central and Coastal Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP) or Conservation Easements. Despite this protection, wildlife management often requires intervention for sensitive species targeted at likely causes of species’ population decline. The Cactus Wren, White-tailed Kite, and western spadefoot are three examples of species for which the IRC has implemented specific actions to improve the chances of recovery. Artificial cactus structures and nest boxes were designed and installed for the Cactus Wren to address the lack of sufficient nesting habitat. For the White-tailed Kite, raptor perches were constructed to facilitate foraging in areas lacking trees or other structures. Finally, breeding pools were excavated for the western spadefoot adjacent to dirt roads in areas where this species was known to breed in road ruts. These examples suggest that occasional intervention can facilitate the continued survival and potential recovery of sensitive wildlife in an urban wildland.
EVALUATING THE PRECISION OF CEMENTUM ANNULI ANALYSIS FOR AGING MULE DEER FROM SOUTHERN CALIFORNIA

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Conservation and Management of Wildlife on Military Lands  Wednesday, 1:45 p.m., De Anza

Abstract: We evaluated the precision of age estimates produced by cementum annuli analysis of blind-duplicate incisors taken from 994 southern mule deer (Odocoileus hemionus) collected over 15 years. If incisor pairs received different age estimates for each tooth, then at least one of the estimates was incorrect. We found that the mean annual proportion of unreliably aged incisor pairs was greater for females, 0.48 (SD = 0.13), than for males, 0.22 (SD = 0.07). Most of the 308 unreliably aged tooth pairs disagreed by only one year. Based on logistic regression the best predictors for agreement of estimated ages within incisor pairs were sex, precipitation, and certainty codes assigned by Matson's Laboratory to each age estimate. We estimated an overall age error rate for cementum annuli analysis in deer, 17%, that was over three times as large as error rates from Montana and South Dakota, but less than half of error rates estimated for Mississippi and south Texas. Knowing the error rate of age estimates from a specific deer population improves the ability of wildlife managers to use techniques requiring specific age class information such as monitoring the harvest rate of older female deer in a hunted population or performing population reconstruction.

SENSITIVITY TO CLIMATE CHANGE FOR TWO REPTILES AT THE MOJAVE-SONORAN DESERT INTERFACE

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Ecology and Management of Amphibians and Reptiles  Thursday, 3:30 p.m., Victoria

Abstract: Reptiles in arid regions may be particularly sensitive to climate change as they occur where high temperatures and drought may already approach physiological limits. Here I examine climate change sensitivity for two large-bodied, vegetarian reptiles that occur across the Mojave-Sonoran Desert interface. I employed the Mahalanobis D2 statistic to model spatially explicit niches for desert tortoises, Gopherus agassizii, and chuckwallas, Sauromalus ater. Modeled niches included climate variables as well as those that define soils and terrain that constrain these species’ distributions. To assess climate-change sensitivity I altered climate variables along a gradient of increasingly severe levels of predicted climate change and then calculated shifts in the species’ modeled niche space. Each of the reptiles’ niches responded uniquely to climate change simulations, responses that correlated with differences in the elevation limits where these species are typically found as well as differences in their vegetarian diets. The maximum climate-shifted model for the desert tortoise revealed a 49% loss of suitable niche space, whereas for the chuckwalla there was just a 17% loss. For the tortoise the prognosis may be worse than indicated by a totaling of suitable hectares; their climate-shifted niche models resulted in high levels of habitat fragmentation.

EFFECTS OF SAHARA MUSTARD ON THE BIODIVERSITY OF A DESERT LANDSCAPE

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Ecology and Management of Invasive Species  Friday, 8:05 a.m., De Anza
**Abstract:** Given the abundance of non-native species invading wildland habitats, managers need to employ informed triage to focus control efforts on weeds with the greatest potential for negative impacts. Our objective here was to determine the threat Sahara mustard, *Brassica tournefortii*, represents to meeting regional goals for protecting biodiversity. Sahara mustard has spread throughout much of the Mojave and Sonoran Deserts. It has occurred in southern California’s Coachella Valley for 80 years. In years when the mustard occurs at high densities it has clear negative impacts on the native flora. We identified reductions in native plant reproduction, shifting composition increasingly toward Sahara mustard while decreasing the fraction of native species. We also examined the impact of Sahara mustard on wildlife species, including the threatened Coachella Valley fringe-toed lizard, *Uma inornata*. The mustard invasion appears to result in complex responses to the lizards’ prey and habitat quality. Without control measures the long-term impacts to desert biodiversity will be an increasing decline in native annual plants, arthropod species richness, and dune stabilization with broad regional trophic impacts and reductions in potential habitat for a host of dune narrow-endemic species.

**RIVERSIDE COUNTY’S RENEWABLE ENERGY OUTLOOK**

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*Alternative Energy vs. Arid Land Resources*    **Thursday, 2:25 p.m., De Anza**

**Abstract:** Riverside County supports renewable energy and anticipates positive local environmental and economic effects as a result of renewable energy projects. While Riverside County appreciates the benefits of renewable energy projects, there are concerns regarding projects that are located within Riverside County but whose approval is outside the jurisdiction of Riverside County. In responding to the State of California Executive Order S-14-08 requiring 33% of the total electricity sales by 2020 are from renewable energy sources, Riverside County is attempting to provide reasonable and thoughtful direction regarding the design and placement of renewable energy facilities. The goal is to encourage renewable energy development while addressing conservation, health and safety issues, recreational needs, development potential, and economic stability in Riverside County.

**LONG-TERM RESPONSES OF A DESERT TORTOISE POPULATION TO DROUGHT, PREDATION, AND DISTURBANCE**

**KRISTIN BERRY,** U.S. Geological Survey, Western Ecological Research Center, 21803 Cactus Ave., Suite F, Riverside, CA 92518, (951) 697-5361, kristin_berry@usgs.gov

*Conservation and Management of Wildlife on Military Lands*    **Wednesday, 3:10 p.m., De Anza**

**Abstract:** The desert tortoise (*Gopherus agassizii*) was federally-listed as a threatened species in 1990. Since the listing, no population has achieved recovery. In 2010, we re-surveyed a low density population of tortoises in the northwestern Mojave Desert (California) after a hiatus of 37–39 years to determine population status. The first survey in 1971–1973 was in a remote part of a military installation and was the site of an early translocation experiment. Of 47 residents registered: 25.5% were juvenile or immature sizes and 74.5% were adults. The male-female sex ratio of adult tortoises (10:25) differed significantly from the expected 1:1 ratio. The study occurred during drought, and predation by wild canids resulted in deaths of >30% of adults. In 2010, the study area again became available for a re-survey. During the new survey, 27 tortoises were located of which 51.8% were juvenile and immature sizes and 48.1% were adults. Fewer adults (37%) were observed than in the earlier study and most adults were female. Two tortoises from the original study were recaptured, providing new longevity records for
wild desert tortoises. Factors affecting recovery will be discussed and compared with similar data from other Mojave Desert studies.

SAHARA MUSTARD IN DESERT TORTOISE CRITICAL HABITAT: INVASION, ESTABLISHMENT AND POTENTIAL IMPACTS TO TORTOISES

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Ecology and Management of Invasive Species Friday, 8:25 a.m., De Anza

Abstract: We studied invasion and establishment of the alien, Sahara mustard (Brassica tournefortii) at two sites in desert tortoise (Gopherus agassizii) critical habitat in California. At one site in the western Sonoran Desert, we developed a predictive model for invasibility. During initial invasion and establishment, significant predictor variables were proximity to highway and the axial valley wash, as well as numbers of small stream channels. At the second site in the southern Mojave Desert, contributors to invasion of B. tournefortii included the highway, a frequently bladed county road and access roads associated with transmission lines. Overall, we found that B. tournefortii thrives in disturbed areas along road edges, in poorly developed soils, and on young geological surfaces. It is highly successful in naturally disturbed areas, such as axial valley washes and stream channels that experience frequent stream flow events. B. tournefortii is altering distribution and biomass of native annual vegetation at sites where it has become established. Potential negative impacts to tortoises include obstruction of movements, reduction in access to burrows, reduction in preferred native forage plants, diseases associated with consumption of toxic substances, and decline in health.

AMPHIBIAN AND REPTILE SPECIES OF SPECIAL CONCERN IN CALIFORNIA

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Ecology and Management of Amphibians and Reptiles Thursday, 1:05 p.m., Victoria

Abstract: “Species of special concern” (SSC) is an administrative designation whose intent is to 1) focus attention on animals at conservation risk by the Department of Fish and Game (Department), other State, local and Federal governmental entities, regulators, land managers, planners, consulting biologists, and others, 2) stimulate research on poorly known species and 3) achieve conservation and recovery of these animals before they meet California Endangered Species Act criteria for listing as threatened or endangered. The amphibian and reptile document, first completed for the Department by Mark Jennings and Marc Hayes in 1994, is currently under revision via a Department contract with the University of California at Davis. The draft document is scheduled for review by a Technical Advisory Committee, herpetologists, agency staff and others during January 2011, with publication anticipated in late 2011 or early 2012. The document includes accounts for 45 taxa containing brief sections on identification, taxonomic relationships, life history, habitat requirements, distribution, abundance trends, threats, status, management recommendations, implications of climate change, as well as monitoring, management and survey needs. Also included are range and distribution maps for all taxa. This publication will join the 2008 bird SSC update, along with concurrent revisions of the fish and mammal SSC publications.
SAN CLEMENTE ISLAND LISTED AND SENSITIVE SPECIES MANAGEMENT; PROGRESS TOWARD RECOVERY OF CONSERVATION-RELIANT SPECIES

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Conservation and Management of Wildlife on Military Lands Wednesday, 1:25 p.m., De Anza

Abstract: San Clemente Island has one of the highest numbers of ESA listed species on a continental U.S. Military Installation. It also supports the only U.S. live fire ship-to-shore/air-to-ground range, hosts one of the highest concentrations of Naval Special Warfare training, and is part of the most heavily used Navy range complex in the eastern Pacific. Within this operational context, the Navy has made remarkable progress toward recovery of the San Clemente loggerhead shrike \((Lanius ludovicianus mearnsi)\), which has rebounded from only 14 wild individuals in 1998 to 62 wild pairs and 158 independent fledglings in 2010. The SCI island night lizard \((Xantusia riversiana)\) population is recommended for delisting (USFWS 5-yr review). The San Clemente island fox \((Urocyon littoralis clementae)\) population was not ESA listed when other subspecies were and has experienced a population increased over the past 4 years. While concern exists over the San Clemente sage sparrow \((Amphispiza belli clementae)\), recent research has identified actionable management objectives that the Navy is funding for 2011. With the recovery of listed species, Navy mission encumbrances have eased and Navy Natural Resource goals are being met; however, species management in perpetuity is almost certainly inevitable due to non-native predators and anthropomorphic influences.

RECOVERY EFFORTS FOR THE ENDANGERED SAN CLEMENTE LOGGERHEAD SHRIKE

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Southern California Island Ecology and Management Friday, 9:05 a.m., Victoria

Abstract: The San Clemente loggerhead shrike \((Lanius ludovicianus mearnsi)\) is considered one of the rarest birds in North America. The population reached a low of 14 individuals in the wild in 1998. The U.S. Navy has undertaken an aggressive program to recover this subspecies, which includes captive breeding and release, supplemental feeding of released birds, intensive monitoring of the wild population, marking of the population for demographic analyses, and controlling non-native predators. Release of captive-produced offspring has been successful and has resulted in a large proportion of the population being derived from a captive-produced parent. Efforts to control non-native rats and feral cats and supplemental feeding have increased nest success. The number of nesting pairs has increased from 7 in 1998 to 62 pairs in 2010. In 2010, there were 195 dependent fledglings and 158 independent fledglings produced from known nests; combined with known adults and 2010 released birds, the 2010 population estimate is 323. Population distribution has expanded from a few canyons at the south end of the island to almost two-thirds of the island. Population viability analysis and demographic modeling is currently being employed to help define population recovery goals and guide future management.
OBSERVATIONS OF ARROYO TOAD AND WESTERN SPADEFOOT BREEDING HABITAT IN POTRERO VALLEY, SAN DIEGO COUNTY

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Ecology and Management of Amphibians and Reptiles Thursday, 2:05 p.m., Victoria

Abstract: During spring of 2009 ICF was retained by San Diego Gas & Electric (SDG&E) to map the breeding habitat of western spadefoot (Spea hammondii) and the federally endangered arroyo toad (Bufo californicus) on a 750-acre mitigation property for the Sunrise Powerlink Project (120-mile transmission line that will carry renewable energy from the Imperial Valley to San Diego). Both western spadefoot and arroyo toad were present and widespread on the property. The breeding habitat of these species was nearly completely segregated and appears to be related to surface hydrology affected by channel morphology and the influence of existing dams. Western spadefoot preferred the main open sandy channel while the arroyo toad breeding was limited to the areas below dams and adjacent ponds with extended periods of surface hydrology. The results of the surveys suggested that arroyo toads benefitted from human-made dams because of the prolonged presence of surface water in and below the ponds. Specifically this study raises several questions including; can arroyo toad habitat be improved by extending the period of surface hydrology through installation of human-made dams? Do western spadefoot toads and arroyo toad naturally segregate their breeding activities in freshwater streams? Is the extension of breeding habitat for arroyo toad sustainable?

ARGENTINE ANT SPREAD AND MANAGEMENT ON SANTA CRUZ ISLAND

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Ecology and Management of Invasive Species Friday, 8:45 a.m., De Anza

Abstract: Argentine ants (Linepithema humile) are a highly invasive, non-native species that out-compete native ants and disrupt mutually beneficial interactions between plants and native ants. First discovered on Santa Cruz Island in 1996 at two locations, surveys conducted in 1997 estimated the infestations at 1.5 and 0.05 km² respectively. Thereafter, Argentine ants established at two additional locations in the Island’s central watershed. In Fall 2010, managers delimited the four infestations, now estimated to cover 2.28 km². Within the original infestations, now covering 2.1 km² and 0.08 km² respectively, Argentine ants had extended linearly between 44 m and 5 m per year, depending on habitat. Argentine ant density may be higher in oak woodlands, riparian areas, and lower in fennel/annual grass and coastal sage scrub. If food resources are limited in fennel/annual grass and coastal sage scrub and these habitat types comprise over 70% of the infested areas, then total Argentine ant spread may be slowed by resource limitations. Spread may also be constrained by water resources. Managers are working with researchers and ant control experts to identify baiting regimes effective in eliminating colonies. They are increasing island biosecurity to ensure that Argentine ants do not re-invade from the southern California mainland.

THE ROLE OF THE U.S. FISH AND WILDLIFE SERVICE IN THE DEVELOPMENT OF RENEWABLE ENERGY

RAYMOND BRANSFIELD, U.S. Fish and Wildlife Service, 2493 Portola Road, Suite B, Ventura, CA 93003, (805) 644-1766 x317, ray_bransfield@fws.gov
**Alternative Energy vs. Arid Land Resources**  
*Thursday, 1:45 p.m., De Anza*

**Abstract:** A diverse array of plants and animals, many of which are superbly adapted for life in a harsh, arid environment, inhabit the California desert. The desert also supports numerous human activities, including military training, various forms of recreation, residential and commercial development, and transportation uses, that have a variety of effects on the resident plants and animals. The recent push for the development of renewable energy, however, has presented a challenge to the desert’s plants and animals unlike any other in recent times. This presentation will provide an overview of the role of the U.S. Fish and Wildlife Service in the renewable energy development with focus on the desert tortoise, California condor, and golden eagle.

**MONITORING ENDANGERED SPECIES WITHIN AND ACROSS MILITARY LANDS: APPLICATION OF OCCUPANCY MONITORING FOR THE ARROYO TOAD AND STEPHENS KANGAROO RAT ON MCB, CAMP PENDLETON AND U.S. NAVY REMOTE TRAINING SITE WARNER SPRINGS**

**CHERYL BREHME,** USGS Western Ecological Research Center, 4165 Spruance Road, San Diego, CA 92101, (619) 225-6427, cbrehme@usgs.gov; Co-authors: Cheryl S Brehme; Denise R. Clark; Robert N. Fisher

**Conservation and Management of Wildlife on Military Lands**  
*Wednesday, 3:50 p.m., De Anza*

**Abstract:** It is important that monitoring programs for military lands provide valid scientific information to help inform both military training and management of endangered species. Spatial programs can be ideal for generating this information due to their power to model landscape and environmental covariates in relation to the presence of species across the landscape. They also allow for inclusion of military training by modeling covariates to directly test for training impacts. Finally, replication of these programs allow for greater power to test these effects and wider inference over military lands. We describe and present highlights of two long-term adaptive monitoring programs implemented on Marine Corps Base Camp Pendleton that have been recently extended to the Naval Base Coronado, Remote Training Site at Warner Springs: Programs for the arroyo toad (*Anaxyrus californicus*) and Stephens’ kangaroo rat (*Dipodomys stephensi*).

**LONG TERM MONITORING OF ARROYO TOADS: MULTI-YEAR TREND ANALYSIS AND PROGRAM EVALUATION**

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**Ecology and Management of Amphibians and Reptiles**  
*Thursday, 1:45 p.m., Victoria*

**Abstract:** Since 2003, we have conducted an occupancy monitoring program for the endangered arroyo toad (*Anaxyrus californicus*) on Marine Corps Base Camp Pendleton (MCBCP). To address the problems associated with large variations in adult toad activity, we track the presence of arroyo toad breeding populations by documenting the presence of eggs and larvae. Multi-year occupancy models show that arroyo toad population dynamics differ according to hydrology. Population dynamics of ephemeral systems are highly variable and driven by stochastic processes (i.e. amount of rainfall), while perennial systems are more stable and likely driven by deterministic processes (i.e. predation, competition, habitat alteration). In the perennial systems, detection of toad larvae is consistently negatively associated with the presence of non-native aquatic species. MCBCP is actively working to eradicate non-natives in this system. In a recent program review, we also used simulated data to
evaluate the effectiveness of current and alternate sampling scenarios to detect changes in the
distribution of breeding arroyo toads. Using model comparison techniques, we assessed the power to
pick the “true” model vs. competing models of decline or no decline. All designs had relatively high
power to detect a 20% decline in occupancy over a 6-year period and were able to distinguish between
differing patterns of decline simulated for ephemeral and perennial watersheds.

ON THE ROAD TO A MONITORING PROGRAM: PILOT STUDIES AND EVALUATION OF
LIVE TRAPS, TRACKING TUBES, AND CANINES TO DETECT THE ENDANGERED PACIFIC
POCKET MOUSE

CHERYL BREHME, USGS Western Ecological Research Center, 4165 Spruance Road, San Diego,
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Matsuda; Rebecca N. Booth; Robert N. Fisher
Ecology and Management of Small Mammals II Friday, 8:45 a.m., Arlington

Abstract: The USGS, in collaboration with a scientific panel, is developing a comprehensive long term
monitoring plan for the Pacific pocket mouse (PPM) on Marine Corps Base, Camp Pendleton (MCBCP).
The only current sampling methodology is live-trapping. Our objective was to find an alternate,
accurate, sampling method that would increase probabilities of detection and cost effectiveness, as well
as decrease negative impacts to the species and its habitat. First we compared Sherman live-traps (small,
medium standard, medium with perforations) to tracking tubes of different diameters (1.5” vs. 1.0”). In
addition, we recorded behavioral responses of PPM using infrared video cameras. We then evaluated
canine scent detection and developed a complementary scat DNA assay for PPM. Results showed all
methods were successful in detecting PPM. Detection rates were highest for the canines, small and
medium Sherman live-traps, and 1.5” tracking tube. For each sampling method, we discuss advantages
and disadvantages, relative cost analysis, and recommendations for use based upon study objectives.

THE “ONE WORLD, ONE HEALTH” PARADIGM; A ROLE FOR WILDLIFE MANAGERS

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Diseases and Parasitism Thursday, 1:05 p.m., Magnolia

Abstract: The view that wildlife diseases are beyond the concern of wildlife managers is antiquated
and refuted by the emergence or reemergence of diseases that devastate wildlife populations, risk
livestock health and trade, or threaten human health. Diseases including white-nose syndrome,
chytridiomycosis, West Nile encephalitis, avian influenza, chronic wasting disease and brucellosis, have
garnered significant attention and resources from wildlife, domestic animal and human health agencies
at both state and federal levels. Recognition of the relevance of emerging diseases has supported the
conceptual acceptance of a “one world, one health” paradigm in which human, domestic animal and
wildlife health all depend upon the health of functionally intact ecosystems. While this concept has
rapidly gained support in the conservation community, its importance has yet to be fully accepted by the
human and domestic animal health communities. Wildlife biologists and managers are in unique
positions to educate the public and promote the interdependence of ecosystem and animal (including
human) health. Such connections help people with other priorities appreciate the importance of
maintaining robust wildlife populations and protecting habitats. Promotion of the “one world, one
health” paradigm as another reason for conservation requires that wildlife managers embrace the
importance of wildlife diseases.
MOONLIGHT MADNESS: BAT EXIT BEHAVIOR AND PREDATOR AVOIDANCE?

PATRICIA BROWN, Brown-Berry Biological Consulting, 134 Eagle Vista, Bishop, CA 93514, (760) 920 3975, Patbobbat@aol.com

Ecology and Management of Small Mammals I Thursday, 2:05 p.m., Arlington

Abstract: California leaf-nosed bats (*Macrotus californicus*) are hesitant to exit roosts in the evening under moonlit conditions, especially the week before the full moon. Under other similar environmental parameters, the number of bats exiting in the 90 minutes following sunset can vary as much as twenty fold within the week encompassing pre and post full moon, and occurs at all seasons. Preliminary observations suggest that other bat species, such as maternity colonies of the fringed myotis (*Myotis thysanodes*), may also experience lunar phobia when emerging from a roost. This can have implications for the timing of surveys to assess bat occupancy of mines slated for AML (Abandoned Mine Land) closure, as well as monitoring the effectiveness of different bat compatible closures. A unique account of owl avoidance by a bat will be presented.

HUMAN RECREATION AND WILDLIFE ACTIVITY PATTERNS IN THE IRVINE RANCH NATURAL LANDMARKS

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Southern California Wildlife Management Issues Wednesday, 1:25 p.m., Magnolia

Abstract: Urban wildlands are frequently maintained with the potentially conflicting goals of wildlife protection and human recreation. While recreation opportunities in wildlands are important to our quality of life and our perceived value of protected lands, they can disrupt wildlife movement, stress animals, and reduce available habitat. Here we compared bobcat, deer, coyote, gray fox, and mountain lion activity across high and low human activity days and areas using data acquired from 28 fixed wildlife cameras over two years. Mesopredators generally were less likely to occur on days and in areas of high human use, whereas mule deer were not affected. We found no evidence of temporal displacement of wildlife in high human use areas. Our results are consistent with past studies and emphasize that increased recreation could have cryptic negative effects on carnivore communities. Wildlife activity patterns can be used by land managers to adjust human access during periods of or in areas with high wildlife activity in order to ameliorate human impacts. Further analysis of the possible thresholds at which effects become apparent are underway.

BASELINE ECOLOGICAL STUDIES IN THE IMPERIAL VALLEY, CALIFORNIA

MELISSA BUSBY, AMEC Earth & Environmental, 9210 Sky Park Court, Suite 200, San Diego, CA 92123, (858) 300-4330, melissa.busby@amec.com

Southern California Wildlife Management Issues Wednesday, 3:30 p.m., Magnolia

Abstract: Baseline ecological surveys, which targeted 96 sensitive species, were conducted over 3 years for the Imperial Irrigation District. A cutting edge study design was used to effectively survey the approximately 630,000-acre (approximately 985 square-mile) Study Area while addressing the diversity of species, variety of habitats, and budget constraints. A rotating panel design was used to sample a measurable portion of the Study Area by using 100-acre survey panels, which were evaluated for multiple biotic and abiotic environmental parameters. These panels were distributed throughout the Study Area and designated as “sentinel” or “rotating” panels. Sentinel panels were located by hand to
capture rare habitats and/or to improve the probability of detecting rare species and were sampled each year of the study. Rotating panels were located randomly, stratified by habitat type, and a subset of these panels was sampled each year. Using this approach, data pertaining to presence/absence, distribution, suitable habitat, and specific habitat parameters were collected during the same sampling effort. The results of this study will be used to inform a long-term monitoring program to assess the success of the avoidance, minimization, and mitigation measures included in the HCP and to determine when adaptive management measures should be implemented.

RESEARCH AND MONITORING OF BATS ALONG THE LOWER COLORADO RIVER WITH EMPHASIS ON THEIR RESPONSE TO HABITAT RESTORATION

ALLEN CALVERT, Bureau of Reclamation, PO Box 61479, Boulder City, NV 89005, (702) 293-8311, acalvert@usbr.gov; Co-authors: Susan C. Broderick; Beatriz Vizcarra
Ecology and Management of Small Mammals I Thursday, 1:05 p.m., Arlington

Abstract: The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a 50-year multi-partner effort that will provide habitat for 26 covered and 5 evaluation species. There are four species of bats listed within the habitat conservation plan of the MSCP. They include; western red bat (Lasiurus blossevillii), western yellow bat (Lasiurus xanthinus), California leaf-nosed bat (Macrotus californicus), and Townsend’s big-eared bat (Corynorhinus townsendii). Monitoring and research of covered species occurs at two scales; system-wide and post-development of habitat creation areas. Research and monitoring techniques include roost outflight counts, acoustic surveys, and capture surveys. System-wide acoustic monitoring includes the use of four long-term Anabat stations to collect data nightly and 144 short-term Anabat stations used for an occupancy modeling study. Post-development research and monitoring consists of mist-netting and acoustic surveys within all habitat creation areas. Within the last 4 years, trees in these large scale habitat creation areas have grown tremendously and bats have responded positively to the new habitat. We expect these trends to continue as these areas mature and additional habitat is created.

ECOHYDROLOGY STUDY OF VERNAL POOLS AT THREE MILITARY BASES IN CALIFORNIA

MAGGIE CHRISTMAN, Institute for Ecohydrology Research and UC Davis, 1111 Kennedy Place, Suite 4, Davis, CA 95616, (530) 756-4257, nmccarten@ecohydrology-research; Co-authors: Niall McCartney; Kirsten Christopherson; Jamie Kneitel; Ruben Rosas
Conservation and Management of Wildlife on Military Lands Wednesday, 2:25 p.m., De Anza

Abstract: Research is being conducted to identify hydrological process involving surface and groundwater inputs into vernal pools and the response of macroinvertebrates and plants at two current US Air Force based (Beale AFB and Travis AFB), the Marine Corps Base at Camp Pendleton and two former Air Force bases (Mather Field and McClellan). A water balance approach of vernal pool catchment hydrology involving inputs of rainfall; within catchment transport by surface and groundwater; and outputs from evapotranspiration and discharge has identified important relationships that determine the depth and hydroperiod of water within vernal pools. There are two primary vernal pool systems, one in which the vernal pool water is represented by the groundwater table and the second which only has surface water. In both cases, the catchment area, topography, and subsurface water restricting soil layers determine the potential for depth and hydroperiod of vernal pool water. From 25 percent to nearly 60 percent of the water in vernal pools is derived from the surrounding catchment. Depth to a water restricting layer does affect the depth and hydroperiod of surface water.
Macroinvertebrates and plant species are shown to be directly correlated with a specific hydroperiod which occur or an elevation gradient within a vernal pool depression.

**INITIAL RECOVERY OF ENDANGERED ISLAND FOXES: FROM MANAGEMENT TO MONITORING**

**TIMOTHY COONAN**, National Park Service, 1901 Spinnaker Drive, Ventura, CA 93001, (805) 658-5776, tim_coonan@nps.gov; Co-authors: Melissa A. Booker; Christina L. Boser; Julie King; Grace Smith; David K. Garcelon

*Southern California Island Ecology and Management*  
*Friday, 9:25 a.m., Victoria*

**Abstract:** Island foxes (*Urocyon littoralis*) are unique to California’s Channel Islands, where they exist as six separate subspecies, one on each of the six largest islands. Four subspecies underwent catastrophic declines in the mid to late 1990s, caused by golden eagle (*Aquila chrysaetos*) predation on the northern Channel Islands and canine distemper virus (CDV) on Santa Catalina Island. Those subspecies were Federally listed as Endangered in 2004, but are recovering due to swift and sustained implementation of recovery actions by a consortium of land owners, agencies and non-profits. The bulk of those recovery actions, which included captive breeding, reintroduction and translocation of island foxes, capture and relocation of golden eagles, and vaccination of foxes against CDV, occurred from 1999-2008. Intensive monitoring of island foxes continues, both to track recovery and to mitigate future threats. Population recovery is tracked via annual estimates of density from spatially-explicit capture-recapture methods, and cause-specific mortality from radiotelemetry. Current data suggest 3 of the 4 endangered subspecies have increased their population by ~10X since their decline, and are approaching biological recovery. Because the threat of future disease outbreaks or predation remains tangible, the next step in island fox conservation is development of epidemic and predation response plans.

**FORAGING PATTERNS OF ISLAND FOXES: IMPLICATIONS FOR CONSERVATION**

**BRIAN CYPHER**, CSU-Stanislaus, Endangered Species Recovery Program, P.O. Box 9622, Bakersfield, CA 93389, (661) 835-7810, bcypher@esrp.csustan.edu; Co-authors: Alexandra Madrid; Christine Van Horn Job; Erica Kelly; Stephen Harrison; Tory Westall

*Ecology and Management of Carnivores*  
*Wednesday, 3:50 p.m., Victoria*

**Abstract:** Scats (n = 2643) from endangered island foxes (*Urocyon littoralis*) were analyzed to (1) compare use of foods among islands and seasons, (2) identify preferred items, (3) determine use of non-native items, and (4) develop recommendations for habitat management/restoration that might increase food availability for foxes. Scats were collected from all 6 islands with foxes (San Clemente, Santa Catalina, San Nicolas, San Miguel, Santa Rosa, and Santa Cruz). Important items (>10% frequency of occurrence in scats) included deer mice, lizards, beetles, beetle larvae, Jerusalem crickets, sand crickets, grasshoppers, earwigs, terrestrial snails, and fruits of prickly pear cactus, toyon, manzanita, sea fig, and Australian saltbush. Based on results from Santa Rosa where food item diversity is relatively high and fox density is relatively low (therefore providing the best opportunity for foxes to exhibit item preferences), deer mice, beetles, and Jerusalem crickets may be preferred food items for island foxes. Non-native items commonly used by foxes included sea fig fruits, terrestrial snails, Myoporum fruits, and ungulate carcasses. Habitat management and/or restoration that increases both the diversity of food items and the abundance of preferred items could help to moderate fluctuations in fox numbers associated with environmental variation (e.g., extended drought), thereby contributing to population security.
USE OF ALTERNATIVE FIELD TECHNIQUES TO SURVEY FOR MOHAVE GROUND SQUIRRELS ON FEDERAL LANDS

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Abstract: Until recently, Mohave ground squirrel (MGS) surveys have used conducted using live-trapping methods that are effective, but cost prohibitive. Cost effective techniques are needed to locate MGS. Non-invasive camera traps offer a potential new way to survey MGS over wider areas. We investigated the effectiveness of camera traps for detecting MGS compared with live-trapping surveys. We conducted surveys within the Western Expansion Area on Fort Irwin, CA from 2009-2010. We live-trapped for 5 days followed by 5 days of camera trapping at the same grids, and compared the number of individuals and detection rates. In April 2009, cameras documented 271 detections from 4 MGS over 64 trap days compared with 1 MGS detection over 2,000 trap days using live-traps. In May 2009, cameras recorded 162 detections from 1 MGS over 80 trap days, while live-traps recorded 6 detections from 6 MGS over 2000 trap days. We increased the number of camera stations from 3-4 stations per grid in 2009 to 14 stations per grid in 2010. In April 2010, cameras provided 399 detections from 20 MGS over 280 trap days compared with 24 detections from 14 MGS over 2000 trap days using live-traps. Examples of preliminary data will be discussed.

SURVIVAL OF JUVENILE SAN CLEMENTE SAGE SPARROWS ON SAN CLEMENTE ISLAND, CALIFORNIA

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Abstract: For most bird species, little is known about juveniles after they disperse from their natal territories. However, understanding this life-stage is critical to the management and recovery of threatened and endangered birds. The San Clemente sage sparrow (Amphispiza belli clementae) is a federally threatened subspecies endemic to San Clemente Island, California. Mark-resight survival analyses indicated exceptionally low juvenile survival rates and a recent population viability analysis suggested poor juvenile survival may pose the greatest threat to persistence. To better quantify juvenile survival and to identify sources of mortality, we attached 140 transmitters to juvenile sage sparrows. We documented 20 mortalities in 2,445 telemetry days. Predators were the primary source of mortality and included black rats (Rattus rattus), American kestrels (Falco sparverius), and the endangered San Clemente loggerhead shrike (Lanius ludovicianus mearnsi). This study yielded known-fate survival estimates that were low and seemingly supportive of survival estimates from 2003–2009 mark-resight data. Additionally, we found that juveniles were utilizing habitat types which had not been previously identified as being important for sage sparrows. These findings will allow us to better understand San Clemente sage sparrow population dynamics and will assist in managing for their recovery.

CONSERVATION OF THE SOUTH COAST GARTER SNAKE, A DFG SPECIES OF SPECIAL CONCERN: ARE CURRENT HCP’S ADEQUATE?

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Abstract: The vernacular name South Coast Garter Snake originated with Jennings and Hayes (1994) for a southern California population of *Thamnophis sirtalis* they determined to warrant conservation status. Fifteen years after the Jennings and Hayes account we provide the results of the first in-depth examination of the ecology and ecological distribution of this population. Analysis of our dot locality map (containing 133 georeferenced occurrence records) resulted in the identification of three fundamental factors that best explain the archipelago distribution pattern of extant and historical records of the South Coast Garter Snake: perennial surface water, low gradient topography, and dense multi-storied riparian vegetation. Based on ecological requirements we provide the framework for a conservation strategy for this regionally rare snake that persists in cool/mesic islands of perennial wetlands in a landscape of hot/dry upland arid-adapted vegetation. And finally, we discuss the conservation of the South Coast Garter Snake in the context of existing HCP’s in the South Coast Ecoregion.

**REINTRODUCTION OF FISHERS INTO THE NORTHERN SIERRA NEVADAS OF CALIFORNIA**

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Abstract: The fisher (*Martes pennanti*) population in Northwestern California has expanded to the east but remained absent from the former range in the Northern Sierra Nevada. A cooperative effort by California Fish and Game, US Fish and Wildlife Service, Sierra Pacific Industries and North Carolina State University proposed to reintroduce 40 fishers to the Northern Sierras over 3 years. During December-January 2009-10 we captured 20 fishers in Northwestern California and translocated 15 (9 females and 6 males). Each fisher received an extensive examination to assess physical condition, sex, age, and exposure to contagious diseases and each was vaccinated for distemper virus and parvovirus. We released fishers on private lands owned by Sierra Pacific Industries. We monitored fishers daily using VHF and Satellite transmitters. Fisher movements have varied widely and we document dispersal distances over 50 km for males. Five females denned and 4 kits (1 each for 4 females) were known to have been born. We have documented 3 female and no male mortalities. An additional 15 fishers were released in autumn of 2010. This reintroduction provides a framework to test hypotheses regarding habitat use, patterns of reproduction and survival, and to develop an *a priori*, mechanistic habitat model for fishers.

**NORTHERN SPOTTED OWL DETECTION AND TERRITORY OCCUPANCY IN THE EASTERN KLAMATH MOUNTAINS AND SOUTHERN CASCADES OF INTERIOR NORTHERN CALIFORNIA**

STUART FARBER, W.M. Beaty & Associates, 845 Butte Street, Redding, 96001, (530) 243-2783, stuf@wmbeaty.com; Co-authors: Andrew J. Kroll

Abstract: Private forestland owners in the Pacific Northwest conduct presence/absence surveys for Northern spotted owls prior to timber harvest activities. However, the presence of barred owls is negatively associated with spotted owl detection probabilities and can lend uncertainty to conservation and management activities. We evaluated Northern spotted owl detection and occupancy probabilities
for 63 territories on a study area in interior Northern California where barred owls occur infrequently. Sixteen sites were in the Southern Cascades (25%) and 47 sites (75%) were in the Klamath Mountains province. During 1282 individual surveys a total of 480 spotted owl detections (37.4%) and 13 barred owl (1.0%) detections occurred. Average per visit detection probability (95% CL) was 0.93 (0.89, 0.96) for day surveys and 0.47 (0.42, 0.53) for night surveys. The average per visit detection rate (95% CL) from the null model was 0.67 (0.63, 0.71). The most supported simple occupancy model included a negative temporal trend for colonization and a constant trend for extinction. Our results provide critical information about current survey protocol effectiveness and Northern spotted owl occupancy dynamics in the absence of barred owls. 

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CAN RENEWABLE ENERGY LEAD TO TORTOISE RECOVERY

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Abstract: California Bureau of Land Management land use plans developed in the late 1990's and early 2000's identified renewable energy development as likely. However, the industrial renewable energy projects BLM reviewed in 2010 and is reviewing in 2011 are of a size and scale beyond anything which had been contemplated or envisioned. With the potential loss of thousands of acres to a fenced, single-use, BLM must be strategic in our approach to mitigation. How to get the maximum benefit for the tortoise and other wildlife species is a deeply complex and contentious issue. Specific mitigations for 2010 projects and proposed mitigations for the next round of projects will be presented. The challenges of permitting and implementing of 2010 projects will be evaluated. Comparison of what BLM is doing now, in the near future, and where BLM wants to go will be discussed. While many argue that renewable energy will be the demise of the tortoise, we ask, "Could industrial renewable energy provide an unprecedented opportunity to implement suites of targeted recovery actions and actually move the tortoise towards recovery?" In coordination with USFWS, CDFG, and CEC, California BLM is striving to chart that path.

Biodiversity and Disease

JANET FOLEY, U.C. Davis, Department of Medicine and Epidemiology, Davis, CA 95616, jefoley@ucdavis.edu

Abstract: Biological diversity has been proposed as an inherently beneficial characteristic of ecosystems, tending to reduce force of infection and risk of disease in humans, domestic animals, and wildlife. Tick-borne disease ecologies by definition encompass at least three trophic levels (pathogen, tick, and host), but, as evidenced in North America, can also include considerably more participant species. An important theory to account for low tick-borne disease prevalence is that there are “diluting” host species such as lizards in the west and small carnivores and low reservoir-competence small mammals in the east. However, we also show that biological diversity can serve to prolong enzootic infection in nature. California’s ecology, with heterogeneous plant and animal communities and high tick, small mammal, and pathogen diversity, can serve as a natural laboratory for understanding how diversity and biocomplexity influence disease in the west. Such an understanding will help guide surveillance and management of important vector-borne disease threats such as plague and tularemia to
wildlife and Lyme disease and anaplasmosis to humans. Recognition of the key features that determine dilution vs. prolonged infection could help clarify possible beneficial influences of biodiversity for disease reduction in non-vector disease systems as well.

EVALUATING REPRODUCTIVE TRENDS IN CALIFORNIA LEAST TERN NESTING IN SAN DIEGO COUNTY, CALIFORNIA; A STABLE ISOTOPE APPLICATION

JOELLE FOURNIER, San Diego State University & San Diego Zoo's ICR, Biology Department, 5500 Campanile Drive, San Diego, CA 92182-4164, (619) 972-3096, fournier.joelle@gmail.com; Co-author: Rebecca Lewison; Ronald R. Swaisgood

Abstract: California Least Terns (Sterna antillarium brownii) were listed as endangered in 1970 due to the loss of nesting habitat, increased predation, and human disturbance. Site specific protection has resulted in higher reproductive success at individual colonies yet key population metrics such as hatching and fledging success remain low. Using data compiled from satellite imagery of ocean surface chlorophyll content and stable isotope signatures from egg membranes, we assess the links between reproductive parameters and prey abundance during the breeding season between 2003 and 2008. Although not strongly related statistically, temporal patterns in concentration of chlorophyll were mirrored in nitrogen stable isotope measurements. Carbon values also varied between years, measurements maintained set differences between some nesting colonies as well. There were no clear relationships between key reproductive parameters used in this study and stable isotope measurements, but our results indicate that more years of data might reveal stronger patterns. Although more study is needed to clearly define the relationships quantitatively, this study shows California least tern population trends on the breeding grounds are influenced by environmental variation in ocean primary productivity.

MORTALITY IN CALIFORNIA FISHERS: DIRECT AND INDIRECT PATHOGENIC INFLUENCES

MOURAD GABRIEL, University of California Davis, Davis, CA 95616, (707) 826-1313, mwgabriel@ucdavis.edu; Co-authors: Leslie Woods; Stefan Kellar; Patty Gaffney; Megan Jones; Rick Sweitzer; Craig Thompson; Reginald Barrett; Kathryn Purcell; Deana Clifford; Mark Higley; Karen Terio; Sean Matthews; Edward Dubovi; Greta Wengert; Linda Munson

Abstract: The insular fisher (Martes pennanti) populations within the states of Washington, Oregon and California are being considered for listing under the Endangered Species Act. To date, the causes of mortality in fishers have not been documented within the state of California. In order to implement conservation efforts to reduce fisher mortality, the causes of mortalities need to be described. We identified proximate causes of mortality in fishers within three long-term California fisher research projects; one in northwestern California and two in the southern Sierra Nevada. Over 65 fisher necropsies were performed by wildlife pathologists at the University of California Davis between the years of 2007-2010. Causes of mortality included infections with protozoan, bacterial and viral pathogens, predation from other carnivores, vehicular trauma and anticoagulant rodenticide poisoning. Investigation of several mortalities that occurred in a small area within a short time period during 2009 resulted in the detection of a distemper epidemic in the southern Sierra Nevada fisher population. Accordingly, we recommend performing full necropsies in conjunction with serological and molecular diagnostics to aid in the identification of cause-specific mortalities and indicate whether infectious and noninfectious agents may play roles in fisher susceptibility to other causes of mortality for fishers.
Abstract: The wolverine has historically been an element of the carnivore community of California’s Sierra Nevada range. In the early 20th century their population was reported in decline, due to trapping and carnivore persecution. Despite extensive monitoring, the only verifiable records of wolverine in the Sierra Nevada since 1922 are recent photographs of a single immigrant male. Surveys suggest that if the historic Sierra Nevada wolverine population persists, its numbers are so low that it faces a high risk of extinction. Consequently, the future presence of wolverines in California will likely require a translocation from another population. Because habitat components necessary to support a wolverine population appear to be available in the Sierra Nevada and primary habitat is within protected areas, a translocation is likely to be successful at reestablishing a healthy wolverine population. A small number (6-8) of wolverines would be translocated from a healthy wild population, quarantined, and then soft-released using techniques adopted from other carnivore programs. Extensive telemetry and ground follow-up of released animals would be conducted to determine survival, spatial organization, habitat use and any successful reproduction. These data would also be used to determine whether additional releases should be conducted.

THE CALIFORNIA DEPARTMENT OF FISH AND GAME, RENEWABLE ENERGY AND MITIGATION CHALLENGES

SERGE GLUSHKOFF, CDFG, 1416 9th Street, Suite 1341-B, Sacramento CA, (916) 539-5669, SGLUSHKOFF@DFG.CA.GOV

Abstract: Californian deserts support valuable biological resources and extensive renewable energy resource potential. The Desert Renewable Energy Conservation Plan (DRECP), scheduled for completion in 2012, will advance state and federal desert conservation goals, and facilitate integrated State and federal permitting of renewable energy projects. The Renewable Energy Action Team (REAT), comprised of the California Energy Commission, California Department of Fish and Game (CDFG), Bureau of Land Management, and U.S. Fish and Wildlife Service is forming a conservation strategy for the DRECP that identifies areas for renewable project development and long-term natural resource conservation and study, is supported by the State’s Natural Community Conservation Planning Act, and linked to existing regional NCCP’s and other planning efforts such as BLM’s Solar Energy EIS and the State’s Wildlife Action Plan. SB 34 authorizes REAT’s design and implementation of advanced mitigation actions, through an Interim Management Strategy (IMS) based on purchase of land and conservation easements to protect, restore, and enhance habitats of CESA-listed species. This CDFG-administered mitigation program benefits listed species’ habitats and project proponents, by pooling of financial resources and creation of large-scale mitigation opportunities. This presentation provides orientation to CDFG roles in these new mitigation strategies, and an overview of the impacts of renewable energy plant installations that will be mitigated.
ECOLOGICAL IMPACTS AND MANAGEMENT OF FERAL CATS ON THE CALIFORNIA CHANNEL ISLANDS

DARCEE GUTTILLA, California State University Fullerton, Dept. of Biological Science, P.O. Box 6850, Fullerton, CA 92834-6850, (657) 278-3426; dguttilla@gmail.com; pstapp@full; Co-authors: Paul Stapp; Annie Little; David K., Garcelon; Julie L. King
Southern California Island Ecology and Management Friday, 1:10 p.m., Victoria

Abstract: In spite of their close proximity to the mainland and each other, the California Channel Islands are host to numerous endemic species and threats unique to each island. Three of the eight islands are inhabited by feral cats: San Clemente Island and San Nicolas Island are owned and operated by the U.S. Navy; Santa Catalina Island is privately owned, with 88% of the island managed by the Catalina Island Conservancy. Feral cats are a potential threat to species of conservation concern on each island, either through predation, competition or disease transmission. We summarize highlights from studies on the status and ecological effects of feral cats and resulting management efforts to address and mitigate the impacts of cats on native wildlife on the Channel Islands. We explore the rationale of eradication and control versus trap-neuter-release (TNR) as management methods, the sociopolitical and financial challenges agencies have faced, and the observed and anticipated benefits from management actions. Updates on status of feral cats on each island are provided. Lessons learned from research and management on the Channel Islands can be a powerful tool to demonstrate the critical need for effective feral cat management at the urban-wildland interface on the mainland.

LEAST BELL'S VIREO RESPOND TO MANAGEMENT STRATEGIES IN THE SANTA ANA RIVER WATERSHED

SUSAN HOFFMAN, Santa Ana Watershed Association, PO Box 219, Chino, CA 91708, (951) 538-0284, sue-hoffman@sbcglobal.net; Co-authors: Richard Zembal; James Pike; Dharm Pelligrini; Talula Barbee; Bonnie Nash; Melody Aimar; Terry Reeses; Allyson Beckman; Jill Coumoutso
Ecology and Management of Passerines Friday, 10:30 a.m., Magnolia

Abstract: The Least Bell’s Vireo, Vireo belli pusillus, is an endangered bird of riparian habitats in California and Mexico. Its decline is due to habitat loss and nest parasitism by Brown-headed Cowbirds, Molothrus ater. A low count of 19 pairs was documented in Prado Basin in 1986 by U.S. Fish & Wildlife biologists. A management program consisting of habitat restoration and cowbird trapping was initiated in a cooperative effort among the Orange County Water District (OCWD), the Santa Ana Watershed Association (SAWA), the Army Corps of Engineers, and the U.S. Fish & Wildlife Service. SAWA and the OCWD have initiated major habitat restoration for the vireo with the removal of approximately 3,800 acres of giant reed, Arundo donax, and associated invasive species from the watershed since 1997. Over 100,000 Brown-headed Cowbirds have been removed from the watershed since 1986. The Least Bell’s Vireo population in the watershed has increased from 19 territories in 1986 to 1013 in 2008. Annual data was collected on the vireos’ reproductive success, parasitism rates, depredation rates and nest site characteristics.

RESPONSES OF BIGHORN SHEEP AND MULE DEER TO FIRE AND RAIN IN THE SAN GABRIEL MOUNTAINS

STEVE HOLL, Steve Holl Consulting, 7049 Pine View Drive, Folsom, CA 95630, (916) 988-8043, steve@hollconsulting.com; Co-author: Vernon C. Bleich
Southern California Wildlife Management Issues Wednesday, 2:25 p.m., Magnolia
Abstract: Bighorn sheep (Ovis canadensis nelsoni) and mule deer (Odocoileus hemionus californicus) are sympatric in the eastern half of southern California’s San Gabriel Mountains, occupying chaparral for at least 4 months during winter and spring. Chaparral is a fire-adapted community, characterized by 30-50 year fire return intervals and high intensity fires. Fire history was associated with the abundance of bighorn sheep during 1976-1989 (r = 0.654, P < 0.05) when the population declined slowly and during 1995-2006 (r = 0.823, P < 0.01), as the population increased; however, there was no relationship during 1989-1995 (P > 0.05) when the population declined rapidly. Fire history and habitat suitability were also associated with recruitment in mule deer during 1973-1989 (r = 0.51, P < 0.1); however, that relationship did not occur during 1989-2006 (r = 0.158, P >0.1), indicating other factors may have been associated with fawn recruitment. During 1985-2004 there was a linear relationship between precipitation during pregnancy and fawn recruitment (r2 = 0.58, P = 0.004), indicating a prolonged drought reduced recruitment and mule deer abundance after 1988. No such relationship was associated with bighorn sheep (P >0.05). These results were used to partially explain population changes in bighorn sheep and mule deer during the past 31 years in the San Gabriel Mountains.

POPULATION STATUS OF THE YELLOW-BILLED CUCKOO IN THE SACRAMENTO VALLEY: GRIM NEWS

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Abstract: The western population of the Yellow-billed Cuckoo (Coccyzus americanus) in the United States is distinguished by its affinity for riparian habitat. USFWS has designated the western population as a distinct population segment (DPS) which is a candidate for federal listing. Loss of riparian forests due to changing land use and alterations of river flow regimes in the last 150 years have drastically reduced the available breeding area for this riparian obligate species. In California cuckoos are primarily restricted to the Sacramento Valley, the Kern River Valley, and the Colorado River with individuals occasionally reported in other locations. The Sacramento Valley is believed to be one of the last strongholds for the species in California where cuckoos are listed as a state endangered species. In 2010 PRBO conducted comprehensive surveys of cuckoos in the Sacramento Valley focusing on 100 mile stretch between Red Bluff and Colusa. We used standardized call playback methods to visit 1500 separate call point locations. Each point was visited four times during the cuckoo breeding season from mid-June through early August. We report survey results and vegetation analyses for cuckoos detected along the Sacramento Valley and compare our results to previous comprehensive survey efforts.

AN EPIDEMIC RESPONSE PLAN FOR ISLAND ENDEMICS

BRIAN HUDGENS, Institute for Wildlife Studies, 55 Ericson Ct #1, Arcata, CA 95521, (707) 822-4258, hudgens@iws.org; Co-authors: T. Winston Vickers; Deana L. Clifford; Richard N. Brown; David K. Garcelon

Abstract: Island endemic wildlife are generally highly susceptible to introduced pathogens because of limited exposure to the diversity of pathogens prevalent in mainland habitats and limited genetic variability associated with founder effects. The introduction of pathogens to islands has led to severe declines of many species. Disease management for island wildlife, however, is largely limited to relying on isolation to prevent pathogen entry and reactionary responses after wildlife has already been impacted by an epidemic. Using island fox (Urocyon littoralis) as an example, we provide a template...
for proactive management of wildlife diseases to minimize the impact of an epidemic-causing pathogen on island endemic wildlife. The management program begins with active monitoring to detect an invading pathogen at the earliest stages of an epidemic. Invasion prevention may be bolstered by vaccination against likely pathogens. Finally, post invasion response should be guided by an Incident Response Plan, patterned after those used in disaster response. An ideal Incident Response Plan facilitates the rapid assembly of a team of relevant stakeholders and wildlife disease experts, includes an initial framework for a response, and identifies the range of likely threats and responses in establishing a protocol for adaptive management and monitoring.

**POPULATION MODELS TO GUIDE MANAGEMENT OF THE SAN CLEMENTE SAGE SPARROW**

BRIAN HUDGENS, Institute for Wildlife Studies, 55 Ericson Ct #1, Arcata, CA 95521, (707) 822-4258, hudgens@iws.org

*Southern California Island Ecology and Management*  
*Friday, 10:30 a.m., Victoria*

Abstract: The multitude of threats that need to be addressed to conserve threatened species poses a serious management challenge, particularly when those threats change over time. Complex population models provide a powerful tool for identifying when old risks have been mitigated and management should refocus on new priorities. The San Clemente sage sparrow (*Amphospiza belli clementae*, SCSS) provides a poignant example. Endemic to San Clemente Island, SCSS were listed under the Endangered Species Act with habitat loss and degradation cited as the primary threat. Potential threats currently facing SCSS were evaluated using a simulation model parameterized from an intensive monitoring program. Sensitivity analysis indicated that SCSS persistence is weakly influenced by habitat loss and the primary threat appears now appears to be low juvenile survival. These results clearly indicate that a management priority is to understand and mitigate the causes of high juvenile mortality, which are discussed by Docherty et al. A thorough evaluation of a well founded and complex model of SCSS population dynamics was critical to understanding and communicating the robustness of SCSS to habitat loss and their sensitivity to juvenile mortality and climate change; a counterintuitive pattern that likely to be common among species with disturbance-driven ecology.

**SOUTHERN SEA OTTERS AS SENTINELS FOR LAND-SEA POLLUTION**

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*Diseases and Parasitism*  
*Thursday, 3:50 p.m., Magnolia*

Abstract: Southern sea otters (*Enhydra lutris nereis*) are a federally listed threatened species found only along the California coast. Despite 70 years of state and federal protection, this population has failed to recover and recolonize large expanses of historical range. Poor population recovery and high, ongoing mortality appear to be associated with substantial exposure to terrestrial-origin pollution that is spatially concentrated along the land-sea interface. The spectrum of terrestrial-associated pollutants that have been implicated in sea otter deaths includes biotoxins, parasites, bacteria, fungi and anthropogenic chemicals. These pollutants appear to be particularly noxious to sea otters due to unique aspects of their metabolism and biology. Sources of sea otter mortality that appear to have the clearest and strongest connection to the terrestrial environment include systemic infection by the protozoal parasites *Toxoplasma gondii* and *Sarcocystis neurona*, and liver failure due to poisoning by freshwater cyanotoxins (microcystin). Long-term studies of causes and sources of sea otter mortality offer important insight for guiding public policy for southern sea otter population recovery and coastal water
quality. Also, because sea otters and humans consume many of the same marine foods, this research reveals potential health risks for humans when consuming invertebrates harvested at the land-sea interface.

**WIND ENERGY POST-CONSTRUCTION MONITORING: AN EVALUATION OF STUDY DESIGN, BIASES, AND LIMITATIONS.**

**DAVE JOHNSTON, H. T. HARVEY & ASSOCIATES, 983 University Avenue, Los Gatos, CA 95032, (408) 458-3226, djohnston@harveyecology.com; Co-authors: Judd A. Howell; Nellie Thorngate; Scott B. Terrill; Robert Shields; James Castle**

Ecology and Management of Small Mammals I Thursday, 1:25 p.m., Arlington

**Abstract:** Many studies have documented bat and bird mortality at wind energy facilities using carcass surveys, while others have examined migratory movements using radar, acoustic, and/or night vision devices. The methods used for determining mortality and the rate passage of bats and birds through wind energy areas have varied widely. Using data from a unique two-year study at Montezuma Hills Wind Energy Area to examine methods used for monitoring post-construction wind energy sites, we compared mortality estimates based on data from daily carcass searches vs. data from models using the mean time carcasses remain in the field for search interval periods. We will present different field techniques to conduct carcass searches and searcher bias methods. We found that total mortality determined by carcass searches based on the mean time interval that carcasses remain in the field underestimates the total mortality for bats and small passerine migrants. We found that acoustic data do not reliably detect migrating bats for some areas, and night vision observations may not correlate to the numbers of mortalities. Various mitigation measures, including acoustic deterrents and feathering or curtailment, are discussed. Additionally, other limitations, such as access to sites and ownership of data, are also addressed.

**STATUS OF THE ENDANGERED CALIFORNIA LEAST TERN: POPULATION TRENDS AND INDICATORS FOR THE FUTURE**

**KATHLEEN (KATHY) KEANE,** Keane Biological Consulting, 2892 N Bellflower Blvd. #480, Long Beach, CA 90815-1125, (562) 708-7657, keanebio@yahoo.com; Co-authors: Spencer Langdon; Nathan W. Mudry

Ecology and Management of Shorebirds and Waterfowl Friday, 11:30 a.m., De Anza

**Abstract:** The California least tern is a small seabird that nests at scattered protected nesting sites on the coast of California, as well as parts of coastal Mexico. Following listing as an endangered species, the California population increased from 664 breeding pairs in 1976 to approximately 7,000 in 2009. The majority of the increase occurred during the 1990s, following the initiation of focused predator management. Despite ongoing protection efforts, predation by several species (including gull-billed terns [*Gelochelidon nilotica*] in some areas), as well as fluctuations in prey abundance and chronology, have resulted in low reported levels of productivity in recent years. Thus, although annual estimates of breeding pairs suggest a continued slow increase in the least tern population, many tern researchers predict a sudden future population decline. However, estimates of breeding pairs and fledglings are not systematically and consistently calculated among colonies. Thus, we analyzed several other breeding variables derived from colony data. Results suggest large annual variations in most parameters, but, aside from a statistically significant decline in clutch size, we found no significant trend over time in egg abandonment, egg predation, chick/fledgling mortality, or chick/fledgling predation.
NOTOEDRIC MANGE AND ANTICOAGULANT RODENTICIDE EXPOSURE IN BOBCATS IN SOUTHERN CALIFORNIA

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Diseases and Parasitism Thursday, 3:10 p.m., Magnolia

Abstract: Since 2002, an epizootic of notoedric mange has had a significant impact on a population of bobcats in Los Angeles and Ventura Counties in Southern California. Further, mange has become a primary source of mortality for these bobcats. Notoedric mange is an ectoparasitic disease that has generally only been reported in isolated cases in wild felids and there are no previous reports of epizootics of notoedric mange in wild-cat populations. All bobcats that have died with mange in the study area have also been exposed to high levels of anticoagulant rodenticide compounds (>0.5ppb). This study examines the potential role of chronic anticoagulant rodenticide exposure in the mange epizootic in bobcats in Southern California. We are sampling bobcats across a broad geographic scale in Los Angeles and Ventura Counties. We measure anticoagulant exposure and basic health parameters (complete blood counts and blood chemistries) for every individual. Further, using a newly developed notoedric mange ELISA, we are testing for mange exposure across the landscape. Increased sampling has shown that the mange epizootic affects multiple populations of bobcats in Los Angeles and Ventura Counties. Preliminary results of blood chemistries suggest a pattern of anomalies for animals that have mange and anticoagulant exposure.

STATUS OF THE ENDANGERED MORRO BAY KANGAROO RAT IN 2011

CHRISTOPHER KOFRON, U.S. Fish and Wildlife Service, Ventura, CA 93003, chris_kofron@fws.gov; Co-author: Francis X. Villablanc; Department of Biological Sciences, California Polytechnic State University, San Luis Obispo, CA 93407

Ecology and Management of Small Mammals II Friday, 9:05 a.m., Arlington

Abstract: The Morro Bay kangaroo rat Dipodomys heermanni morroensis is endemic to Los Osos, San Luis Obispo County, California. It was listed as endangered in 1970, and recovery efforts have not been successful. The last capture occurred in 1988, and the last captive individual died in 1993. There are two main causes of decline. First, direct loss of habitat has occurred by development in Los Osos. Second, due to the absence of fire, its optimal habitat comprising the early seral stages of coastal dune scrub has progressed to dense, mature plant communities lacking open spaces for hopping and growth of their annual food plants. Despite many trapping efforts since 1988, the Morro Bay kangaroo rat has not been captured again. However, we have observed recent potential signs at several historic sites suggesting that some isolated colonies may still persist. In addition, we have been unable to search on several large private properties, including two where the taxon previously occurred. We will continue searching in 2011, which will include trapping and possibly habitat restoration by prescribed fire at the sites with potential signs.

TAMARISK BIOCONTROL AND RIPARIAN BIRDS: ASSESSING THE IMPACTS OF TAMARISK LEAF BEETLES ON THE AVIAN COMMUNITY OF THE VIRGIN RIVER, NEVADA

MICHAEL KUEHN, University of California, Marine Science Institute, Santa Barbara, CA 93016, (805) 388-9944, michael@wfzv.org; Co-authors: Tom L. Dudley; Matthew L. Brooks; Steven M. Ostoja
**Abstract:** Tamarisk leaf beetles (*Diorhabda spp*.), are poised to spread throughout the lower Virgin River valley of southern Nevada where invasive tamarisk (*Tamarix spp*.) is widespread and comprises nearly 90% of the riparian habitat. Tamarisk leaf beetles defoliate tamarisk trees during the avian breeding season and many songbirds, including several species of special conservation concern, use this habitat for breeding, migration and overwintering. In 2009 and 2010 we collected pre-biocontrol data to establish baseline assessments of avian habitat associations and reproductive success, with the ultimate goal of assessing the short-term and long-term impacts of tamarisk beetles on the nesting success, habitat use and foraging behaviors of the avian community on the Virgin River. We monitored nests of all riparian bird species at ten 3-ha plots along a 55 km stretch of the river. Nest searching plots were established in monotypic tamarisk and mixed (tamarisk/native) habitats. Point count surveys were conducted at 120 locations on the same stretch of river in four habitat types: (1) monotypic tamarisk, (2) tamarisk/native mixed, (3) outer riparian edge and (4) successional (flood-scourged) habitats. This presentation will provide an overview of the project’s design, long-term objectives and preliminary results from 2009 and 2010.

**LONG TERM MANAGEMENT GOALS OF BAT POPULATIONS ASSOCIATED WITH AML SITE USE IN JOSHUA TREE NATIONAL PARK**

**KRISTEN LALUMIERE,** National Park Service, 74485 National Park Drive, Twentynine Palms, CA 92277, (760) 367-5577, Kristen_Lalumiere@nps.gov; Co-author: Michael S. Vamstad  

**Ecology and Management of Small Mammals I**  Thursday, 1:45 p.m., Arlington

**Abstract:** Abandoned mine lands throughout Joshua Tree National Park (JTNP) includes over 700 openings (i.e. shafts, adits) associated with historic mining activities. Many of these mine related openings provide quality habitat for a number of bat species including the California leaf-nosed bat, a federal species of special concern. Due to safety issues surrounding these openings, JTNP has assessed all historic mine sites and found 120 locations classified as extremely hazardous. These sites are immediately planned for closure to visitors. As many of these locations have documented bat use and/or potential habitat, most of these sites will be closed with bat compatible gates. Working to establish current baseline data and a monitoring program of these sites, JTNP biologists began conducting surveys of mines in 2009. Project goals are to establish a long term monitoring program, document species composition, assess bat patterns and use of the mines as well as perform pre- and post- bat gate installation surveys. With the impending arrival of White-nose Syndrome (caused by *Geomyces destructans*) to the southwest, another primary objective of these surveys is to collect solid baseline data of bat presence in the park prior to the arrival of the disease to JTNP.

**IMPACTS OF SOLAR ENERGY POWER PLANTS ON DESERT REPTILES**

**LARRY LAPRE,** Bureau of Land Management, 22835 Calle San Juan de los Lagos, Moreno Valley, CA 92553, (951) 697-5218, llapre@ca.blm.gov  

**Ecology and Management of Amphibians and Reptiles**  Thursday, 4:10 p.m., Victoria

**Abstract:** The Bureau of Land Management has approved six fast-track solar energy power plant projects in the latter months of 2010. Some of these sites, and their associated transmission lines, are within desert tortoise habitat. Some will impact other declining reptiles, including flat-tailed horned lizards and Mojave fringe-toed lizards. In addition, many common species, such as sidewinder, Mojave rattlesnake and desert horned lizard will lose substantial populations and habitat. The individual impacts
of each of these projects to desert reptiles will be reviewed, and the cumulative impacts to the protected species will be tabulated. Strict protective measures have been imposed on two solar projects with many desert tortoises. The effectiveness of these measures will be evaluated. The lessons learned from one project where desert tortoises have been cleared from the construction site and relocated to temporary pens include both successes and oversights.

**ASSESSING THE BIOLOGICAL IMPACTS OF RENEWABLE ENERGY DEVELOPMENT: RESEARCH NEEDS**

**PHILIP LEITNER**, California State University, Stanislaus, One University Circle, Turlock, CA 95382, (925) 253-8400, pleitner@pacbell.net

*Abstract: The on-going boom in renewable energy development in the California deserts is familiar to all of us. In 2010, seven major solar projects were approved, with a total generating capacity of ~3500 MW. These projects included 3 types of concentrating solar power (CSP) technology and are expected to impact >40 mi² of desert habitat. The extensive ground disturbance needed for CSP facilities leaves little doubt regarding the extent of biological impacts. However, there are many unanswered questions about the types and magnitude of impacts from wind and solar photovoltaic (PV) energy development. The direct habitat loss from installation of wind turbines and related infrastructure is small, but there are no data on the total impacts to terrestrial wildlife. There are also unanswered questions about the effects of PV installations. Complete clearance of vegetation may be avoided, yet emplacement of photovoltaic panels creates ground disturbance and the panels will impact the distribution of sunlight and moisture over large areas. The growth and spread of invasive weeds is a likely result. I will discuss the research needed to understand and mitigate the potential but poorly understood impacts of these energy technologies.**

**SEABIRD RESTORATION ON THE CHANNEL ISLANDS**

**ANNIE LITTLE**, U.S. Fish and Wildlife Service, 1901 Spinnaker Drive, Ventura, CA 93022, (805) 658-5763, annie_little@fws.gov; Co-authors: Annie L. Harvey; David Mazurkiewicz; William R. McIver; Harry R. Carter

*Abstract: The Channel Islands provide critical nesting and roosting habitat for seabirds in southern California. The Montrose Settlements Restoration Program is currently implementing seabird restoration projects on several of the Channel Islands and associated offshore rocks. The goal of these projects is to restore seabird populations impacted by the releases of DDT into the Southern California Bight. On-going island restoration projects include the removal of non-native species, revegetation of native habitat, enhancement of nesting habitat through the use of artificial nesting sites, and use of social attraction to draw seabirds to suitable habitat. Several of the accomplishments to date include: 1) the removal of 55 feral cats from U.S. Navy-owned San Nicolas Island, 2) restoration of 5 acres of native habitat on Santa Barbara Island to benefit Cassin’s Auklets and Xantus’s Murrelets, 3) on-going removal of iceplant from Scorpion Rock to improve burrow nesting habitat for Cassin’s auklets, and 4) the successful use of artificial nest sites by the rare Ashy Storm-petrel on Orizaba Rock. Although logistically challenging, restoration work on the Channel Islands benefits numerous nesting and roosting seabirds and can help buffer some of the ongoing threats that seabirds face.
LESSONS LEARNED ABOUT THE LONG-TERM EFFECTS OF WIND ENERGY DEVELOPMENT ON THE DESERT TORTOISE

JEFF LOVICH, U.S. Geological Survey, 2255 N. Gemini Drive, Flagstaff, AZ 86001, (928) 556-7358, jeffrey_lovich@usgs.gov; Co-authors: Joshua R. Ennen

Abstract: We began studying a desert tortoise (Gopherus agassizii) population at a wind energy facility near Palm Springs, California during the mid-1990s marking over 130 individuals by the year 2000. Throughout that time and from 2009-2010, varying numbers of tortoises were outfitted with radio transmitters. Females were captured at regular intervals to determine clutch size and frequency during the reproductive season from April-July in 1997-2000, 2009 and 2010. Desert tortoises appear to have adapted to the industrial landscape as tortoise burrows are more likely to be located closer to roads and turbines than are random points without burrows. Tortoises at the site are extremely fecund producing more eggs/year than other populations. Nests produce viable hatchlings that survive to recruit into the population. Tortoises have persisted at the site since construction began in 1983 with high adult survivorship and no evidence of population decline or disease, although tortoise mortalities have been documented as a result of industrial activities. High productivity at the site appears to the driving factor in the success of the population although worker awareness and site protection contribute to tortoise survival. Site selection and mitigation of impacts from energy development are critical for minimizing adverse affects to wildlife.

DO FROGS STILL GET THEIR KICKS ON ROUTE 66?

ROBERT LOVICH, U.S. Navy, 1220 Pacific Highway, San Diego, CA 92111, (619) 889-7587, rloovich@gmail.com; Co-authors: Chris Petersen; Michael J. Lannoo; Priya Nanjappa; Chris Phillips

Abstract: One fifth of the world’s amphibians now face extinction. A major factor in these declines has been the spread of infection by the chytrid fungus, Batrachochytrium dendrobatidis (Bd); the disease it causes (chytridiomycosis) has been devastating amphibian populations globally. Two general scenarios, not mutually exclusive, have been proposed for the nature and spread of this pathogen: 1) Bd is an epidemic, spreading as a wave and wiping out individuals, populations, and species in its path; and 2) Bd is endemic, widespread throughout many geographic regions on every continent except Antarctica. Distinguishing from among these hypotheses could have impacts on amphibian management and conservation and requires, in part, broad-scale studies using standardized techniques to determine. Towards this end, we conducted a transcontinental transect designed to sample for the presence of Bd. United States Department of Defense (DOD) installations were sampled from west to east along U.S. Highway 66 from California into central Illinois, and continuing eastward from there across to the Atlantic Seaboard along U.S. Interstate 64 (in sum from Camp Pendleton in California to Naval Air Station Oceana in Virginia, between 33° and 39° N latitude). We sampled each installation across the 2009 warm season using standardized collection and analytical techniques to address the following questions: 1) Does Bd occur in amphibian populations in these relatively undisturbed DoD environments? 2) Is there a spatial pattern to the presence of Bd? 3) Is there a temporal pattern to the presence of Bd? and 4) Do our results shed light on whether Bd is acting as an epidemic or endemic infection across North America? This study represents the single most geographically extensive survey for Bd conducted to date. Half of the amphibian species surveyed (15/30) tested positive for Bd as follows: Plethodontidae (4 species), Bufonidae (3 species), Hylidae (5 species) and Ranidae (3 species). There was a strong spatial component to our dataset. The ten eastern temperate DoD installations had
higher rates of Bd infection (18.9%) than the five bases situated in the arid west (4.8%). There was also a strong temporal (seasonal) component to our dataset. In total, 78.5% of all positive samples came in the first (spring/early-summer) sampling period. These data support the conclusion of Ouellet et al. (2005) that Bd is now widespread, and argues that Bd, a pathogen that was once likely epidemic, can today be considered endemic across much of North America, extending from coast-to-coast, with the exception of remote pockets of naïve populations. Some of the DoD installations sampled, such as Camp Pendleton, have already experienced declines of native amphibians and also tested positive for Bd. It is likely that this emerging disease will stimulate new and innovative measures to avoid further reduction of amphibian biodiversity on North American DoD installations.

**ABUNDANCE AND DISTRIBUTION OF PINNIPEDS AT THE CHANNEL ISLANDS IN SOUTHERN CALIFORNIA**

MARK LOWRY, National Marine Fisheries Service, La Jolla, CA, (858) 546-7174, mark.lowry@noaa.gov

*Southern California Island Ecology and Management*  
*Friday, 12:50 p.m., Victoria*

**Abstract:** NOAA Fisheries monitors pinnipeds for assessing population status, as required by the Marine Mammal Protection Act. The Channel Islands are occupied by California sea lion (*Zalophus californianus*), Northern elephant seal (*Mirounga angustirostris*), Pacific harbor seal (*Phoca vitulina richardii*), and Northern fur seal (*Callorhinus ursinus*), and occasionally by the Guadalupe fur seal (*Arctocephalus townsendi*) and Steller sea lion (*Eumetopias jubatus*). California sea lions occupy all eight Channel Islands and since 1975 pup production has increased 5.4% annually, with San Miguel Island and San Nicolas Island accounting for approximately 90% of U.S. pup production (99.6% of pups in the U.S. are born at the Channel Islands). Northern elephant seals occupy five of the islands; pup production has increased 7.2% annually at the islands, with San Miguel and San Nicolas Islands currently accounting for approximately 69% of U.S. births (80% of pups in the U.S. are born at the Channel Islands). Pacific harbor seals occupy all eight islands; where approximately 3900 seals were counted in recent years (accounting for 18% of the California population in 2009). A small colony of northern fur seals at San Miguel Island currently produces about 2500 pups a year. Thus, pinniped populations at the Channel Islands are either stable or increasing.

**RESPONSES OF LARGE AND MEDIUM-BODIED MAMMALS TO INCREASED RECREATION ACTIVITIES OVER AN EIGHT YEAR PERIOD**

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*Southern California Wildlife Management Issues*  
*Wednesday, 2:05 p.m., Magnolia*

**Abstract:** A study was conducted by the USGS in 2001-2002 at the Puente Hills Preserve in southeastern Los Angeles County to study recreational effects to wildlife in and around a tunnel under a busy regional road. In 2009-2010, the study was repeated using the same scent-station transect and motion-sensor camera locations in order to evaluate any changes in wildlife use considering a nearly five-fold increase in human activity. Most notable was the change in bobcat activity. Camera data indicates that bobcat tunnel use has decreased by more than half, but transect data indicates that bobcat presence has nearly tripled. The decrease in bobcat activity at the tunnel may be due to the substantial increase in human activity. The increase in bobcat activity along transects may be because there were high levels of disturbance in 2001-2002 from habitat restoration activities, which have since decreased and the restored habitat as matured. However, this increase does not bring bobcat activity levels to those
recorded in the area in the late 1990s before it was officially opened to recreational activities. These results indicate that recreational and restoration activities may influence bobcat activity, which is important for Preserve management as they are a key indicator species.

REGIONAL GENETIC SUBDIVISION IN THE MOHAVE GROUND SQUIRREL: EVIDENCE OF HISTORIC ISOLATION AND ONGOING CONNECTIVITY IN A MOJAVE DESERT ENDEMIC

MARJORIE MATOCQ, University of Nevada Reno, 1000 Valley Road, Reno, NV 89512, (775) 784-4621, mmatocq@cabnr.unr.edu; Co-author: Kayce C. Bell

Ecology and Management of Small Mammals II Friday, 8:25 a.m., Arlington

Abstract: The Mojave Desert is characterized by unique biodiversity and is an area of particular interest for development of renewable energy facilities, which could impact habitat quality and population connectivity. To begin understanding current habitat connectivity in a Mojave Desert endemic, we examine population genetic characteristics of the Mohave ground squirrel, *Xerospermophilus mohavensis*. We use microsatellite and mitochondrial data to examine the spatial distribution of genetic variation and to infer regional demographic history and connectivity across the species’ range. We also examine the demographic history of individual populations and assess the degree to which *X. mohavensis* may be hybridizing with its sister species, *X. tereticaudus*. We find that populations of *X. mohavensis* group into three regionally defined genetic clusters with admixture among the groups. Patterns of regional genetic subdivision and inferred patterns of colonization are consistent with what would be expected from the location and timing of the historic lake and river systems of the region. On a more recent timescale, *X. mohavensis* populations do not appear to have experienced genetic bottlenecks, as would be expected from known population declines. Finally, we find that hybridization between *X. mohavensis* and *X. tereticaudus* is limited and, thus, not a source of introgression into the threatened species. The patterns of diversity and regional connectivity that we describe here for the Mohave ground squirrel are a first step in determining critical conservation areas for endemic Mojave Desert fauna.

GROUND SQUIRREL PATCH DYNAMICS IN THE SIERRA NEVADA

TONI LYN MORELLI, Museum of Vertebrate Zoology, 3101 Valley Life Sciences, Berkeley, CA, 94720, moreli@berkeley.edu

Ecology and Management of Small Mammals Thursday, 3:50 p.m., Arlington

Abstract: The effects of climate change are complex, manifested in changes not just in temperature and precipitation but also changes in habitat, food availability, and interspecific interactions. Unfortunately, baseline historic data on animal populations are rare. As part of the Grinnell Resurvey Project, I capitalized on historic data collected by U.C. Berkeley Museum of Vertebrate Zoology researchers to understand the effects of climate change on animals in the Sierra Nevada. Specifically, from June to September, 2010, I resurveyed areas in eastern California with documented historic (1910-1960) Belding’s ground squirrel occurrences. I conducted visual and trapping surveys of 118 sites, mostly meadows, from the southern Cascade Range to Sequoia National Park, recording sightings of Belding’s ground squirrels (N=140) as well as California ground squirrels (*Otospermophilus beecheyi*, N=76) and golden-mantled ground squirrels (*Callospermophilus lateralis*, N=95). Using occupancy modeling, I found that Belding’s ground squirrel continued to occupy the majority of sites (probability of site occupancy (p) = 87%, probability of detection (psi) = 88%). Habitat quality, presence of other ground
squirrel species, and water availability had an effect on site occupancy; patch size and survey date did not. These results will be extended to identify climate change refugia throughout the Sierra Nevada.

**PROACTIVE CONSERVATION MANAGEMENT OF NORTH AMERICA'S LONE INSULAR BIRD SPECIES**

SCOTT MORRISON, The Nature Conservancy, 201 Mission St, 4th Floor, San Francisco, CA 94105, (619) 884-5834, smorrison@tnc.org; Co-authors: T. Scott Sillett; Walter M. Boyce  
*Southern California Island Ecology and Management*  
Friday, 11:30 a.m., Victoria

**Abstract:** North America has >50,000 islands and ~650 bird species but only one insular bird species— the island scrub-jay (*Aphelocoma insularis*). Its global range is the smallest of any North American bird: <250 km², the area of Santa Cruz Island, ~30 km off-shore of Santa Barbara, CA. Although the species is not listed as threatened, novel threats call for proactive conservation management. West Nile virus, for example, is prevalent on the mainland but not yet on the island; high mortality rates experienced by other corvids when exposed to the disease are cause for concern. We describe management efforts underway, which include vaccination, demographic research, and population modeling. The most promising long-term strategy, however, may be in creating a second population. Recently uncovered records suggest the species was extirpated from neighboring Santa Rosa Island in the late 1800s, perhaps due to habitat destruction by introduced livestock. Reestablishing the jay to Santa Rosa Island would reduce its vulnerability to extinction; it could also leverage the species’ seed caching habit and so ecosystem engineering role to accelerate restoration of that island’s currently highly degraded native vegetation. This strategy for conserving island scrub-jay illustrates how strategies for species protection, ecosystem restoration, and climate adaptation can converge into an integrated solution.

**FEATHER GROWTH OF STELLER’S JAYS FEEDING IN CAMPGROUNDS**

STEPHANIE NEFAS, Humboldt State University, 1544 Stewart CT, Arcata, CA 95521, (818) 324-8854, smn32@humboldt.edu; Co-authors: Will Goldenberg; Thomas L. George  
*Ecology and Management of Passerines*  
Friday, 1:30 p.m., Magnolia  
Student Paper

**Abstract:** Steller’s Jays (*Cyanocitta stelleri*) have been identified as a primary nest predator of the Federally threatened Marbled Murrelet (*Brachyramphus marmoratus*) within Redwood National and State Parks (RNSP). Anthropogenic food sources in campgrounds attract Steller’s Jays and could potentially affect nutritional status and physiological condition of the birds. We examined the relationship between feather growth bar length and the proportion of time Steller’s Jays were observed in campgrounds. We color marked and sampled feathers from 70 Steller’s Jays in Elk Prairie campground between March and September 2010. During this period, we simultaneously monitored their use of campgrounds. Feathers grew slower in individuals observed frequently in the campground, feather growth and observational frequencies were significantly different between age classes but not statistically different between sexes. This relationship maybe explained by the nutritional properties of anthropogenic food compared to natural food sources, and social interactions between different age groups. Negative consequences to Steller’s Jays that rely on campgrounds to meet nutritional needs have implications to reproduction, survival, and subsequently management decisions in RNSP.

**AVIAN RESPONSE TO ARUNDO DONAX INVASION ON THE LOWER SANTA CLARA RIVER**

DEVYN ORR, Riparian Invasion Laboratory, Marine Science Institute, University of California, Santa Barbara, Santa Barbara, CA 93106-6150, (510) 847-7657, devyn@umail.ucsb.edu

**Abstract:**
Ecology and Management of Invasive Species  

Friday, 9:25 a.m., De Anza

Abstract: *Arundo donax* is among the top invasive plant species degrading California’s riparian ecosystems; however few studies have examined the wildlife implications of *A. donax* invasion, despite the scale of resulting habitat transformation. In 2009, I began an avian monitoring study to assess the habitat value of *A. donax* stands relative to native vegetation types (*Baccharis spp.*, *Populus spp.*, *Salix spp.*). Habitat value was determined by abundance of individuals and diversity of species present. I conducted point count surveys at two sites on the Lower Santa Clara River, Ventura Co., once a month from May through August. Each site contained an equal distribution of points among *A. donax* (over 70 percent cover), mixed *A. donax* and natives, and natives (over 70 percent cover). Preliminary results show diminished species diversity and fewer total individuals in *A. donax* relative to native stands, with intermediate diversity in mixed patches. I intend to continue this study and use results to inform river restoration efforts to maximize habitat value for vulnerable avian populations present in this system, including the Least Bell’s Vireo, Yellow-billed Cuckoo, and Southwestern Willow Flycatcher.

DEVELOPING PV SOLAR WITH RESOURCE AVOIDANCE

KIM OSTER, First Solar, 111 Broadway # 400, Oakland, CA 94607, (510) 625-7400, koster@firstsolar.com

Alternative Energy vs. Arid Land Resources  
Thursday, 1:05 p.m., De Anza

Abstract: First Solar has used a strategy of resource avoidance and minimization of impacts in siting and developing photovoltaic solar farms on private and public lands in California and elsewhere. Strategies such as early surveys to identify resources and coordination with environmental stakeholders has helped develop projects that avoid and minimize impacts to biological resources while allowing for large scale solar development.

A MULTI-AGENCY APPROACH TO THE MOHAVE GROUND SQUIRREL PETITION FOR LISTING

DANNY REINKE, Edwards AFB, CA, POB 385, Edwards, CA 93523, (661) 277-9080, danny.reinke@edwards.af.mil

Conservation and Management of Wildlife on Military Lands  
Wednesday, 4:10 p.m., De Anza

Abstract: On 27 April 2010, the U.S. Fish & Wildlife Service published a notice of a 90-day finding and initiation of a 12-month status review in the Federal Register (Vol. 75, No. 80) to determine if the petitioned action to list the Mohave ground squirrel as endangered was warranted. The Desert Managers Group, a federal, state and local government working group developed a multi-agency response effort by establishing a common data base of trapping data and field studies. No one agency had general coverage of the historic range, but the combined effort provided almost complete coverage of the published historic range. On Edwards AFB, we have been surveying for MGS for more than 20 years; populations currently exist in the eastern, western, northern, and southern portions of the base. The data show high variability but no downward trend. Lastly, our data documents that a one-year trapping effort is unreliable and does not provide accurate presence or absence data. Juveniles make up most of the MGS’s that are live-trapping, few adults are captured, and most of these are females. During years of less than average rainfall, it has been documented that MGS delay breeding resulting in few trappings.
THE PACIFIC FLYWAY SHOREBIRD SURVEY

MATTHEW REITER, PRBO Conservation Science, PO Box 747, Pescadero, CA 94060, (760) 417-9997, mreiter@prbo.org; Co-authors: Catherine Hickey; Gary W. Page
Ecology and Management of Shorebirds and Waterfowl Friday, 1:10 p.m., De Anza

Abstract: Trends of North American shorebird populations are poorly understood but many appear to be declining. To better understand how to create and manage habitat to sustain this wide-ranging group of birds, a coordinated effort is needed to quantify population trends and the relationship of species’ abundance with specific habitat conditions. Over the last two years, we have developed, coordinated, and launched the initial phase of the Pacific Flyway Shorebird Survey (PFSS). The PFSS is an annual, multi-partner effort that integrates both ongoing and newly established survey efforts to quantify spatial and temporal variation in wintering shorebird populations in the Pacific Flyway. Our initial phase is focused within California but will be used as the template to expand coordinated monitoring of wintering shorebirds throughout the Pacific Flyway. Our analysis of historical data of shorebird distribution and abundance as well as variability in the distribution of their habitat informed the development of robust sampling designs for large estuaries and interior wetland habitats where shorebirds may be highly aggregated. PFSS data are collected by professional biologists and skilled volunteers using several predefined, standardized survey protocols. These data are compiled through an online data entry portal in the California Avian Data Center (CADC); a secure platform for managing, analyzing, and visualizing ecological monitoring data. State-of-the-art analytical approaches, integrated within CADC, will provide partners with annual summaries of shorebird data and interactive tools to visualize results, including population trends, spatial patterns of distribution, and relative abundance by habitat type or location. This platform provides the foundation to evaluate both local and broad-scale population trends and, subsequently, to inform shorebird conservation at multiple scales. Further, the PFSS, through an iterative process of learning using data collected annually, will provide a framework to guide the conservation of shorebirds amid a changing climate in California and the Pacific Flyway.

THE BEHAVIORAL FUNCTION OF SOCIAL CALLS IN THE MIGRATORY HOARY BAT LASIURUS CINEREUS

GABRIEL REYES, Humboldt State University, 2387 Baldwin St. #7, Arcata, CA 95521, (510) 207-9498, gabe.reyes01@gmail.com; Co-author: Joseph M. Szewczak
Ecology and Management of Small Mammals Thursday, 3:10 p.m., Arlington Student Paper

Abstract: The migratory tree-roosting hoary bat Lasiurus cinereus has been experiencing high rates of mortality at wind energy development sites during its fall migration/mating season. Seasonally variable social and behavioral factors may contribute to its susceptibility to turbines, and understanding these factors may reveal mitigation strategies. This study aimed to 1) determine how hoary bats respond to conspecific social call broadcasting, and if these responses are seasonally variable, 2) assess the effectiveness of using acoustic lures to aid in the study of hoary bats, and 3) describe hoary bat social calls. We broadcasted social calls and observed hoary bat responses using mist nets and infrared cameras, and used full-spectrum bat detectors to record and analyze social vocalizations. During the spring migration in New Mexico, we captured 22 hoary bats during call playback, and only two during control, suggesting that the conspecific social call sequences we broadcast attracted hoary bats (Poisson GLM, P=.0189 and P=.0193). We are continuing fieldwork during the fall migration in California and will present these additional results. Examining seasonal variation in hoary bat social behavior may provide insight into both the underlying causes of mortality at wind energy sites, and the natural history of this elusive species.
DISCOVERY OF A REMNANT POPULATION OF SIERRA NEVADA RED FOX (VULPES VULPES NECATOR) IN THE SOUTHERN SIERRA NEVADA.

ADAM RICH, US Forest Service, Summit RD, #1 Pinecrest Lake Road, Pinecrest, CA, (209) 965-3434, arich@fs.fed.us; Co-authors: Sherri K. Lisius; Mark J. Statham; Benjamin N. Sacks

Abstract: Historically, the Sierra Nevada red fox (Vulpes vulpes necator) occurred throughout the high elevations of the Sierra Nevada and from Mount Shasta and Lassen Peak westward to the Trinity Mountains; it was reported by Grinnell and others (1937) to be “not really numerous anywhere.” The current distribution, abundance, and population trend for Sierra Nevada red fox are uncertain, and since the early 1990s, it has been unclear whether this native mountain fox persisted outside of the Lassen Peak region. Here we report on evidence we have collected that confirms the persistence of an apparent remnant population of Sierra Nevada red fox occurring in the southern Sierra Nevada. We will report the latest results from 1) a multi-agency effort to survey for Sierra Nevada red fox in the southern Sierras, 2) DNA analyses of saliva, hair, and scat we have collected, and 3) a monitoring effort of key risk factors that may affect viability of this sub-population. The future direction of research and research opportunities will also be discussed.

BREEDING STATUS AND DIET TRENDS OF LEAST TERN COLONIES IN THE SAN FRANCISCO BAY ESTUARY

DAVID RIENSCHE, East Bay Regional Park District, P.O. Box 5381, Oakland, CA 94605, (510) 544-2319, driensche@ebparks.org; Co-authors: Meredith L. Elliott; Susan Euing

Abstract: The two largest colonies of the California least tern (Sternula antillarum browni) in the San Francisco Bay area, at Alameda Point and Hayward, are located 10 miles apart. The Alameda Point colony, on the former Naval Air Station, Alameda, has grown at an average rate of 9.2% per year since its inception in 1976. Long-term breeding success at Alameda has averaged 0.86 fledglings per breeding pair. Breeding success increased through the 1980s, declined through the 1990s and the early 2000s, and increased again in the last five years. The Hayward colony, located on an island created from dredge materials in 2001, has been enhanced with additional substrate materials, vegetation management, social attraction devices, and predator management. Least terns began appearing at this island in 2003, and successful breeding attempts have been observed since 2006. This colony has grown at an average rate of 51.5% per year. Long-term breeding success has averaged 0.87 fledglings per breeding pair, despite lower success rates in 2008 and 2009. Dropped fish have been collected from both colonies, and silversides (family Atherinopsidae) are the dominant dropped prey at both sites. Hayward terns forage mainly on nearshore species in the shallow marsh waters near their breeding site; Alameda terns forage on a greater variety of species found in both shallow and deeper waters of the Central and South Bay. While Atherinopsids remain the dominant dropped prey, northern anchovy (Engraulis mordax) and surfperches have declined as prey since the 1990s.

ADAPTIVE MANAGEMENT FOR CONTROL OF RIVER OTTER AT A SMALL LEAST TERN NESTING COLONY IN THE SAN FRANCISCO ESTUARY

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Ecology and Management of Shorebirds and Waterfowl

Friday, 10:30 a.m., De Anza

Abstract: The size of a small colony of California least terns (*Sternula antillarum browni*), located on a 0.5-acre gravel spit in the upper San Francisco Estuary, has declined since 2002. This prompted efforts to determine the reason for the decline and a re-evaluation of predator management priorities. Predation by terrestrial mammals had been identified as the primary factor in poor tern reproductive success from 2002 to 2005. In March 2007, aggressive vegetation removal was initiated to reduce predator cover. By May, several unidentified mammal scat piles were observed in untreated areas in close proximity to six abandoned least tern nests. In March 2008, fencing at the landward end of the spit was extended into the surrounding waterway to better exclude terrestrial mammals. However, tern nest abandonment was observed again in May along with new unidentified mammal scat piles. Examination of scat and tracks, combined with incidental observations of river otter (*Lontra canadensis*) at the site, suggested predation by otters may be the primary cause of the tern decline. Controls have been introduced to target river otters at the site, but further monitoring is necessary to determine the effectiveness of the new measures.

INFLUENCE OF AVIAN SPECIES ECOLOGICAL CHARACTERISTICS ON THE INTERPRETATION OF OCCUPANCY ESTIMATES FROM POINT COUNT DATA

L. JAY ROBERTS, PRBO Conservation Science, 3820 Cypress Dr. #11, Petaluma, CA 94954, (707) 781-2555 x323, ljroberts@prbo.org

Ecology and Management of Passerines

Friday, 12:50 p.m., Magnolia

Abstract: Occupancy estimates that account for imperfect detection have led to improved state variable reliability for a wide variety of monitoring projects. The occupancy parameter can be interpreted biologically as a variety of quantities depending on the size of sample units and distribution patterns of the species of interest. I show how occupancy parameters correlate with species ecological characteristics by modeling occupancy for 20 species that vary in body size, detectability, territory size, prevalence, and specificity of habitat associations. Using data over two years from a large set of point count locations spread throughout National Forest lands in the Sierra Nevada mountains of California, I modeled occupancy for sample units of 1, 5, or 10 point count locations to show how parameters vary at these spatial scales and in relation to species characteristics. In general, the results show that occupancy increases with larger sample units since more area is sampled, but the effect is diminished for very prevalent and highly detectable species. Detectability has a similar relationship; the effect diminishes for species that are less prevalent and habitat specialists. These and other results help to guide the design of monitoring projects that intend to track occupancy as a state variable.

THE DESERT TORTOISE IN MEXICO—A COOPERATIVE INTERDISCIPLINARY RESEARCH APPROACH

PHILIP ROSEN; Co-author(s): Mercy L. Vaughn; Kristin H. Berry; Mary Brown; Taylor Edwards; Alice E. Karl; Robert Murphy; Ma. Cristina Meléndez Torres

Ecology and Management of Amphibians and Reptiles

Thursday, 3:50 p.m., Victoria

Abstract: Approximately 40% of the desert tortoise’s (*Gopherus agassizii*) geographic range is in northwestern Mexico. In 2001, we initiated collaborative international efforts to acquire baseline data on tortoise ecology, status, health, and conservation biology in Mexico. In 2001–2002 we documented a major mortality event on and near Tiburón Island. In 2005–2006 we sampled near Alamos (tropical deciduous forest, TDF), Hermosillo (Sonoran desertscrub), and Obrégon (foothill thornscrub), capturing 63 tortoises, as well as telemetering 19 in TDF. During 2008–2010, we focused in Sinaloa, the currently
known southern range limit (Topolobampo, Sinaloa), on the genetic-morphological-ecological transition zone in eastern and southern Sonora, Tiburón Island, and coastal Sonora. We found 53 additional tortoises. We confirmed the presence of an infectious disease, *Mycoplasma agassizii*, in captives in Hermosillo but so far have not found this disease in wild tortoises. We identified two genotypes in Sonora: one in desertsrub and thornscrub resembling the “Sonoran” type, and a second “Sinaloan” type associated with TDF. We estimate this Sinaloan type diverged 5-6 mya from a common ancestor with the Sonoran and Mojave lineages. Two key conservation problems are climate-driven mortality episodes and intensified fire regimes associated with type conversion from native vegetation to Africanized buffelgrass pasture.

**STORMING THE BEACHES: INVASION STYLE FISHERIES ECOLOGY AND MANAGEMENT ABOARD MARINE CORPS BASE CAMP PENDLETON**

**MICHAEL ROUSE**, United States Marine Corps, AC/S Environmental Security, Box 555008, Camp Pendleton, CA 92055, (760) 763-6989, michael.rouse@usmc.mil

*Conservation and Management of Wildlife on Military Lands*  Wednesday, 3:30 p.m., De Anza

**Abstract:** Coastal Southern California’s endemic aquatic species have adapted various life history methodologies for persisting in dynamic localized habitats. Decades of habitat modification exacerbated by introductions of non-native aquatic species within the Coastal Southern California region have greatly reduced, and in some cases, extirpated populations of endemic aquatic species. Maintaining habitat integrity at an ecosystem level, population monitoring, and non-native species removal are core management strategies that Marine Corps Base Camp Pendleton utilizes to support extant populations of native threatened and endangered aquatic species. Marine, freshwater, anadromous, and estuarine species all derive protection through Camp Pendleton’s philosophy of ecosystem management. Camp Pendleton’s Wildlife Management Branch coordinates non-native aquatic species removal activities with population monitoring in an effort to better support native species such as the tidewater goby, arroyo toad and Southern California steelhead.

**ANALYTICAL AND VISUALIZATION TOOLS FOR THE STUDY AND MANAGEMENT OF PASSERINES AT THE CALIFORNIA AVIAN DATA CENTER**

**LEO SALAS**, PRBO Conservation Science, 3820 Cypress Drive #11, Petaluma, CA 94954, (707) 781-2555, Isalas@prbo.org; Co-authors: Douglas Moody; Michael Fitzgibbon; Thomas Fonseca; Sherie Michaile; Grant Ballard

*Ecology and Management of Passerines*  Friday, 1:10 p.m., Magnolia

**Abstract:** We have made available through the California Avian Data Center (CADC) a wealth of avian data collected in California by PRBO Conservation Science, many other non-profit and government institutions, and by citizen scientists. These data span many decades, cover the entire geography of the state and mainly consist of records of Passerine species. There is an increasing need to synthesize information from centralized data clearinghouses for adaptive management, standard and advanced analyses and visualizations, predictive modeling, data mining and exploration of patterns. The effects of on-going climate change also require the ability to produce trends and estimates at various spatial scales. To address these needs, we built a user-interface and set of statistical tools for the exploration and use of datasets in CADC that include menu-driven and map-based selections, as well as tools to display the results of predictive models of reproductive success, phenological parameters and species distributions. The map-based tools permit retrieval of summaries and visualization of data and predictive model results at multiple geographic scales. We will present examples of uses of these tools.
DEVELOPMENT OF HABITAT IN IMPERIAL IRRIGATION DISTRICT'S MANAGED MARSH COMPLEX

CARLA SCHEIDLINGER, AMEC Earth & Environmental, Inc., 9210 Sky Park Court Suite 200, San Diego, CA 92123, (858) 300-4311, carla.scheidlinger@amec.com; Co-author: Clayton R. Kraft
Southern California Wildlife Management Issues Wednesday, 3:10 p.m., Magnolia

Abstract: The Water Transfer Project addresses the conservation, use, and transfer of Colorado River Water by the Imperial Irrigation District (IID) and its partners. One mitigation measure implemented by the IID for impacts associated with this project is the creation of a 959-acre managed marsh complex to provide wetland and native woodland habitat for species that normally use drain and canal vegetation for their life history needs. Phase 1 is 365 acres, which encompasses 20 cells designed to accommodate a variety of habitats, including riparian forest, mesquite woodland, and emergent aquatic wetlands. Principal targets for the project are the Yuma clapper rail and California black rail. We worked with IID on design, adaptive management for water delivery, and planting and invasive species control for the Phase 1 project. Water management included development of meandering channels for riparian vegetation, flow-through provision for marsh cells, and precise depth control to facilitate plant establishment at different water levels. Soil preparation included ripping and discing for root-zone enhancement for trees and agricultural-style surface preparation for seeding. Over 150 acres were seeded to achieve high plant species diversity. Transplanted tree species intergrade with marsh species in some cells, enhancing ecological diversity. After 12 months, vegetation is well-developed and bird species diversity is high.

REMOVAL OF A DESERT PUPFISH POPULATION FROM TEMPORARY PONDS AT THE SALTON SEA

SHARON KEENEY, CA Department of Fish and Game, 78078 Country Club Drive, Ste. 109, Bermuda Dunes, CA 92203, (760) 200-9410, skeeney@dfg.ca.gov; Co-authors: John J. Crayon
Southern California Wildlife Management Issues Wednesday, 4:10 p.m., Magnolia

Abstract: From 2006 to 2010, the Bureau of Reclamation funded the construction, operation and maintenance of an experimental 120-acre pond complex which used blended water from the Salton Sea and the Alamo River. Although steps were taken to exclude fish, desert pupfish appeared in the ponds after the first year of operation. As the ponds were scheduled for decommissioning, a multi-agency crew was organized to salvage the fish. The crew worked for three weeks, trapping, dip-netting and seining fish for transport from the ponds. As fish became more concentrated in the receding waters, daily catches went from dozens, to hundreds, to thousands of fish. By the time the operation was completed on August 5, 2010, over one million salvaged desert pupfish had been distributed to wild populations and refuge pond populations. The result of the operation has important implications for desert pupfish sampling methods and management strategies.

BALD EAGLE RESTORATION AND MONITORING ON THE CALIFORNIA CHANNEL ISLANDS

PETER SHARPE, Institute for Wildlife Studies, P.O. Box 2500, Avalon, CA 90704, (310) 510-2728, sharpe@iws.org; Co-author: David K. Garcelon;
Southern California Island Ecology and Management Friday, 8:05 a.m., Victoria
Abstract: Bald eagles disappeared from the California Channel Islands by the early 1960s, primarily because of the impact of DDE contamination. Reintroduction efforts began on Santa Catalina Island in 1980, but DDE contamination of the eggs precluded hatching in the first breeding attempts in 1987 and 1988. For the next 20 years we maintained the population through egg manipulations and hacking of birds. A second restoration effort on Santa Cruz Island began in 2002 with the goal of monitoring nesting success without human intervention. In 2006 two chicks hatched on Santa Cruz Island, the first natural hatchings of bald eagle chicks on the Channel Islands since 1950. We began leaving eggs in some nests on Santa Catalina Island in 2007, and as of 2009 nest manipulations have ceased. We have successfully released 173 eagles on the islands via hacking and fostering, and 28 chicks hatched in nests have fledged. During the 2010 nesting season we located seven breeding pairs on Santa Catalina Island, four on Santa Cruz Island, and two on Santa Rosa Island. Eleven (85%) of these pairs successfully fledged a total of 15 chicks. We continue to investigate DDE contamination in unhatched eggs and in blood samples.

A ROAD MORTALITY SURVEY OF THE CALIFORNIA NEWT ALONG 1.8 KILOMETERS OF ROAD BISECTING THEIR MIGRATION PATH

ROBERT SHIELDS, RAS Wildlife Surveys, 4527 Student Lane, San Jose, CA 95130, (408) 710-7827, robertshields1@hotmail.com

Ecology and Management of Amphibians and Reptiles    Thursday, 1:25 p.m., Victoria
Student Paper

Abstract: Adult migrating newts and salamanders are at risk of becoming road-kill when they are moving to and from their breeding waters. Roads that bisect a migration route can accumulate high numbers of mortalities throughout the season. We set up a walking survey of 1.8 kilometers of road in southern Santa Clara County that bisects a known route of California Newt. We were looking to see how many mortalities occur over the season, where are there hotspots of mortalities and how long does it take for carcasses to disappear. Over the course of the winter and early spring of 2009-2010 we conducted 14 surveys and collected data on 626 Coastal Newt mortalities. The carcasses of other amphibians and reptiles disappeared from the survey area quite quickly, while the carcasses of the Coastal Newts remained on the road for longer periods of time. The toxicity of the Coastal Newts might be averting scavengers from consuming the carcasses. Many areas of the survey road had concentrations of over 10 mortalities in a 10 meter section; a few 10 meter sections had over 15 mortalities. There is a significant level of California Newt mortality along the 1.8 kilometers of road with some areas of the road having very high concentrations of mortalities.

STATUS AND HABITAT USE OF LONG-BILLED CURLEWS IN THE CENTRAL VALLEY IN FALL

W. DAVID SHUFORD, PRBO Conservation Science, 3820 Cypress Drive #11, Petaluma, CA 94954, (415) 868-0371 x 310, dshuford@prbo.org; Co-authors: Gary W. Page; Gary M. Langham; Catherine Hickey

Ecology and Management of Shorebirds and Waterfowl    Friday, 12:50 p.m., De Anza

Abstract: The long-billed curlew (Numenius americanus) – a large shorebird of conservation concern at the continental level – is a migrant and winter resident in California’s Central Valley, where it concentrates primarily in agricultural lands. Despite recent estimates of the size of the curlew’s North American breeding population, little is known about its abundance and habitat needs at migratory stopovers and wintering areas. To help fill these gaps, we coordinated three broad-scale surveys of
curlews in the central and southern portions of the Central Valley in fall and winter in 2007-2008 and a more comprehensive survey of the entire Central Valley in August 2009. On the latter survey, we recorded 20,775 curlews in 197 flocks. In all years in autumn, the vast majority of curlews were found in irrigated croplands, primarily alfalfa and irrigated pastures, during this otherwise arid season. More frequent surveys at the local level in Solano County and more recent radio-telemetry studies indicate that some curlews shift their distribution from fall to winter. More work on fine-scale habitat preferences and movements in the Central Valley is needed to aid in the conservation of this at-risk shorebird.

ECOLOGY OF ORANGE-CROWNED WARBLERS ON THE CALIFORNIA CHANNEL ISLANDS

T. SCOTT SILLETT, Smithsonian Conservation Biology Institute, National Zoological Park, Washington, DC 20008, (202) 633-4213, silletts@si.edu; Co-authors: Helen R. Sofaer; Jongmin Yoon; Kathryn M. Langin; Scott A. Morrison; Cameron K. Ghalambor

Southern California Island Ecology and Management Friday, 11:10 a.m., Victoria

Abstract: The California Channel Islands provide a valuable opportunity to study how climate, food availability, and nest predation shape avian life histories. We studied orange-crowned warblers (Oreothlypis celata sordida) on Santa Catalina and Santa Cruz Islands from 2003-2009. We found that annual survival of island warblers was high (70-80%) compared to mainland conspecifics (40-50%), whereas clutch size was small (2-4 eggs vs. 4-7). Reproductive success and phenology was most strongly affected on both islands by winter rainfall and food availability, with birds foregoing breeding in drought years and laying eggs earlier and having larger clutches in wet years. Parental behavior, in contrast, was shaped by nest predator community and nest predation risk. Females on Catalina Island, which lacks an avian nest predator, nested higher in vegetation (1.10 ± 0.06 m) than females on Santa Cruz Island (0.39 ± 0.09 m), home of the endemic island scrub-jay (Aphelocoma insularis). In addition, parents on Catalina made fewer feeding trips to nests (2.79 ± 0.16 visits/hr) compared to Santa Cruz parents (1.36 ± 0.06 visits/hr). Orange-crowned warblers on the Channel Islands thus show remarkable phenotypic plasticity in their reproductive effort and behavior. Our results suggest that understanding the sensitivity of different behavioral and life history traits to variation in ecological conditions can yield more precise predictions for management purposes, as well a more robust understanding of how ecological conditions shape life history evolution.

THE POLITICAL ECONOMY OF DESERT TORTOISE CONSERVATION

SIDNEY SILLIMAN, California State Polytechnic University, Pomona, 1225 Adriana Way, Upland, CA 91784, (909) 946-5027, gssilliman@csupomona.edu

Ecology and Management of Amphibians and Reptiles Thursday, 4:30 p.m., Victoria

Abstract: The conservation and recovery of the Mojave desert tortoise is about science and the application of scientific principles. Yet conservation and recovery depends on political and economic considerations. The science is easy; it is the politics that are hard. Add wealth to power and the challenge is evident. Thinking about public policy as it pertains to desert tortoise recovery should incorporate a political economy perspective. Public policy is what government chooses to do or chooses not to do. As governments decide, they exercise power. The distribution of wealth determines both the ideological context and who has the resources to influence what governments decide. The choices may result in greater or lesser protection for tortoises. Two sets of decisions illustrate the value of linking the science of recovery to a political economy perspective. Science documented the decline of the Mojave desert tortoise and the need to protect tortoises in their natural habitat, while wealth and power gained the listing of the species as “threatened.” Implementation of the science in the Desert Tortoise Recovery
Plan would recover the species, but wealth and power drives the approval of solar projects on desert tortoise habitat.

**WEEDY NATIVE VS ENDANGERED SPECIES: THE PROBLEMS WHEN RELATIVES MOVE IN**

**MARIE SIMOVICH**, University of San Diego, San Diego, CA; simo@sandiego.edu; Co-authors: Kathryn B. Davis; Andrew J. Bohonak  
*Southern California Wildlife Management Issues*  
*Wednesday, 4:30 p.m., Magnolia*

**Abstract:** Hybridization has been recognized as a significant and sometimes fast acting threat to the integrity and persistence of endangered species. Examples frequently involve a narrow endemic that is threatened by an exotic species introduced by human activity. However, anthropogenic disturbance can also bring together formerly allopatric congeners, transforming regional sympatry into local co-occurrence. Depending on the nature and degree of isolating mechanisms, hybridization is one possible outcome. The narrowly endemic San Diego fairy shrimp (*Branchinecta sandiegonensis*) is federally endangered due to high levels of habitat loss. It is the only fairy shrimp species found in most undisturbed vernal pools in San Diego County. Human disturbance (e.g., road building, off-road activity esp. on military bases) tends to spread its congener *B. lindahli*, which may be considered a “weedy” species in southern California. We review the available information regarding hybridization in *Branchinecta*, and consider whether it may constitute a threat to the integrity of the San Diego fairy shrimp.

**CHALLENGES IN THE UPLANDS: MANAGING UPLAND NATURAL RESOURCES ABOARD MCB CAMP PENDLETON**

**ROLAND SOSA**, Department of Defense, AC/S Environmental Security, Wildlife Management Branch, Marine Corps Base, Camp Pendleton, CA 92055-5008, (760) 725-1767, roland.sosa@usmc.mil  
*Conservation and Management of Wildlife on Military Lands*  
*Wednesday, 1:05 p.m., De Anza*

**Abstract:** As one of the largest West Coast military installations, Marine Corps Base Camp Pendleton, CA, is the home of the Marine Corps’ premiere amphibious training Base and home to 16 federally listed threatened and endangered species. Camp Pendleton supports military training for nearly 60,000 active and reserve duty personnel in the Marine, Navy, Army, Air Force, and National Guard units. By virtue of the Bases’ vast amount of open space and its compliance and stewardship initiatives Camp Pendleton contributes substantially to regional biodiversity conservation. Ongoing military training and mission support activities create impacts to listed species and their habitat. Natural resources management programs on Base support military activities while striving to sustain and enhance threatened and endangered species habitat and recovery. I will discuss the Bases’ management strategies and the challenges we encounter managing three federally listed upland species, coastal California gnatcatcher (*Polioptila californica californica*), Stephens’ kangaroo rat (*Dipodomys stephensi*), and Pacific pocket mouse (*Perognathus longimembris pacificus*).

**TRENDS IN INDEPENDENT SCIENCE ADVICE FOR NCCP/HCPS**

**WAYNE SPENCER**, Conservation Biology Institute, 815 Madison Ave., San Diego, CA, (619) 296-0164, wdspencer@consbio.org  
*Conservation Planning*  
*Friday, 8:25 a.m., Magnolia*
Abstract: The California NCCP Act requires NCCP plans to “establish a process for the inclusion of independent scientific input…” and specifies that this input should address scientifically sound conservation strategies for species and natural communities as well as principles for reserve design, adaptive management, monitoring, establishing conservation goals, and reducing data gaps and uncertainties. Since 2002, I have led or participated in about a dozen NCCP independent science processes—from “traditional” terrestrial conservation and development plans to more specialized plans, such as the Sacramento-San Joaquin Bay Delta Conservation Plan and the Desert Renewable Energy Conservation Plan. I will summarize some emerging trends in the nature of advice coming from independent scientists, including the following: (1) greater emphasis on establishing measurable conservation goals and objectives; (2) greater emphasis on using spatially explicit models to address data gaps and uncertainties (e.g., species and habitat distribution models, reserve-selection algorithms, decision-support models, and population dynamics models); (3) increasing attention to climate change implications; and (4) recognition that independent science advice is best provided throughout planning and implementation, not just as one-time, early input. Another recent trend is advising that (5) conservation plans should develop an Adaptive Management Framework early in the planning process—rather than as a final task once conservation strategies have been established—and develop the plan itself using this framework.

EFFECTIVENESS AND EFFICIENCY OF MULTIPLE SPECIES AND MULTIJURISDICTIONAL HCPs

STEPHANIE STANDERFER, Dudek, 1650 Spruce Street, Suite 240, Riverside, CA, 92507; (951) 300-2100, sstanderfer@dudek.com; Co-author: Joe Monaco

Abstract: Riverside County in particular has had its share of experience with Habitat Conservation Plans (HCP) in recent years; the adoption of the Stephen’s Kangaroo Rat HCP, Western Riverside County Multiple Species Habitat Conservation Plan (WRCMSHCP) and the recently executed Coachella Valley Association of Governments (CVAG) MSHCP. Specifically, the WRCMSHCP involves a particularly complicated implementation structure. Important considerations for implementation include: method of acquisitions, funding, multiple interpretations and long-term political support. We will explore the effectiveness and efficiency of multiple species and multijurisdictional HCPs, and what considerations should be given for future planning efforts.

ESTIMATING THE POPULATION SIZE OF ISLAND LOGGERHEAD SHRIKES ON SANTA ROSA AND SANTA CRUZ ISLANDS, USA

THOMAS STANLEY, US Geological Survey, 2150 Centre Ave. Bldg. C, Fort Collins, CO 80526, (970) 226-9360, stanleyt@usgs.gov; Co-authors: Susan Teel; Linnea S. Hall; Linda C. Dye; Lyndal Laughrin

Abstract: Island loggerhead shrikes (Lanius ludovicianus anthonyi) are an endemic, genetically distinct subspecies of loggerhead shrike on California’s Santa Rosa and Santa Cruz Islands. This subspecies is listed as a Species of Special Concern by the California Department of Fish and Game and has been petitioned for federal listing under the Endangered Species Act. Because of suspected low numbers and the possibility of federal listing, there was an urgent need to rigorously estimate the number of remaining individuals and their locations on the Islands. In 2009 and 2010 we surveyed sample units on Santa Rosa and Santa Cruz Islands using a double observer method with independent observers, where
units were selected under a stratified random sampling design. For Santa Rosa Island we estimated shrike abundance was 169 in 2009 and 240 in 2010, and for Santa Cruz Island we estimated shrike abundance was 35 in 2009 and 42 in 2010. These numbers, especially for Santa Rosa Island, are higher than previously reported but nevertheless are still low. Rapid vegetation change on both islands due to recent removal of non-native herbivores may threaten the habitat and status of this subspecies, and so we suggest that that intensive demographic and habitat use projects be initiated immediately to obtain additional information for the successful perpetuation of this subspecies.

STATUS OF THE AMERICAN PIKA AT HISTORIC CALIFORNIA LOCALITIES

JOSEPH STEWART, California Dept. Fish & Game, R2, 1701 Nimbus Rd, Suite A, Rancho Cordova, CA 95670, (302) 299-2758, jastewart@dfg.ca.gov; Co-author: David H. Wright

Ecology and Management of Small Mammals Thursday, 3:30 p.m., Arlington Student Paper

Abstract: American Pika (Ochotona princeps) may be threatened by climate change, but the species’ status in California is unclear. Pika often are associated with montane talus and are sensitive to acute heat stress. In the Great Basin, research has implicated climate change as the primary factor in extirpation of low-elevation populations. In California, models project a loss of most of the species’ range under climate warming, but data on persistence of pikas at historic localities has been limited. We located and resurveyed 22 historic pika sites in California. Historic pika records were found using electronic databases, museum specimens and old field notes. Records from 1892 to 1982 were accepted as historic. We surveyed during 2009 and 2010 using a protocol adapted from Beever and others. Twenty resurveyed sites had extant pika, whereas two toward the lower elevation range appeared extirpated. Two of our “extant” sites had complex occupancy patterns suggesting they are dynamic zones near the lower margin of pika distribution. In addition to our own surveys, we obtained current records of pika status at about 20 other historic localities. Of all 40-plus surveyed localities, 36 were currently occupied with five apparent extirpations toward the lower elevation range of sites. Our results are consistent with upward retreat of pika distribution in the face of warming climate, though alternative hypotheses cannot yet be ruled out.

MEETING RECOVERY GOALS FOR TWO LISTED SHOREBIRDS ON MILITARY TRAINING BEACHES: HISTORIC CHALLENGES AND OPPORTUNITIES FOR THE FUTURE

SHERRI SULLIVAN, Marine Corps Base Camp Pendleton, AC/S Environmental Security, Marine Corps Base, Bldg. 22165, Camp Pendleton, CA 92055; (760) 725-0377, sherri.sullivan@usmc.mil

Conservation and Management of Wildlife on Military Lands Wednesday, 2:05 p.m., De Anza

Abstract: Marine Corps Base Camp Pendleton (MCBCP) in San Diego County is home to sixteen federally listed species, including two shore birds: California least tern (Sterna antillarum browni) and western snowy plover (Charadrius alexandrinus nivosus). Both shorebird species typically nest in exposed tidal flats or on beaches, providing challenges in Southern California where historic nesting sites have been abandoned or have become unsuitable as development and recreation have expanded over time. MCBCP is one of the last remaining breeding habitat refuges for these species where the bird species typically utilize approximately one third of the 17 miles of undeveloped shoreline for nesting in a given year. The author will discuss various management techniques implemented since the 1970’s that have contributed to sustainability and success of least tern and snowy plover populations on the installation. She will also present current and future challenges, including discussion of predation management, habitat enhancement, monitoring intensity, recreation challenges, military training mission support, and adaptive management prospects. As MCBCP strives to provide leadership in least tern and
snowy plover management, we are seeking ways to move from an intense nest monitoring strategy toward more science based studies to help attain recovery goals on Base and range wide.

**SURVIVAL AND CAUSES OF MORTALITY FOR PACIFIC FISHERS IN THE SOUTHERN SIERRA NEVADA, CALIFORNIA**

**RICK SWEITZER,** Department of Environmental Science, Policy, and Management, University of California, Berkeley, CA 94720, (559) 642-4539, rasweitzer@berkeley.edu; Co-authors: Craig M. Thompson; Kathryn L. Purcell; Mourad W. Gabriel; Greta M. Wengert; Reginald H. Barrett

*Ecology and Management of Carnivores*  
**Wednesday, 1:45 p.m., Victoria**

**Abstract:** Combined data on causes of mortality and survival are critical for understanding the dynamics of small populations of rare animals. A recent estimate suggests there are fewer than 350 fisher (*Martes pennanti*) in the southern Sierra Nevada. A key objective of both the Sierra Nevada Adaptive Management and Kings River Fisher studies is to estimate survival and determine causes of mortality. Multiple fishers have been radiocollared and monitored on the two projects since summer 2007. We documented 39 and 26 fisher mortalities on the SNAMP and Kings River studies, respectively. Predation, roadkill and disease are the leading causes of mortality, but both roadkill and disease appear more common in the SNAMP study area. We used the Kaplan-Meier method and known fate analyses in Program MARK to evaluate survival. Preliminary indications were that overall survival was lower in the SNAMP area than the Kings River area. Prior to 2010 survival for adult females exceeded 78% in both areas, which, in combination with high rates of reproduction and fecundity, suggested a stable population scenario. Adult female survival is much lower in the SNAMP area in 2010, however, and detailed information on age- and sex-specific survival, and estimates for lambda will be provided.

**TO RESCUE OR NOT TO RESCUE? WRESTLING WITH ETHICAL, SCIENTIFIC, AND CONSERVATION QUESTIONS WHEN FISHER KITS BECOME ORPHANS**

**RICK SWEITZER,** Department of Environmental Science, Policy, and Management, University of California, Berkeley, CA 94720, (559) 642-4539; rasweitzer@berkeley.edu; Co-authors: Carrie O'Brien; Deana Clifford; Eric Wolters; Lewis Wright

*Ecology and Management of Carnivores*  
**Wednesday, 2:25 p.m., Victoria**

**Abstract:** At present there are five research projects in the western United States where scientists are closely monitoring den use by female fishers during the spring denning season. All but one of these studies has been confronted with the death of a denning female, and live fisher kits left behind in a known den tree. Each research team subsequently ascended the den tree(s), and succeeded in rescuing orphaned fisher kits before they succumbed to starvation. During late April-early May 2010, two denning female fishers were killed on the Sierra Nevada Adaptive Management Fisher Project in the Sierra National Forest, California. Researchers rescued 5 fisher kits from two different den trees, whereupon a 5 month program of bottle feeding and pen rearing was initiated by the Fresno Chaffee Zoo in cooperation with California Department of Fish and Game, and Fresno Wildlife Rehabilitation and Rescue. Four of the fisher kits survived and were recently released back into the National Forest, but not before many questions were raised regarding the wisdom of these efforts, and the disposition of pen-reared fisher kits. We provide an update on the four fisher kits, and review policy and conservation implications involved with rescuing rare, but not endangered wildlife.
USING ACOUSTIC BROADCASTS TO DETER BATS FROM WIND TURBINES AND EXCLUDE THEM FROM BRIDGES AND OTHER STRUCTURES

JOSEPH SZEWCZAK, Humboldt State University, 1 Harpst St, Arcata, CA 95521, (707) 834-1932, joe@humboldt.edu; Co-author: Edward B. Arnett
Ecology and Management of Small Mammals Thursday, 2:25 p.m., Arlington

Abstract: Bat mortality at wind energy facilities threatens bat populations and has become a complicating factor in wind power development. We previously tested broadcasted ultrasound and found it could deter bats from treated airspace. During seven day study periods at open foraging areas, bat activity declined from 9.8% (±2.3% SE) to 3.3% (±0.0%) of control levels within the effective range of the broadcast, <15 m. Preliminary and full scale field seasons of testing acoustic deterrence on operating wind turbines have demonstrated a nearly 50% reduction in mortality. We have also applied acoustic deterrence on complicated bridge structures that would require extensive physical exclusion prior to demolition. At one previously occupied site bats did return mid-season but left again in a matter of days, presumably from the deterrent. Although the effective range of this treatment limits its potential contribution toward reducing impacts of bats randomly flying through the rotor-swept area of wind turbines, learned behavior may improve its effectiveness at turbines. Acoustic deterrence can also exclude bats from bridges and other structures where the treatment area can match the effective broadcast range and provide a viable alternative to physical exclusion, particularly in situations where physical exclusion may be impractical or costly.

THE USE OF MULTIPLE SPATIAL DATASETS TO ILLUMINATE FISHER ECOLOGICAL BEHAVIOR IN THE SIERRA NATIONAL FOREST, CA

CRAIG THOMPSON, USDA Forest Service, Pacific Southwest Research Station, 2081 E. Sierra Av, Fresno, CA 93710, (559) 760-9995, cthompson@fs.fed.us; Co-authors: Kathryn L. Purcell; Rebecca E. Green; James Garner
Ecology and Management of Carnivores Wednesday, 2:05 p.m., Victoria

Abstract: Fishers are secretive, wide-ranging animals that present numerous challenges to wildlife researchers and managers. Following concerns about population fragmentation in the western United States, listing has been proposed and several large-scale research and reintroduction efforts have been initiated. However nearly all the habitat use data currently available stems from the identification of rest sites, large forest structures with cavities or platforms where fishers rest securely between periods of activity. Almost no information exists regarding the habitat used for travel or foraging, or the influence of either habitat heterogeneity or the forest matrix on these behaviors. As part of the ongoing US Forest Service Kings River Fisher Project, fishers in the Sierra National Forest have been monitored using multiple techniques since 2007. Monitoring techniques include triangulation of radio-collared animals, identification of resting and denning sites through homing, the use of scat detector dogs, and most recently, the use of miniature GPS collars. Each technique presents unique strengths and weaknesses, and provides a different window into the animals’ behavior. Between February 2007 and October 2010, we collected 2451 accurate ground triangulations, 369 rest site locations, 593 genetically verified scats, and 1109 GPS collar locations on 73 fishers. We examined each dataset with respect to topography and forest characteristics. By comparing the results between datasets as well as to random locations, we differentiate the habitats used for behaviors such as resting, foraging, and travel as well as temporal patterns of behavior.
CONTEMPORARY AND HISTORICAL DNA SHOW FISHER DECLINE AND ISOLATION OCCURRED PRIOR TO THE EUROPEAN SETTLEMENT OF CALIFORNIA

JODY TUCKER, U.S. Forest Service and University of Montana, 800 East Beckwith, Missoula, MT 59801, (406) 626-4248, jtucker@fs.fed.us; Co-authors: Michael K. Schwartz; Richard L. Truex; Kristine M. Pilgrim; Fred W. Allendorf

Ecology and Management of Carnivores Wednesday, 1:25 p.m., Victoria Student Paper

Abstract: Historical and contemporary genetic information can provide insights into the nature of population expansions or contractions and temporal changes in abundance and connectivity. Fisher populations in California are thought to have declined precipitously over the last 150 years and currently only two populations remain in the state (one in the northwestern California and the other in the southern Sierra Nevada) and these two populations are both geographically and genetically isolated from each other. Our question is whether the isolation of these two populations is a result of a recent anthropogenically induced population decline that occurred as a result of the European settlement of California in the mid-1800’s or if it is the result of a more ancient demographic event. We collected both historical and contemporary genetic samples from each of the two extant fisher populations in California. We were able to successfully obtain microsatellite genotypes (at 10 loci) for 21 museum specimens (dated 1882-1920) and 275 contemporary individuals (2006-2009). We found significant temporal shifts in allele frequencies between historical and contemporary samples between regions indicating large amounts of genetic drift likely due to isolation and small population size. Tests for recent population bottlenecks were either non-significant or inconclusive. However, we found a strong genetic signal for a 10 fold contraction in effective population size of fisher and estimated that this decline occurred over a thousand years ago. A decline in abundance of this magnitude likely resulted in contraction of the geographic range, and our analyses suggest that fisher populations in northwestern California and the southern Sierra Nevada became isolated from one another far prior to the European settlement of the state.

SPACE USE OF THE THREATENED GIANT GARTERSNAKE IN AGRICULTURAL AND CONSTRUCTED WETLANDS

PATRICIA VALCARCEL, Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR; patricia.valcarcel@oregonstate.edu; Co-authors: B. Halstead; D. Rosenberg; G. Wylie; M. Casazza

Ecology and Management of Amphibians and Reptiles Thursday, 3:10 p.m., Victoria Student Paper

Abstract: The spatial ecology of a species is a vital component of informed management and restoration plans, yet little is known how animals use presumably restored habitat. We compared home ranges, core areas, and habitat selection of the federally threatened Giant Gartersnake (*Thamnophis gigas*) between agricultural habitat and recently constructed wetlands used as conservation banks. Space use patterns were estimated from radio tracking 21 adult female snakes over 2 years at a site that is the center of conservation efforts for the species. Home range (95% kernel density contour) and core area (50% kernel density contour) sizes were analyzed along with the configuration and overlap of the home range utilization distributions. Generalized linear mixed-effects models were used to assess habitat influences on home range size and microhabitat use. Contrary to expectations but consistent across years, we found home ranges in the agricultural habitat were on average 80% smaller and less variable than those in the constructed wetlands. Macrohabitat composition (open water, emergent vegetation, and terrestrial vegetation) within home ranges was similar for snakes in both agricultural and wetland habitat, but distance between water and terrestrial vegetation was directly proportional to home range size.
size. Snakes in agricultural habitat also had greater and more uniform home range overlap as indicated by the utilization distribution overlap index and Bhattacharyya’s affinity. Our analysis of microhabitat selection used a matched location-random point design and focused on vegetation patch edges. Patterns of use were evident in both agricultural and wetland snakes. The restricted home ranges observed in the agricultural snakes suggest we need further investigation into dispersal movements and habitat connectivity. Recovery efforts for the Giant Gartersnake, including construction and management of new wetlands, will benefit from greater knowledge of their space use patterns.

**EFFECTS OF FIRE ON VEGETATION AND SMALL MAMMAL COMMUNITIES IN A MOJAVE DESERT JOSHUA TREE WOODLAND**

MICHAEL VAMSTAD, NPS - Joshua Tree N.P., 74485 National Park Drive, Twentynine Palms, CA 92277, (760) 367-5562, Michael_Vamstad@nps.gov; Co-author: John T. Rotenberry

*Ecology and Management of Small Mammals II*  
Friday, 9:25 a.m., Arlington

**Abstract:** Wildfire size and frequency are increasing in Mojave Desert Joshua tree woodlands principally due to anthropogenic factors. These habitats are generally considered to be fire intolerant and the effects from fire are a major concern for land managers. This study investigated trends of ecosystem response to fire by looking at a chronosequence of historic burns. Plots were chosen at 2, 9, 13, 15 19, and 65 years since burn in which to sample vegetation and rodent communities. Rodent diversity was lower in burned plots and seemed to converge to paired unburned plots over time. The abundance of rodents however, was not significantly different between the burned and unburned plots. Vegetation showed a directional change in species composition with time since fire. However, reestablished vegetation assemblages seem to differ greatly from the assumed pre-burn condition. It is probable that this difference relates to the slow rates of establishment of certain vegetation components that make up the pre-burn condition of the plots. There is a concern that exotic species, nitrogen deposition, and global climate change may initiate a fire cycle in this ecosystem that will arrest succession before the Joshua tree woodland is allowed to re-establish.

**RANGE-WIDE GENETIC ASSESSMENT OF THE FEDERALLY ENDANGERED RIVERSIDE FAIRY SHRIMP**

AMY VANDERGAST, USGS Western Ecological Research Center, San Diego Field Station, 4165 Spruance Road, Suite 200, San Diego, CA 92101, (619) 225-6445, avandergast@usgs.gov; Co-authors: Megan Lahti; Yara Matta; Andrew J. Bohonak; Kathryn Davis; Marie Simovich

*Southern California Wildlife Management Issues*  
Wednesday, 1:05 p.m., Magnolia

**Abstract:** We surveyed the federally endangered Riverside fairy shrimp, *Streptocephalus woottoni*, throughout its range in southern California. *Streptocephalus woottoni* occupies approximately 60 pool complexes in Ventura, Los Angeles, Orange, Riverside and San Diego Counties, and Baja California, MX. We sequenced ~650 bases of the mitochondrial Cytochrome Oxidase I gene from 179 individuals (cysts and adults) from 32 pools throughout San Diego, Orange and Riverside Counties. Genetic variability was very low overall. Five haplotypes were detected, with pairwise sequence divergence ranging from 0.15% to 0.3%. All genetic diversity was limited to San Diego County, with a single widespread haplotype found in all other surveyed pools. Low genetic variation may indicate that *S. woottoni* has undergone a recent range expansion, or a recent selective sweep at the mtDNA locus. A recent range expansion may be consistent with the occurrence of this species almost exclusively in deep pools that have been modified or created as wallows or cattle tanks. Widespread creation of cattle tanks likely coincided with the spread of ranching in southern California, after Spanish colonization in the
1700s. This work represents the first range-wide assessment and genetic analysis of S. woottoni. Our data may help inform future management and restoration efforts for this species. Despite low variation, significant genetic differentiation was detected among some pools in San Diego County, suggesting that gene flow is limited among even geographically proximate pool complexes. This cautions against moving cysts among pool complexes for restoration activities. Finally, we examined amplification success rates for cysts taken from soil stored over various lengths of time (ranging from less than 1 year to 19 years), and found that amplification success rate decreased significantly over time. Lower PCR success in older samples strongly suggests DNA degradation and may indicate loss of viability in samples stored for long periods of time. We recommend that cyst viability experiments be conducted for cysts currently being stored for mitigation purposes. Nuclear markers are being developed to better quantify the scale of genetic divergence within this species and to differentiate the signature of range expansion from selective sweeps.

**TREATMENT FOR EAR MITES AS A MANAGEMENT TECHNIQUE TO REDUCE CANCER RISK IN ENDANGERED CATALINA ISLAND FOXES**

**WINSTON VICKERS**, Institute for Wildlife Studies and UC Davis, 1000 E. Ocean Blvd #307, Long Beach, CA 90802, (949) 929-8643, twvickers@ucdavis.edu; Co-authors: Deana L. Clifford; Linda Munson; David K. Garcelon; Patricia M. Gaffney; Julie King; Calvin Duncan; Megan Moriarty; Walter M. Boyce  

*Diseases and Parasitism*  

**Thursday, 2:25 p.m., Magnolia**

**Abstract:** Endangered Santa Catalina Island (SCA) foxes (*Urocyon littoralis*) have an unusually high prevalence of aggressive ear canal cancer that has been linked to severe inflammation from ear mite infections. We treated a group of SCA foxes for ear mites to determine if ear canal inflammation could be reduced, thereby reducing the risk of cancer development. Foxes were trapped in July 2009, examined for the presence or absence of ear mites, and sampled to assess severity of ear inflammation. Each fox was randomly assigned to receive ear mite treatment or no treatment. Study foxes were recaptured at 2, 4, and 6-months post-treatment. At the final recapture, 90% (36/40) of treated foxes were free of ear mites, while 84% (31/37) of untreated foxes remained infested with mites. Ear canals of treated foxes significantly improved in clinical appearance with less inflammation. Some foxes remained mite-free up to six months after a single treatment, suggesting that significant reductions in mite burdens may be accomplished with only occasional re-trapping and treatment. These findings prompted managers to initiate acaracide treatment of foxes handled during population monitoring. Long-term monitoring will determine if treatment reduces the incidence of tumor development and improves overall fox population health.

**IMPROVING FLIGHT SAFETY THROUGH EFFECTIVE GIANT GARTER SNAKE HABITAT MANAGEMENT**

**CHERYL VIVAS**, EM-ASSIST, 90 Blue Ravine Road, Suite 180, Folsom, CA 95630, (916) 355-8444, CVIVAS@EM-ASSIST.COM; Co-author: Chuck J. Carroll  

*Conservation and Management of Wildlife on Military Lands*  

**Wednesday, 4:30 p.m., De Anza**

**Abstract:** Opposing requirements create difficult management decisions for natural resource planners. This is the case at Beale AFB where a riparian wetland complex is in close proximity to the base runway. This area provides habitat for migratory waterfowl, which pose a risk to flight safety, and for the threatened giant garter snake (*Thamnophis gigas*), which is protected under law. Any action to remove water from this area to discourage waterfowl use, could be considered “take” of the protected
snake’s habitat. An innovative plan is required in order to satisfy both the flight safety requirement not to attract waterfowl to the runway while at the same time not degrading a protected species habitat. Three plans were developed to manage this area in a way that would discourage avian use without degrading the listed snake’s habitat. These plans vary from intensive modification of the landscape by changing the geomorpholy, hydrology, and vegetation, to a low impact plan of managing water flows and discouraging ponding in the area. Whichever plan is implemented, long term monitoring of the managed area will be required in order to determine the success of the project and to adapt to changing site conditions.

IDENTIFYING PREDATORS OF CALIFORNIA FISHERS: LINKING PATHOLOGIC FINDINGS TO PREDATOR SPECIES CONFIRMED THROUGH MOLECULAR TECHNIQUES

GRETA WENGERT, U.C. Davis, Veterinary Genetics Laboratory, Davis, CA 95616, (707) 845-7848, gmwengert@ucdavis.edu; Co-authors: Mourad W. Gabriel; Rick A. Sweitzer; Reginald H. Barrett; Craig Thompson; Kathryn Purcell; Sean M. Matthews; J. Mark Higley; Rebecca Green; Leslie Woods, Megan Jones; Stefan M. Keller, Benjamin Sacks; Patty M. Gaffney, Linda Munson; Ecology and Management of Carnivores Wednesday, 1:05 p.m., Victoria

Abstract: Fisher (Martes pennanti) populations in the Pacific states are a candidate for federal endangered species protection and threats to population persistence and expansion are currently being examined. Fisher mortality due to predation appears higher than any other cause of mortality in California. We conducted forensic molecular analyses to identify predator species responsible for fisher predation by sampling bite wounds on each fisher carcass to obtain potential predator DNA. Using polymerase chain reaction with canid and felid specific primers, we amplified predator DNA from a majority of the fisher carcasses and identified the predator species, which included bobcats, mountain lions, and coyotes. For each fisher carcass, a full necropsy was performed by a pathologist in order to identify ante-mortem wounds, confirm or rule-out predation as cause of death, and identify additional factors that may have contributed to the fisher’s death. We incorporated information on condition of the carcass in the field, such as whether it was cached and how much of the carcass was consumed. Pathologic findings and condition of the fisher carcass varied depending on predator species. We will use correlations of pathologic findings with predator species to develop a key to assist with in-field identification of fisher predators.

MITIGATION MEASURES FOR WESTERN BURROWING OWL) WITHIN IMPERIAL IRRIGATION DISTRICT RIGHTS-OF-WAY

BRUCE WILCOX, Imperial Irrigation District, 333 E. Barioni Blvd, Imperial, CA , (760) 482-9827, BWilcox@IID.com; Co-authors: Alexa Dejoannis; Jessica L. Lovecchio Southern California Wildlife Management Issues Wednesday, 3:50 p.m., Magnolia

Abstract: As part of the mitigation measures for the Quantification Settlement Agreement the Imperial Irrigation District has developed and implemented a multi-tiered mitigation program for the western burrowing owl (Athene cunicularia hypugea) population located within the rights-of-way of the IID Service Area. The mitigation includes a burrow avoidance program, artificial burrow creation program, population and distribution monitoring and demographic evaluations. A three year study of BUOW population and distribution has been completed and a sub-sampling protocol has been developed to estimate populations within the IID rights-of-way. The three year study provided information on the status of the BUOW population and informed the development of the sub-sampling protocol to estimate the population. The burrow avoidance program, which includes documentation of the number of
burrows per right-of-way segment, has provided information on areas of the distribution of potential burrows within the service area. The data from these efforts is being analyzed to develop potential demographic studies to inform potential management measures for the BUOW population.

SAN DIEGO CACTUS WREN CONSERVATION AND HABITAT RESTORATION IN SAN PASQUAL VALLEY, SAN DIEGO, CALIFORNIA

COLLEEN WISINSKI, San Diego Zoo Institute for Conservation Research, 15600 San Pasqual Valley Road, Escondido, CA 92027, (760) 747-8702 x5737, cwisinski@sandiegozoo.org; Co-authors: Sara M. Motheral; Bryan A. Endress; Lisa A. Nordstrom

Ecology and Management of Passerines  Friday, 10:50 a.m., Magnolia

Abstract: The San Diego cactus wren (Campylorhynchus brunneicapillus sandiegensis) is endemic to southern California and requires native cactus scrub in which to build nests year-round. The distribution of San Diego cactus wrens in coastal southern California is patchy and localized due to their dependence on prickly pear and cholla cactus and their populations have been declining dramatically due to frequent fires, exotic plant invasions, habitat loss, fragmentation, and degradation. These populations will likely remain isolated due to the continuing loss of cactus scrub and the wrens’ limited dispersal ability. In 2008, San Diego cactus wren was listed as a priority 1 subspecies by California Department of Fish and Game indicating an immediate need for conservation. San Pasqual Valley is one of the last remaining areas in San Diego County that has a relatively robust San Diego cactus wren population. Within the 900-acre Multiple Species Conservation Program habitat preserve at the San Diego Zoo Safari Park (formerly Wild Animal Park), we have initiated a habitat restoration and population monitoring program. We will also explore novel techniques for restoring cactus scrub habitat that will be useful to land managers. Here we present preliminary results.

MICRONUTRIENT DEFICIENCY, PEDICULOSIS AND HAIR LOSS SYNDROME IN CALIFORNIA DEER

LESLIE WOODS, California Animal Health and Food Safety Laboratory, P.O. Box 1770, Davis, CA 95616, (530) 752-8746, lwwoods@ucdavis.edu; Co-authors: Greg Gerstenberg; Pam K. Swift; Birgit Puschner

Diseases and Parasitism  Thursday, 1:45 p.m., Magnolia

Abstract: An estimated two hundred resident California mule deer died in the spring of 2009 near Yosemite National Park. Clinical signs included poor hair coat and body condition, hair loss, and diarrhea. Necropsies demonstrated deer had exotic lice (Bovicola tibialis), verminous pneumonia, and copper and selenium deficiency. Based on these findings, a pilot field study was initiated to investigate the association of micronutrients, pediculosis and hair loss. Deer were captured by free-range darting and fitted with VHF transmitting ear tag. Three groups of ten deer each were assigned different treatments: copper and selenium, antiparasitic treatment and no treatment. Body and hair condition, and louse burden were assessed, and samples were collected prior to treatment to assess endoparasitism and nutritional status. All deer were recaptured after five months and health assessments were repeated. Findings demonstrated: deer had selenium and copper deficiency, there was poor correlation between liver and hair copper, but good correlation between liver, blood and tail hair selenium, elimination of louse burden by antiparasitic treatment did not improve micronutrient levels, mineral supplementation resulted in a reduction in louse abundance compared to the control group, but was not at a significant level, louse burden did not correlate with hair loss, micronutrient deficiencies more closely correlate with hair loss.
UPDATING THE BANK SWALLOW BURROW-OCCUPANCY ESTIMATE ON THE SACRAMENTO RIVER, 2010

DAVID WRIGHT, California Dept. of Fish & Game, R2, 1701 Nimbus Rd., Suite A, Rancho Cordova, CA 95670, (916) 358-2945, dwright@dfg.ca.gov; Co-authors: Henry Lomeli; Paul Hofmann; Canh Nguyen

Ecology and Management of Passerines Friday, 11:10 a.m., Magnolia

Abstract: The bank swallow (Riparia riparia), a threatened species in California, has been monitored nearly annually along the Sacramento River since 1986. Annual monitoring counts burrows of the species; then data on the rate of occupancy of burrows is used to estimate the number of nesting pairs. The burrow occupancy figure in use (0.45) has not been updated for nearly 20 years. We sampled burrow occupancy at 9 bank swallow colonies along the Sacramento River during and after the breeding season of 2010, following previous survey methods. Burrow counts increased through the latter half of June and then remained relatively unchanged through early August. Nests with eggs peaked in early May and again in latter June; nests with chicks peaked in late May. We observed wide variation in the proportion of burrows occupied before mid-June. Occupancy was high and least variable in early July: on this date we measured an overall proportion of burrows occupied, 0.60 ± 0.02 SE (n = 930), near Garrison and colleagues’ 1987 published value of 0.56 ± 0.03 SE. We detected no significant differences among colonies in occupancy. Measurable occupancy remained high and consistent in an early post-breeding sample. We recommend sticking with raw burrow counts whenever possible, adopting an occupancy value that reflects both approximate occupancy and uncertainty, and conducting future occupancy surveys post-breeding to minimize disturbance.

WIND ENERGY HABITAT CONSERVATION PLANS: THE NEW FRONTIER

DAVID ZIPPIN, ICF International, 620 Folsom Street, Suite 200, San Francisco, CA 94107, (415) 677-7179, dzippin@icfi.com

Conservation Planning Friday, 8:05 a.m., Magnolia

Abstract: Wind energy development in the United States has increased 14-fold from 2000-2009 in terms of installed capacity. As wind farms expand throughout the United States, these projects are increasingly encountering endangered species, particularly birds and bats. Because these projects often lack a federal nexus, habitat conservation plans (HCPs) are often needed to obtain take authorization. There is only one approved wind turbine HCP in the United States at this time (in Hawaii) but many are in development. Covered species in wind turbine HCPs vary by region. In Hawaii, seabirds and endemic bats are included. In the Pacific Northwest it is northern spotted owl, marbled murrelet, and bald eagle. In California, golden eagle, Swainson’s hawk, California condor, and several bats are addressed. In the Great Plains and Midwest, sage grouse, prairie chicken, whooping crane, and Indiana bat are commonly covered. I will discuss unique aspects of wind energy HCPs, unique challenges they face, and several case studies of wind HCPs in process at the project and regional scale.
 CONTRIBUTED POSTER ABSTRACTS

AN INVENTORY OF HERPETOFAUNA WITHIN THE SANTA ANA WATERSHED

MELODY AIMAR, Santa Ana Watershed Association, 6075 Kimball Ave. Bldg. D, Chino, CA 91708, (951) 538-1950, aimar-sawa@sbcglobal.net; Co-author(s): Richard Zembal; Susan Hoffman; Terry Reeser; Allyson Beckman; Jill Coumoutso; Talula Barbee; David McMichael; Nicole Housel; Giovanni Arechavaleta

Poster Session

Abstract: The Santa Ana Watershed Association (SAWA), a non-profit organization dedicated to the restoration and enhancement of natural resources along the Santa Ana River, is conducting a herpetological inventory in support of restoration activities throughout the Santa Ana Watershed. Reptiles and amphibians can be threatened by exotic plants and animals and can also be excellent indicators of system health. The goal of this study is to obtain baseline data for future comparison in support of watershed restoration. Since 2003, 7 sites throughout the watershed have been inventoried using pit-fall/funnel traps for a period of 5 days per month for one year each. A total of 25 reptile and 5 amphibian species have been captured for a total of 30 herpetofauna species. California Species of Special Concern found at one or more locations include western spadefoot toad, orangethroat whiptail, coast horned lizard, coast patch-nosed snake and red diamond rattlesnake. Incidental captures of 10 small mammal species were noted. Capture and incidental sighting data, as well as vegetation characteristics and soil types are presented for each sampling site. A comparison of orangethroat whiptail occurrence within different habitat-types and association with four different habitat elements at one location is discussed.


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Poster Session

Abstract: Since 2005, roadside raptor surveys have been conducted at various locations throughout the Santa Ana River Watershed to assess the abundance and distribution of diurnal raptors among habitat types and for future comparison in support of watershed restoration. One survey route duplicates a roadside raptor census conducted in the San Jacinto valley from 1981-83. Of the 18 diurnal raptor species expected to occur in the Santa Ana River Watershed, we observed 16 species. A total of over 1,350 raptors (not individuals) have been detected along four established survey routes (n=99 surveys). The most abundant species detected was the Red-tailed Hawk (*Buteo jamaicensis*), with 775 total sightings, followed by 268 sightings of the American Kestrel (*Falco sparverius*). Differences in species composition/abundance were noticeable among survey routes. The San Jacinto valley and Lake Perris State Recreation Area appear to not only provide important breeding/foraging areas for resident species, but also serve as important wintering grounds for the Northern Harrier, Ferruginous Hawk, Golden Eagle, Bald Eagle, Merlin, and Prairie Falcon.
TIMING OF NESTING AND NEST SITE SELECTION IN A NORTHERN CALIFORNIA POPULATION OF WESTERN POND TURTLES

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Abstract: We conducted field observations in late May-July of 2008, 2009, and 2010 on a population of western pond turtles (Emys marmorata) living in a semi-permanent vernal lake in Lake County, CA. Gravid females captured during daily visual surveys had morphometric data recorded, and were marked by scute notching, fitted with radio telemetry transmitters, and returned to the pond in order to monitor nesting behaviors. Females initiated nesting forays between June 6 and June 13 in each of the 3 years of the study. Gravid females were noted exiting the pond between 1600-1800 hrs and tracked visually and/or with telemetry to potential nest sites in well-drained upland areas on the NE side of the lake. Nests were constructed between 2-300 meters from the edge of the pond in relatively exposed areas covered with annual grasses. GPS coordinates were recorded for all successful nesting attempts. Analyses of nesting activity indicate philopatry in this population of E. marmorata, with several females returning to nest in the same location several days after abandoned attempts to construct nests.

SHORT-TERM RESPONSES OF RODENT COMMUNITIES TO LARGE-SCALE WILDFIRES IN SOUTHERN CALIFORNIA

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Abstract: In October 2003, wildfires burned large areas of San Diego County. After the fires, we surveyed rodents in both burned and unburned control plots across four sites and four vegetation types (coastal sage scrub, chaparral, woodland and grassland) using a combination of pitfall and Sherman live-traps. We also had extensive pre-fire data at two of the sites. We analyzed the effects of fire on the diversity (Shannon Index), community structure, and relative abundance of rodents across these habitats. Mixed regression models showed that rodent diversity differed among vegetation types but not fire condition. Multivariate analyses revealed significant postfire differences in rodent community composition in coastal sage scrub, which had experienced a drastic 76% reduction in shrub cover from the fires. Individual rodent species largely responded in a manner consistent with their life history characteristics. Generalist and open habitat specialists generally increased in relative abundance, while closed habitat specialists decreased. Among habitats, significant increases in relative abundance were found for the Dulzura kangaroo rat (Dipodomys simulans) and deer mouse (Peromyscus maniculatus). In contrast, significant decreases in relative abundance were found for the California mouse (Peromyscus californicus), San Diego pocket mouse (Chaetodipus fallax) and the desert woodrat (Neotoma lepida) which prefer shrubs, trees and closed habitat. A decrease in the relative abundance of the California vole (Microtus californicus) on burned plots was likely due to mortality from the fires. We discuss our results in relation to management of these natural areas under increased fire frequency scenarios and need for further study.
IMPLEMENTATION OF AVIAN RADAR-SCADA INTERFACE TO MITIGATE RAPTOR MORTALITY AT WINDFARMS

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Poster Session

Abstract: Although wind energy is generally perceived to have low environmental impacts, a wide array of wildlife issues has been documented at windfarms worldwide and an important subset is collision fatalities of long-lived raptors and vultures. Challenges for mitigating collision risk of these types of birds include accurately identifying when raptor-type birds are at risk, minimizing wind turbine downtime, and finding a solution that is applicable to the myriad of collision causes. An innovative way to mitigate avian collision risk while meeting these challenges is to use a radar-based mitigation system that integrates radar, capable of detecting birds at risk in real-time, with the windfarm Supervisory Control and Data Acquisition (SCADA) system, which can implement mitigation measures ranging from issuing alerts to windfarm operators to idling turbines. The technology has been successfully implemented at several windfarms since 2009 for migratory birds, however different mitigation rule sets are applied to address high-risk collision conditions for raptors and vultures. An example of this mitigation strategy applied to Griffin Vultures in Spain will be presented; other potential applications include Golden Eagles, California Condors as well as other raptors. This mitigation technique minimizes raptor collision risk as well as turbine downtime.

TEMPERATURE VARIATION & DIURNAL FLUCTUATION IN NEST CHAMBERS OF THE WESTERN POND TURTLE: IMPLICATIONS FOR SEX DETERMINATION AND DEVELOPMENT

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Poster Session Student Poster

Abstract: Temperature sensors were placed within 20 nest chambers of western pond turtles (Emys marmorata) at a Lake County, CA nesting ground. Gravid females were tracked with telemetry to locate nests. Immediately upon completion of nest construction, we removed the nest plug, recorded position, number, mass, and dimensions of eggs. I-Button sensors set to record temperature at 30-minute intervals were then placed at various levels within the nest chamber before resealing the nests. GPS coordinates were recorded and the nests were covered with predator exclosure devices. Eggs and sensors were recovered from all nests at 70 days (past the thermosensitive period) and placed in incubators for the remainder of the incubation period. Daily temperature fluctuation within the nests commonly exceeded 20 degrees C, with daily temperature maxima often exceeding 40 degrees C. These data are noteworthy, as these temperatures are far above the lethal threshold for eggs incubated at constant temperatures in previous experiments. Comparisons of temperature profiles from nests in the study demonstrated considerable variation depending on nest site selection by individual females. These data indicate that temperature variation likely plays a far greater role in a range of incubation-related developmental variables than previously thought (e.g., incubation duration, sex determination).

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*Poster Session*

**Abstract:** The Northwest Forest Plan is an ecosystem management plan for federal forest lands in the Pacific Northwest. To evaluate the Plan’s effectiveness in conserving forest species, we monitored Marbled Murrelet (*Brachyramphus marmoratus*) populations annually from 2000 to 2009 in marine waters associated with the Plan. We sampled murrelets from boats in coastal waters off Washington, Oregon, and California south to San Francisco, using line transects and distance estimation. We divided the sample area into five subareas/conservation zones. Annual population estimates for the area ranged from 17,400 to 23,700 birds, with a 2009 estimate of 17,800 (95% confidence interval: 14,200 to 21,300). We evaluated population trends at Plan-wide (all 5 zones) and single-zone scales. The population declined over the Plan area for 2001-2009, with an estimated average rate of annual decline of 3.8% (95% CLs: -4.8 to -2.8%). Trend analyses at finer spatial scales are preliminary due to low power, but detected a decline in Washington (Zone 1: Puget Sound, San Juan Islands, Strait of Juan de Fuca). Trend analyses provided preliminary evidence of declines in northern Oregon and the outer coast of Washington, but were not statistically significant. No trend was suggested for northern California and southern Oregon (Zone 4).

**DETERMINANTS OF POST-RELEASE SITE FIDELITY IN CAPTIVE-BRED VANCOUVER ISLAND MARMOTS**

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*Poster Session*

**Abstract:** Captive breeding and release programs have proven essential to the recovery of many critically endangered species. One such species is the Vancouver Island marmot (*Marmota vancouverensis*), a sub-alpine sciurid endemic to Canada whose population once collapsed to <100 individuals. A breeding program has since released >300 marmots to the wild (2003-10), and the population is slowly recovering. Preliminary analyses suggest that captive-bred and released marmots that abandon their release site prior to their first hibernation incur higher mortality than those that remain philopatric to their release sites. I will test several hypotheses to identify the key determinants of site fidelity related to local and landscape-level indexes of environmental and habitat condition. Specifically, I will use general linear mixed models to test if habitat complexity, escape terrain availability and distance from human-disturbed landscapes contribute to marmots remaining on-site. I will also show how site fidelity and survival varied with seasonal timing of release, and with respect to age, gender, and gender ratios in released groups. My research should improve the selection of successful release sites and candidate groupings, and accelerate the re-establishment of a persistent, wild population of Vancouver Island marmots.

**MOVEMENT PATTERNS AND HOME RANGE DYNAMICS OF PACIFIC FISHERS IN THE SIERRA NATIONAL FOREST, CALIFORNIA**
REBEKAH JENSEN, University of California, Berkeley, Department of Environmental Science, Policy, and Management, Berkeley, CA 94720, (559) 642-4539, rebekahjensen@berkeley.edu; Co-authors: Rick A. Sweitzer; Reginald H. Barrett

Poster Session

Abstract: Among terrestrial vertebrates, mammalian carnivores have the largest home ranges for their body size of any organism. Pacific fishers (Martes pennanti) are no exception to this pattern, with annual home ranges of adult males averaging 38 km² and adult females 15 km², based on previous published work. Since 2007, 67 fishers (27 M, 40 F) have been captured and radiocollared in the mid-elevation mixed conifer forests of the southern Sierra Nevada by the Sierra Nevada Adaptive Management Fisher Project. Preliminary estimates of annual home ranges based on the 90% fixed kernel method averaged 53 km² for adult males (n=7) and 26 km² for adult females (n=19). Possible explanations for the larger size of SNAMP fisher home ranges compared to other studies in California include differences in habitat quality or resource availability between populations. Alternately, the discrepancy might be due to methodology rather than ecology. Previous studies have generally relied on ground-based telemetry to track fisher movements, whereas we relocated radiocollared fishers on the SNAMP project near-daily by fixed-wing aerial telemetry. We will present and discuss home range dynamics for fisher in the Sierra National Forest, while also describing seasonal variation in home range movements for female and male fishers.

DESERT TORTOISE HEAD START PROGRAM AT EDWARDS AIR FORCE BASE

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Poster Session

Abstract: The Head Start Program at Edwards Air Force Base (AFB) is fighting against time and multiple threats to find ways to recover the desert tortoise (Gopherus agassizii), federally and state-listed as Threatened under the Endangered Species Act. The program, which began in 2002, is part of a Mojave-wide effort focused on tortoise recovery using adaptive management to discover ways to augment depleted populations. The synergistic effects of multiple individual threats to the desert tortoise indicate the need for development and implementation of a recovery strategy that uses an ecosystem approach. The primary goal of the program at Edwards AFB is to determine the ideal age and conditions at which tortoise hatchlings raised in predator-exclusion pens can be released in the wild to increase the adult breeding population. Four separate releases of one- and two-year-old tortoises have been accomplished since the program’s inception – all were designed to test how variables such as release age and habitat variation affect survival. The mortality rate was 100 percent due to predation and other factors, but the identification of certain avoidable variables will help to guide future actions. Releases of older juveniles with harder shells are expected to yield increased survival rates.

EFFECTS OF SURVEY METHOD AND SEASONALITY ON BURROWING OWL DETECTABILITY

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**Poster Session**

**Abstract:** Ecologists often use standardized surveys to collect distribution and abundance data and inform biological conservation. In North America, Burrowing Owls (*Athene cunicularia*) populations are declining, but dispersed distributions challenge efforts to survey this species. We evaluated methods for surveying burrowing owls in the Coachella Valley, CA. We conducted passive point-based surveys (point counts), point-based call-broadcast surveys (audio point counts), and driving surveys (linear surveys) along roadside routes. We also surveyed wildland plots where sandy soils facilitated detection of owl tracks (wildland surveys). During the 2009 breeding season, we conducted repeated surveys of routes and plots and fitted occupancy models to the resulting data to explore patterns of detectability. Best-fit models described strong but variable seasonal detection patterns among methods. Early-season detectability was relatively high for audio point counts, whereas late-season detectability was higher for linear surveys. Although limited to sandy habitats, wildland surveys achieved the highest detection probabilities, making them potentially useful for supplementing roadside survey methods. Detection patterns documented here parallel those documented elsewhere and likely reflect biological characteristics generally true of burrowing owls. Survey protocols combining early-season call-broadcast surveys with late-season visual surveys may generally maximize burrowing owl detectability and should be considered when planning population monitoring.

**BIOLOGICAL CONSTRUCTION DELINEATION: THE GREEN APPROACH**

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**Poster Session**

**Abstract:** In 2007 the California Energy Commission released a revised report describing California’s changing energy needs. Plans are in-progress for new transmission lines that deliver electricity derived from renewable resources typically located in remote areas that provide habitat for listed/sensitive plant and animal species. These installations often include biological impacts. To mitigate the impacts, measures are undertaken such as permitting through various state and federal agencies. ETIC Engineering, Inc. implements the permit conditions to minimize disturbance to the environment and special-status species. ETIC provides biological consultation for construction monitoring and environmental measure implementation by using "best management practices" (BMPs). ETIC concentrates on fencing and delineation tools to safely divert species such as California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*) from entering construction sites by using high environmental sustainability RRR™ material: Recycled consumer material, Reusable on multiple projects, and Recyclable at the end of life. ETIC’s green approach extends from the use of recyclable material to the implementation of the BMPs to safely and significantly minimize harm to species and their environment. ETIC also provides extensive presence/absence studies for California tiger salamander to ensure impacts to these species are avoided during reconductoring projects, substation expansions, and routine maintenance.

**EFFECTS OF LARGE-SCALE WILDFIRE ON GROUND FORAGING ANTS (HYMENOPTERA: FORMICIDAE) IN SOUTHERN CALIFORNIA**

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**Poster Session**
**Abstract:** We investigated the effect of broad-scale wildfire on ground foraging ants within southern California. In October and November of 2003, two wildfires burned large portions of the wildlands within San Diego County. Between January 2005 and September 2006, we surveyed 63 plots across four sites to measure the effect of the fires on the ant assemblages present in four vegetation types, (1) coastal sage scrub, (2) chaparral, (3) grassland, and (4) woodland riparian. Thirty-six of the 63 plots were sampled before the fires between March 2001 and June 2003. Mixed model regression analyses, accounting for the burn history of each plot and our pre- and post-fire sampling efforts, revealed that fire had a negative effect on ant species diversity. Multivariate analyses showed that ant community composition varied significantly among the four vegetation types, and only the ant assemblage associated with coastal sage scrub exhibited a significant difference between burned and unburned samples. The most notable change detected at the individual species level involved *Messor andrei* (Mayr), which increased from less than 1% of pre-fire coastal sage scrub ant samples to 32.1% in burned plots post-fire. We theorize that *M. andrei* responded to the increase of bare ground and post-fire seed production, leading to an increase in the detection rate for this species. Collectively, our results suggest that wildfires can have short-term impacts on the diversity and species composition of ground foraging ants in coastal sage scrub. We discuss these findings in relation to management implications and directions for future research.

**EVALUATING WILDLIFE CORRIDOR LINKAGES: DO FREEWAY UNDERPASSES CONNECT THE PENINSULAR AND TRANSVERSE MOUNTAIN RANGES?**

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*Poster Session* 

**Abstract:** With the expansion of urbanization and alternative energy resource development, desert environments are becoming fragmented at an increasing rate, making knowledge of the impacts on wildlife in these areas especially important. Highway underpasses may function as wildlife corridors, providing a means for wildlife to make safe crossings between suitable habitats in areas where man-made barriers, such as railways and highways, may be impeding wildlife movement. However, there are few studies demonstrating the degree to which such corridor structures are actually used by wildlife in desert environments. The methods being used make it possible to observe spatial and temporal animal movement and/or road avoidance patterns in the habitat matrix surrounding the freeway underpasses and may also elucidate whether the underpasses serve as prey traps to predatory species. Six pre-existing freeway underpass structures, located along the western portion of the I-10 freeway in the Coachella Valley, Riverside County, California, will be evaluated for one year to determine whether they function as a linkage in facilitating wildlife movement between the Peninsular and Transverse Mountain Ranges. Results of this study will be used as pilot data for planning and implementing a more expansive study to identify generalized principles for effective corridor design in arid environments.

**DIEL ACTIVITY PATTERNS AND DEN ATTENDANCE BY PACIFIC FISHERS IN THE SIERRA NATIONAL FOREST, CALIFORNIA.**
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Poster Session

Abstract: Although fishers are considered nocturnal, they may be active during the day as well. Denning females may differ from nondenning females and males in terms of their overall activity level or activity during the diurnal period. We utilized automatic cameras to examine activity patterns of fishers on the Sierra Nevada Adaptive Management Fisher Project year-round and at den trees during the spring. During camera years 1 (October 25, 2007 to October 15, 2008) and 2 (October 16, 2008 to October 15, 2009) we identified 1290 fisher visits to 561 camera stations distributed across the Bass Lake Ranger District, Sierra National Forest, California. Twenty-seven percent of fisher visits occurred between midnight and 6 am, 31% were between 6 am and noon, 11% were between noon and 6 pm, and 31% were during 6 pm to midnight. Seasonally, fishers were more active during daytime in the spring (48% of 228 visits), and least active during the day during summer (30% of 93 visits). While 50% of the activity by 13 denning females in 2009 occurred during the daytime from 30 March to 30 April, only 34% was during daylight hours later in the den season (1 May to 12 June).

QUANTIFYING HABITAT AND STANDARDIZING MITIGATION FOR SPECIAL-STATUS SPECIES IN EASTERN ALAMEDA COUNTY.

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Poster Session

Abstract: The East Alameda County Conservation Strategy provides an effective framework to protect, enhance, and restore natural resources for over 271,000 acres in eastern Alameda County, while improving and streamlining the environmental permitting process for impacts resulting from infrastructure and development projects. The primary purpose of this Conservation Strategy is to provide a baseline inventory of biological resources and conservation priorities that will be utilized by local agencies and regulatory agencies during project-level planning and environmental permitting. There are two key components of this strategy. First, is a newly developed scoring technique to gain a basic understanding of habitat suitability for special-status species that are typically considered during CEQA review. This scoring system allows project applicants, biologists, and agency personnel to quantify habitat suitability using a common methodology. Further, it allows potential mitigation sites to be scored using the same methodology to ensure that any habitat lost is being properly mitigated, both in size and in function, for the species of interest. Secondly, this strategy establishes standardized avoidance measures and mitigation ratios for natural communities and special-status species. Together these two components make the environmental review process less subjective and ensure adequate mitigation for project effects.

USING GIS TO PRIORITIZE BIRD CONSERVATION AREAS

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Poster Session

Abstract: Avian communities were studied in relation to dominant vegetation types and elevation gradients in the San Jacinto Mountains in southern California for 13 years (1997 - 2010). A geographic...
information system (GIS) was used to derive maps of priority areas for bird habitat conservation. Breeding and migratory birds were surveyed using two trained observers on 100m fixed radius counting stations for 5 minutes starting 30 minutes after sunrise and ending before 1000 from April through June. Using a GIS, species density and richness surfaces were created and compared using three spatial interpolation methods: Inverse Distance Weighting (IDW), Kriging, and spline. The maps depict areas of high, moderate, and low species density and richness. It was assumed that the higher the values, the higher priority for conservation. Inverse distance weighting and Kriging were the ‘best’ surfaces and more closely represent observed field data. Species density and richness was highest at the mid- and low elevations (3,000 – 4,500m), dominated by mixed chaparral (*Adenostema sp.*, *Arctostaphylus sp.*, *Ceanothus sp.*) and oak woodlands (*Quercus sp.*). Upper elevations (> 6,000 m) are shown as low priority for conservation and are dominated by conifer forests (*Pinus sp.*). However, under global warming scenarios, these higher elevation areas will likely be important as future habitats for many species. Based on the GIS analyses and field data, high priority areas in the mid and low elevation and shrub dominated areas are beneficial for many species, including cavity nesting species and migratory warblers and vireos.

**DEVELOPMENT AND EFFICACY OF A STANDARD PROTOCOL FOR SURVEYING FOREST CARNIVORES USING AUTOMATIC DIGITAL CAMERAS**

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*Poster Session*

**Abstract:** Automatic cameras have a long history of use in wildlife science. Problems with reliability and image quality have only recently been overcome, however, by the emergence of motion-sensing digital cameras with fast trigger speeds capable of recording multiple high resolution images while exhibiting extended battery life in field conditions. To generate reliable information a survey protocol needs to be cost-effective and easy to implement while achieving high detection probabilities for the target species. We developed a standard protocol using Reconyx™ digital cameras for surveying forest carnivores in the Sierra National Forest, California during three consecutive fall-winter periods beginning in October 2007. Our protocol uses commercially available scent lures+roadkill venison, photoviewers for verifying camera function, and “bear boxes” to reduce loss of camera survey days by disturbance. Images retrieved from memory cards are archived and then “tagged” by species, quality, and visit number. Our survey protocol has proven useful for detecting multiple species of forest carnivores ranging from long-tailed weasels (*Mustela frenata*) to mountain lions. During the first two camera survey years we generated over 161,000 good quality images of 14 different species of carnivores. Additional details will be provided, including recommendations for surveying for other organisms.

**USE OF NON-INVASIVE GENETIC DATA TO ESTIMATE FISHER POPULATION PARAMETERS IN THE EASTERN SISKIYOU MOUNTAINS OF CALIFORNIA**

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*Poster Session*

**Abstract:** Wildlife managers must understand population dynamics for species they manage. Some species are sensitive to human disturbance, and invasive methods of data collection disrupt normal
population processes, making non-invasive methods preferable. I use DNA in hair follicles to identify individual fishers (Martes pennanti) that enter bait stations during late fall of 2006-2010 in a 507km2 area of the eastern Siskiyou Mountains of California, a region of mixed land ownership (US Forest Service and private timber management companies). I shall estimate annual population sizes using mark-recapture estimators and track other population parameters. Through 2009, 70 individual fishers were identified with roughly half the fishers captured each year having been captured in previous years. In 2009, 28 individual fishers were “captured” 66 times with some fishers “captured” as many as 9 times. After data collection in the 4th and 5th years, several animals were relocated from the population to the Northern Sierra Nevadas to service a current reintroduction effort. I will track relevant population parameters and predict that I shall see no significant change in population size following removal due to the small number of animals removed.

**ASSESSING IMPACTS OF LEPIDUM LATIFOLIUM ON HABITAT QUALITY FOR SUISUN SONG SPARRS IN A BRACKISH MARSH**

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**Poster Session**  
**Student Poster**

**Abstract:** Over the last two decades, human-induced habitat changes have degraded 90% of the California’s coastal wetlands. Lepidium latifolium is a pervasive invader of California wetlands, potentially altering ecological and community dynamics. This project assesses the potential impact of L. latifolium on habitat quality for Suisun song sparrows in the brackish marsh of Rush Ranch Open Space Preserve (RROSP). Habitat quality will be assessed by examining average territory size (small territory size represents high quality habitat), pairing this information with vegetative characteristics and food web structure (via stable isotope analysis C13:C12; N15:N14). Lastly, both territory estimations and food web studies will be supplemented by extensive behavioral observations (via time activity budgets). Preliminary results show L. latifolium’s isotopic signature can be detected in both primary (invertebrate) and secondary (sparrows) consumers. We hypothesize that increased territory size correlates with higher percent cover of L. latifolium within a bird’s territory due to structural differences between native marsh plants and L. latifolium. We predict no evidence of differential feeding by Suisun song sparrows between plant types (native and invasive). Understanding the impacts of L. latifolium on Suisun song sparrows will allow for the conservation of this sensitive species within the context of L. latifolium eradication.

**COMPARING BURROWING OWL FOOD HABITS BETWEEN HUMAN ALTERED LANDSCAPES**

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**Poster Session**  
**Student Poster**

**Abstract:** Food habits are one of the most commonly reported aspects of burrowing owl ecology. Yet, food habits can vary greatly across time and space. Burrowing owls are a wide ranging species with a varied diet, and food habit studies conducted in one part of their range may not accurately reflect prey consumption in other parts of their range, particularly in relation to an evolving human-altered landscape. For one full year beginning in 2004, spanning both the breeding and non-breeding seasons, I monitored burrowing owls occupying four study sites representing three types of human altered
landscapes: urban, agriculture, and natural (grazed grassland). My study was conducted in the southern San Joaquin Valley, location of the second largest concentration of burrowing owls in California where this species is designated as a state Species of Special Concern. I compared prey consumption between study sites and seasons using logistic regression to determine if prey consumption was significantly influenced by the landscape in which the owl found itself. Understanding spatial and temporal differences in burrowing owl ecology may be important in developing regionally specific management plans for this species in decline.