UCLA La Kretz Center for California Conservation Science



The year in review

2018. What a year! Across the US, we've seen an escalation of the federal government's attacks on endangered species and environmental protection, matched by California stepping up its game as a national and international leader in both arenas. We experienced, up close and personal, the largest recorded fire in the Santa Monica Mountains and lost our newly renovated field station. But we've also seen some amazing success stories—80 dedicated undergraduates are helping us understand the biological consequences of the Woolsey fire that ravaged our mountains, donors have stepped in to fund both our fire research and a rebuild of our field station, and our postdocs and graduate students continue to produce cutting edge research that helps our agency partners protect Southern California biodiversity.

Here at the La Kretz Center, we continued to fund and grow our postdoc program, we funded a new cohort of graduate student researchers, and expanded our research and outreach at the Stunt Ranch Reserve. Postdoc Joscha Beninde joined us from Germany to lead our landscape genomics project quantifying movement corridors of 20 species of plants and animals across the LA basin, and agencies and policy makers have joined us in this massive effort to better manage the urban biodiversity that makes LA unique. Dylan Burge and Jesse Grismer moved on to new positions where they will continue to influence California conservation. Luke Browne, Gary Bucciarelli, and several other postdoctoral colleagues published papers on topics ranging from invasive crayfish to neotropical palms to endangered amphibian and reptile conservation. We taught our 6th iteration of the La Kretz Conservation Genomics workshop.

In the following pages we highlight some of our accomplishments for 2018. Thanks for your help and support.

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The La Kretz Center is made possible by a generous endowment by UCLA alumnus and philanthropist Morton La Kretz

Brad Shaffer, Director

Director's Initiatives



Fire severity impacts on plants and animals

The Woolsey fire burned more than 150 square miles in the Santa Monica Mountains last November. As conservation biologists, two important questions confronting us are how long it will take plants and animals to recover, and which ones will thrive or die out after the mountains' worst fire ever recorded.

Now, thanks to a generous donation from the Faucett Catalyst Fund, and in collaboration with scientists from the NPS, USGS, and MRT, the La Kretz Center is working with 80 student volunteers on a months-long study of more than 40 burn areas to closely monitor the recovery of native plants, invasive grasses, insects, slugs, snails and more.

Previous studies have looked at fire recovery across thousands of acres, but few have examined fire recovery at the fine-scale level and short time frames that are relevant to many small animals. Fires are very patchy, and our team is focused on whether more severely burned areas recover differently than patches where the fire was less intense.

By quantifying fire recovery in relation to severity at a close ecological scale, we hope to better inform general policy on managing future fires.

Applying new genomic tools to the conservation of understudied organisms

Brad Shaffer and Evan McCartney-Melstad were featured in the August 2018 podcast from the journal *Heredity*.

The focus of the podcast is the application of new genomic methods to understudied organisms, including a recent <u>study</u> published by McCartney-Melstad and Shaffer with Turkish collaborator Müge Gidiş on an endangered western US frog.

<u>Click here</u> to listen to Brad and Evan discuss their application of genomics tools to the conservation and evolution of the foothill yellow-legged frog and how their work may help the US Fish and Wildlife Service determine whether or not it should be listed under the Endangered Species Act. Their interview begins about 10 minutes into the podcast.

Is the urban jungle the answer to helping some endangered species?

In a <u>CityLab project</u> and <u>Voice of America video</u>, La Kretz Center Director Brad Shaffer and IoES Professor Ursula Heise consider if the urban jungle is the answer to helping some endangered species survive outside their native range. The success of many nonnative species in the Los Angeles area, including endangered red-crowned parrots, have these academics wondering whether a city can be a place to help endangered non-native animals. Think of it as an urban zoo, minus the fences.

In a recent <u>article</u> in Nature Sustainability, and an interview in <u>Smithsonian Magazine</u>, Brad suggests that urban biodiversity is an unplanned species assemblage. Although native biodiversity should be the primary goal of urban ecology, the built environment often contains optimal habitat for non-natives. With planning and research, he argues that we could use cities as semi-natural assurance colonies for endangered species.

Pictured below, non-native red-eared slider turtles bask in the sun at the UCLA Mildred E. Mathias Botanical Garden. Why not endangered Western pond turtles?





Invasive crayfish lead to more mosquitoes and risk of disease in Southern California

Invasive red swamp crayfish are a serious problem in the Santa Monica Mountains and other parts of Southern California. They devastate native wildlife, including threatened species such as the California red-legged frog, throwing off the natural balance of aquatic ecosystems.

They also pose a threat to people, according to a <u>paper</u> in the journal Conservation Biology. The study is based on field research in the Santa Monica Mountains and laboratory experiments by Gary Bucciarelli, UCLA La Kretz Postdoc and the study's lead author.

Mosquitos are notorious vectors that spread diseases including malaria, Zika and West Nile virus. In our mountains, mosquito populations are kept in check by native dragonfly nymphs, which are voracious predators of aquatic mosquito larvae. But invasive crayfish disrupt that predator-prey relationship by preying on dragonfly nymphs and eliminating them from our streams. The result: crayfish eliminate dragonflies, and we get more mosquitoes.

Gary's study is part of a long-term research effort to understand the invasive crayfish and eliminate or reduce their numbers. The original motivation was endangered species protection, but these new findings reveal a human impact that hasn't previously been examined— preventing malaria, encephalitis and dengue fever.

Palm forest habitat loss and fragmentation

La Kretz Postdoc Luke Browne is lead author on a <u>new study</u> on the effects of habitat loss and fragmentation on pollen and seed dispersal published in Molecular Ecology. In a <u>companion paper</u> also published in Molecular Ecology, Luke and his co-authors compared the effects of pollen and seed dispersal on genetic diversity in continuous forest.

Postdoc Research

Native grasslands restoration study

California grasslands have been severely impacted by the invasion of nonnative annual grasses, which often limit restoration of this important ecosystem. La Kretz Postdoc Justin Valliere is lead author on a <u>paper</u> in the journal Restoration Ecology that explores the use of mowing as a restoration tool for native perennial grasslands at the Santa Rosa Plateau Ecological Reserve in southern California.

Justin's study evaluates if, over time, mowing would reduce nonnative annual grass cover and benefit native species. His results suggest that mowing can be used to control nonnative annual grasses and increase the abundance of native bunchgrasses, but that this method may also have the unintended consequence of increasing certain weedy species.



Fellowships & Grants



2018 fellowship awarded to Joscha Beninde

Joscha Beninde is using landscape genetics to understand how species survive and thrive in urban environments.

Joscha did his graduate work at the Universität Trier, Department of Biogeography, in Germany.

As a La Kretz Postdoc, he is now working on a collaborative project with the Sustainable LA Grand Challenge to map the genetic diversity of 22 species of plants, butterflies, flies, slugs and vertebrates inhabiting the LA Basin.

Joscha's goal is to determine the contribution of protected lands to the conservation of genetic diversity, how species traverse the urban landscape of Los Angeles, and genetic resilience to future climate change. His project feeds directly into the councilman Koretz's LA biodiversity initiative.

Training and funding graduate students and postdoctoral researchers is an investment in the future of California conservation

Jesse Grismer



La Kretz Postdoc Jesse Grismer has been using genomic tools to determine the validity of the southern rubber boa, a candidate for listing under the US ESA. Jesse was named by <u>Zootaxa</u> as one of the 101 most productive herpetologists (in terms of "taxon output") in the history of biodiversity science. Jesse has described 49 new reptile species or subspecies, and is 67th on the Zootaxa Top 101 list.

Jesse recently accepted a position as an Assistant Professor at La Sierra College. Congratulations!

UCLA graduate student conservation grants

Our ten 2018 awardees, working on projects ranging from urban wildlife biodiversity to post-fire impacts on coastal lagoons, each contribute to our goal of supporting and promoting the best possible student research conserving California biodiversity.

Ioana Anghel: Investigating divergence with gene flow in the plant genus Linanthus

<u>Eleanor Diamont</u>: Only one way to succeed in a city? Urban Dark-eyed Junco adaptation across multiple novel environments

Sarah Helman: Intestinal pathogen surveillance in Los Angeles region mammals

<u>Gaurav S. Kandlikar</u>: Quantifying the effects of soil microbes on California annual plant community dynamics

<u>Meixi Lin and Ana Garcia Vedrenne</u>: DNA meta-barcoding to inform management for parasites infecting endemic San Miguel Island foxes

<u>Brenton Spies</u>: Community and ecosystem responses to physical processes – assessment of closure dynamics in California coastal wetlands

<u>Erin Toffelmier</u>: Identifying drivers of recent recruitment failures in California tiger salamanders in Santa Barbara County

<u>Amanda Tokoyama</u>: Assessment of helminth biodiversity in Los Angeles County coyotes through fecal meta-barcoding

<u>Rachel Turba de Paula</u>: Post-fire impact on biological community of coastal lagoons in southern California



Our main building at La Kretz field station destroyed in Woolsey fire

Five weeks after opening our new accessory building, the Woolsey fire swept through the field station. Our main building was reduced to ashes, but our second structure remains an intact 'foothold' as rebuilding plans develop.

Each year since it opened in 2013, the field station has hosted hundreds of conservation scientists for conferences, research and overnight stays. The station is run by UCLA; the buildings and land are owned by the National Park Service.

After the fire, UCLA and park service officials both expressed a commitment to restoring a field facility focused on collaborative conservation science in the mountains. Victoria Sork, Dean of Life Sciences at the UCLA College, said the field station provides an important link between UCLA and others in the conservation community. "It's very valuable for teaching and research, and we very much want to rebuild," Sork said. "It's incredibly important symbolically and empirically that we have science-based conservation and have a field station out there to facilitate and promote that research."

David Szymanski, superintendent of Santa Monica Mountains National Recreation Area, offered his support. "The National Park Service remains committed to our partnership with UCLA," he said. "Now more than ever, we value the world-class research that UCLA provides us, which will be critical as we move forward in the aftermath of this devastating fire."

Exactly how that partnership, which is based in scientific research and a strong field station presence in the mountains, moves forward post-Woolsey fire is still being worked out. Whatever the solution, both the La Kretz Center and the NPS are working hard to ensure that we emerge from this loss stronger and even better positioned to help conserve the ecosystems that we all cherish.

Field Station



La Kretz Center celebrates opening of new building

Scientists and researchers studying the Santa Monica Mountains have a new resource.

Working together, UCLA's La Kretz Center for California Conservation Science and the National Park Service opened a new field lab at the La Kretz field station at Rocky Oaks Park in the Santa Monica Mountains National Recreation Area.

The new facility features a "wet" lab, complete with freezers and a longneeded necropsy space that will enable the center's students and researchers to study wildlife in the field. The new facility includes overnight accommodations and a conference room.

The project was funded in part with a \$500,000 grant from the County of Los Angeles, arranged by former Supervisor Zev Yaroslavsky.

At the Sept. 30 opening of the newly completed facility, NPS ecologist Seth Riley described the wet lab as an essential tool for field researchers. "It's amazing to have this facility...[Previously] we've had to perform necropsies on the tailgate of our truck" Riley said. An adjacent "dry lab" will provide room for research and record storage.

UC NRS Stunt Ranch Biological Reserve



The magic of Stunt Ranch Biological Reserve

It was an exciting year for Stunt Ranch! Our research program continues to grow, to attract, and to retain research-based projects aimed at understanding climate change impacts to our ecosystems and how best to use these results to inform California conservation efforts. In total, researchers visiting Stunt Ranch and the number of visits have both increased by greater than 70% from prior year. Stunt also continues to be a top UC Natural Reserve System site for education and outreach. In 2018, we netted 3,676 user days dedicated to education, in part due to recently developed partnerships with local schools. We have also diversified our user base. This year Stunt hosted two graduate MFA students that utilized the Reserve as a primary site for their projects. Adding to our growing list of accomplishments, Stunt was recognized as a "super bloom" site this year!

We support research ranging from native plant restoration methods, chaparral responses to drought, mammal diseases, and the health of local salamander and frog populations.

Facts about Stunt

Stunt Ranch Reserve is a 310-acre reserve in the Santa Monica Mountains. Part of the UC administered Natural Reserve System (NRS), Stunt was established as a Reserve site within the NRS in 1995 and is one of 40 reserves that comprise the NRS. Since 2015, its research program has grown as a result of a formalized relationship with the UCLA La Kretz Center.

During the academic year ending June 2018, there were 115 active researchers on the reserve. A total of 1,864 people visited the reserve on 5,875 user days, representing a 70% increase in unique users since prior year.

Contact Gary Bucciarelli, Research Director, or visit our <u>website</u> for more information about Stunt Ranch Reserve.

Stunt Ranch in the broader context of California and its future

Over the last two years, I have worked alongside my fellow UC NRS Board of Councilors to raise awareness throughout the state of the invaluable research and education that occurs on UC Reserves. I am happy to say that a large collective effort helped the UC NRS attain \$10M via the passage of Proposition 68. These funds were administered equitably across the nine UC campuses to help our Reserves plan improvements and develop infrastructure. We are currently exploring the possibility of using these funds to build on-site lodging for visiting researchers at Stunt Ranch.

In conjunction, the NRS has worked with researchers to design a state-wide program that will parlay Reserve-based climate data into a meaningful tool that will ultimately assist California residents in making sustainable decisions. This project, entitled "The California Heartbeat Initiative," which is in its first phase, will use cutting-edge data from UC NRS Reserves to determine the fate of freshwater in California. It is currently funded by a \$1.2M dollar gift to the NRS from the Moore Foundation and will grow to encompass other facets of California's resources and environment.

This year we also launched the public phase of the UC NRS 50th Capital Campaign. Prominent individuals throughout the history of the UC NRS were honored, including the founding Director Roger Samuelson and philanthropist Linda Duttenhaver. To date, nearly \$40M of the \$50M goal has been raised.

I am excited about the research occurring at Stunt Ranch and within the UC NRS, how this work can better California's efforts to lead the charge against climate change, and ultimately serve as a model for other reserve networks.

Gary Bucciarelli, Research Director



Experimental ponds at Stunt Ranch Reserve inform USFWS about endangered species inbreeding and recovery

One of the most insidious problems faced by endangered species is the decline caused by inbreeding depression. Small populations tend to result in loose relatives breeding with each other, leading to reduced fitness in their inbred offspring. This leads to smaller populations, more inbreeding... and eventually the so-called extinction vortex. PhD student Erin Toffelmier is collaborating with the USFWS to study inbreeding depression in the endangered California tiger populations from Santa Barbara County. The Santa Barbara Distinct Population Segment is extremely threatened, with perhaps only a few hundred remaining individuals. Using experimental "mesocosms", Erin's results will guide potential strategies to use genetic rescue efforts to outbreed salamanders and reintroduce genetically robust individuals back into the wild.

What ecological attributes predict the survival of California flower communities?

How do competition, seeding density, and seeding time determine the success of California annual plant communities? And how can these results contribute to a mechanistic understanding of how the distribution of plants is shaped geographically and over generations? These are the questions visiting graduate student Lea Richardson is attempting to answer with her recent field manipulation study she installed this year at Stunt Ranch. Richardson is specifically interested in how reproductive success of California annuals is affected by a plant's immediate surroundings. For example, which species is a neighbor may increase competition and limit pollination success. It is a timely study as we admire the "super bloom" this year, which based on historical records, was not a rare event. Richardson's results may explain why some flowers can coexist while others appear incapable of coexistence.

Stunt Ranch Research

High School Student Tai Michaels Wins 2018 Los Angeles County AND California State Science Fairs!

Tai Michaels, a high school student mentored by UCLA La Kretz Center postdoc Justin Valliere, won first place in the Environmental Division of the Los Angeles Science Fair and then went on to win first place in the California State Science Fair! Congratulations to Tai for a great job developing and executing his project aimed at understanding effects of shorter fire return intervals on chaparral vegetation.

The La Kretz Center's work with Tai is part of a larger outreach effort to local high schools to form mentorship relationships and conduct research at places like Stunt Ranch, a 310-acre ecological field station in the Santa Monica Mountains.

For Tai, the science fair win stoked his growing passion for environmental science. As he prepared for college, the competition was a crash course on how to conduct and communicate high-level research.

"It was a really great experience," Tai said. "It was really helpful being involved with La Kretz Center and getting to work on a bunch of projects."



Public Outreach



Fossils as a tool for marine restoration: Old shells provide new insights for Santa Monica

One of the great challenges in conservation biology is discovering 'what was natural' before human impacts. This problem is especially pressing in marine systems where biological monitoring and other records are brief or lacking. Dr. Susan Kidwell has been tackling this problem in our Southern California marine ecosystems by treating the shells acquired during marine surveys as a young fossil record to reveal the dramatic, unsuspected changes in species composition and abundance that have occurred across much of our region. This reconstructed history of the last few thousand years highlights the profound transformation of seafloor communities in response to ~300 years of shifting land-use in the Los Angeles watershed, providing a powerful tool that can help set priorities for restoration.

Dr. Kidwell's lecture was followed by a panel discussion moderated by UCLA Associate Vice Chancellor Dr. Mark Gold.

Our Annual Lecture reaches hundreds of attendees each year for a free, informative lecture and discussion of key topics in local, national, and global conservation.

Save the date for the 2019 La Kretz Annual Lecture

Please join us for our free public lecture as three preeminent ecologists discuss the impacts of wild fire on California conservation.

Carla D'Antonio (UC Santa Barbara), Jon Keeley (US Geological Survey) and Seth Riley (National Park Service) all have decades of experience working in the fire-prone landscapes of Southern California. They will present their perspectives on the impact of wildfires on plants, wildlife, and human coexistence at the wildland-urban interface. The event will be moderated by Victoria Sork, UCLA Dean of Life Sciences, and there will be ample time for audience participation. The event is free and open to all!

Thursday, May 2, 2019 5:30 PM – 7:00 PM PDT Fowler Museum Lenart Auditorium 398 Westwood Plaza, Los Angeles, CA <u>RSVP</u>

California conservation genomics workshop



Our annual workshop provides a comfortable, informal training environment for a small group of 25 motivated graduate students to explore how conservation problems can best be addressed with modern genomic data. Our goal is to provide hands-on experience in the efficient collection, troubleshooting, and analysis of large, genome-level data sets for conservation-relevant problems. We focus specifically on non-model systems, and how we can best study and protect endangered taxa with genomic approaches. One of the highlights of our workshop is active participation from members of several US and California governmental agencies who use these data in endangered species protection and management, providing a forum for students to hear from the on-the-ground experts how their work can achieve maximal conservation impacts.

During the UCLA 2018 spring break, the La Kretz Center organized and hosted our 6th annual 5-day genomics workshop. Overnight accommodations for 25 grad students were provided at the La Kretz Field Station, and hands on classes taught by UCLA researchers were held at Stunt Ranch.

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Our partners

We are affiliated with a diverse network of UCLA faculty, postdocs and students, and we work closely with the U.S. National Park Service, the Museum of Natural History of Los Angeles County, the Orange County Natural Communities Coalition, The Nature Conservancy, the US Geological Survey, the US Fish and Wildlife Service, the California Department of Fish and Wildlife, the US Bureau of Land Management and the Mountains Restoration Trust to protect and restore California's biodiversity resources.



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