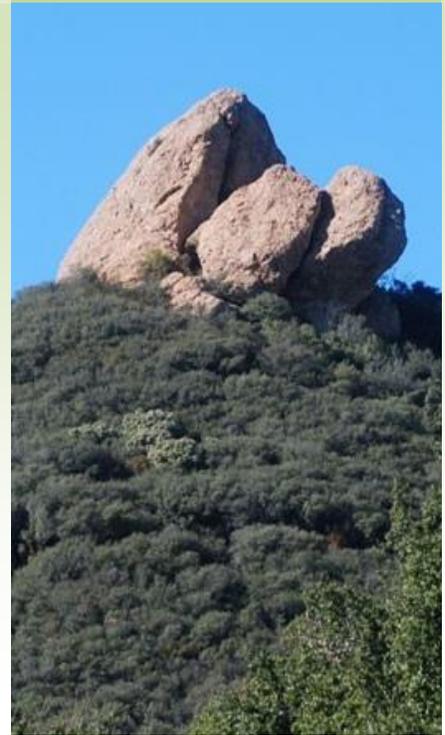


2017 Annual Report

# UCLA La Kretz Center for California Conservation Science



## The year in review

More than any time in the last decade, working collaboratively with our state and federal agency colleagues is critical, and we are funding projects ranging from endangered species management, to monitoring Marine Protected Areas, to planning oak forest replanting in the face of climate change. At our 2017 Public Lecture I vowed to double our commitment to postdoctoral funding, and we're doing just that this year, in collaboration with the UCLA Sustainable LA Grand Challenge. We also funded more graduate students, at a higher average support level, ensuring that they can achieve their scientific and conservation goals. We launched La Kretz Postdoc Alexandria Pivovarovoff onto her new career path at Whittier College where she can continue to influence conservation in Southern California, and we're putting the gears in motion to use genomic data to help the city of LA better manage and improve the biodiversity of our city. Our La Kretz Field Station and Stunt Ranch Reserve both saw huge increases in usage compared to just a year ago, and our new lab/accessory building at the Field Station is nearly complete and ready to further serve the community.

Perhaps most satisfying are the members of our team who have moved on: Mario Colon and Sid Shah, both staff members at La Kretz and former UCLA IoES undergraduates, are pursuing higher degrees in applied conservation at UCSB and Columbia, and a number of our past grant recipients have moved on to the next phases of their careers. We miss them all, but also recognize how important they are to our future.

In the following pages we highlight some of our accomplishments for 2017. Thanks for your help and support.

Brad Shaffer, Director

## Contents

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Director's Initiatives	2
Postdoc Research	3
Fellowships & Grants	4
Field Station	5
Stunt Ranch Reserve	6
Public Outreach	8
Publications	9
Contact Us	10

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

## Director's Initiatives



## Conservation genomics initiative

In 2016 the La Kretz Center launched its California Conservation Genomics Initiative to bring together academic scientists, resource managers and regulatory experts to exploit the power of cutting edge genomics in conserving California's most threatened species.

Thanks to a generous \$200,000 grant from UCLA Grand Challenges, equally matched by our own La Kretz Center, this year we have funding for two new postdoctoral researchers to study the population health and connectivity of

20-30 species of plants and animals across Southern California.

We are seeking two postdoctoral scholars to lead a broad, conservation genomics analysis of multiple co-distributed species across Los Angeles and Southern California. Our goal is to determine the contribution of protected lands to the conservation of genetic diversity, the ability of species to traverse the urban landscape of Los Angeles, and genetic resilience to future climate change.

*Genomics tells us the units of conservation, how animals and plants move across landscapes, and the number of animals in a population.*

## Science to save species

The University of California Natural Reserve System (UCNRS) turned 50, and released a video highlighting conservation on their 39 reserves.

Brad Shaffer's 20-year research program on UCNRS reserves set a state-wide agenda for protecting the upland habitat of endangered California tiger salamanders and is a highlight of the video. Check it out.

[Watch the video>](#)



## California conservation genomics projects

Research in progress funded by the La Kretz Center in 2017:

- Landscape genomics of critical species to determine eligibility for listing under the Endangered Species Act (joint with US Fish and Wildlife Service):
  - Southern Rubber Boa
  - Panamint alligator lizard
  - Western spadefoot toad
  - Lesser slender salamander
- Conserving the California desert tortoise in the face of solar energy development in the Mojave desert.
- Field ecological & genomic analysis of land requirements to maintain the critically endangered Santa Barbara tiger salamander.
- Genomic analysis of our locally declining California newt populations in the Santa Monica Mountains in partnership with the National Park Service.
- Measuring the effects of roads and agriculture on the movement of endangered California tiger salamanders and invasive Barred tiger salamanders.
- Genomic-informed replanting of Valley Oak in the face of climate change.
- Population health of declining tri-colored blackbirds across California.



## High N, dry: Nitrogen deposition and extreme drought

From 2012 to 2016, California experienced an exceptionally severe drought due to below average rainfall and record-high temperatures. These "global change-type drought" events may become increasing common under projected climate change. Working with collaborators from the National Park Service, La Kretz Postdoc Justin Valliere investigated the impact of Nitrogen (N) deposition on coastal sage scrub of the Santa Monica Mountains during five years of drought. Justin showed that N deposition may worsen drought-induced shrub loss by increasing plant productivity (they grow more) and reducing water-use efficiency. While native shrubs declined, nonnative plant invasion increased over time, especially under high N.

This work provides strong evidence that N deposition can exacerbate the negative impacts of other drivers of global environmental change, including extreme drought and nonnative plant invasion. Together, these drivers may contribute to the conversion of native coastal sage scrub to invasive-dominated annual grasslands. Loss of native habitat will further impact native biodiversity and ecosystem services. This in turn could impact human health and property as well, since increased invasion of annual grasses is associated with elevated fire risk, potentially leading to bigger, hotter and more frequent wildfires.

You can read more about this study in an article recently published in the journal *Global Change Biology*, found [here](#).

## Postdoc Research



### Field Expedition to San Jacinto Mountains for rare and elusive Southern California rubber boa

Charismatic endangered species such as polar bears and Los Angeles' famed mountain lions get a lot of public attention when it comes to conservation. Snakes, not so much! But the rubber boa makes a humble case -- they never strike, and gently wrap around a person's fingers after being picked up. The smallest member of the boa family, they subdue prey by constriction, primarily feeding on small mammals including mice and voles.

In April, a field expedition led by UCLA La Kretz Postdoc Jesse Grismer to find the rare and elusive Southern rubber boa doubled the number of known specimens and provided much-needed genetic samples that will be critical for federal decision makers as they determine whether the Southern rubber boa should be listed under the Endangered Species Act. Jesse's work, using genomic data and samples from hundreds of snakes, represents a collaboration between private field herpetologists, state and federal agencies, and the La Kretz Center.

## Fellowships & Grants



## 2017 fellowship awarded to Luke Brown

Rapidly changing climate in California and around the world has the potential to cause a mismatch between the environmental conditions that plants are adapted to and the environmental conditions they will face in the future, which threatens the viability of many plant populations.

Working with the California endemic species Valley Oak, La Kretz postdoc Luke Browne partners with the National Park Service and the U.S. Forest Service to integrate genomic data with growth

and survival information from common garden experiments. The goal of his project is to improve the management and restoration of Valley Oak habitat in a changing climate.

Luke is a member of the Sork Lab at UCLA. He received his PhD from Tulane University in New Orleans in 2017, focusing on the importance of genetic diversity on Amazonian palm tree growth and survival, and how pollen and seed dispersal interact to influence genetic diversity.

*Training and funding graduate students and postdoctoral researchers is an investment in the future—in our future—for California conservation.*

### Alexandria (Alex) Pivovarovff moves on to Whittier College

As a La Kretz postdoc, Alex conducted research on California native plant responses to drought. She collaborated with UCLA Professor Ulrike Seibt on experiments at Stunt Ranch Reserve and was also a visiting lecturer in environmental analysis at Pomona College.

An expert in plant physiological ecology, Alex was a presentation award winner at the 2017 meeting of the Ecological Society of America ("In the heat of the moment: Diurnal patterns of branch carbon uptake and transpiration during heat waves"). Alex is now a visiting assistant professor at Whittier College.

Congratulations, Alex!

## UCLA graduate student conservation grants

Ten UCLA student conservation projects were funded this year through the La Kretz Center/Stunt Ranch Reserve Small Grant Program. Projects ranging from urban lizard ecology to invasive algae control to genomics of endangered tricolored blackbirds, these projects represent the best possible student research on California conservation.

Congratulations to:

- *Emily Ryznar*: Community susceptibility to invasive brown alga
- *Rachel Turba*: Characterizing lagoon biodiversity using environmental DNA
- *Monica Dimson*: Detection of incipient, invasive ambrosia beetles using species distribution models
- *Kelly Barr*: Genomic resources for tricolored blackbird conservation
- *Lauren Smith*: Role of invasive alga in ecosystem functions on sandy beaches
- *Sarah Helman*: Intestinal pathogen surveillance in Los Angeles region coyotes
- *Daniel Cooper*: Long-term urban adaptation in nesting raptors
- *Camila Medeiros*: Conservation physiology of Californian flora
- *Erin Toffelmier*: Monitoring reptile diversity and measuring landscape genetic connectivity in the Los Angeles area
- *Robert Cooper*: Attenuating the spread of invasive tiger salamander genes using pond hydroperiod



## Construction nearing completion

Our new 1400 square foot accessory building will contain a necropsy lab for researchers at the National Park Service and UCLA, plus a conference room and overnight accommodations for conservation researchers.

## Record numbers visit Field Station

2017 was our busiest year yet at the La Kretz Field Station. Here's the year by the numbers, including a few highlights:

- 243 users; 80 more users than in 2016 (50% increase)
- 1388 user days; 694 more days (100% increase)
- 1119 user nights; 375 more nights (50% increase)

Retreats: Sork Lab group; Spring/Fall retreat for Coro Fellows Program in Public Affairs; Spring/Fall Cal State Northridge Behavior, Ecology and Evolution research group retreat.

Long-term housing: Postdoc Jesse Grismer (2.5 months); Visiting professor from Turkey (2 months); NPS ecologist Sara Gabel (10 months); Sork Lab postdoc Dylan Burge (12 months and counting).

Workshops & classes: La Kretz Conservation Genomics Workshop; California Philosophy Workshop "Relationship between mind and environment"; CSU Bakersfield/Pepperdine plant ecophysiology field trip.

Events: La Kretz Donor Dinner, NPS Breakfast Event.

## Field Station



### Postdoc in Residence

Dylan Burge is a postdoc in Professor Victoria Sork's lab at UCLA, part of a team of researchers studying the evolution of pathogen resistance in California's native oaks. His research uses genomic and experimental approaches to learn about the evolution of genes that are involved in pathogen resistance, with an overall goal of predicting how pathogen threats to these ecologically critical "foundational" trees will change as the climate warms during the 21st Century.

Dylan has been in residence at the Field Station for over a year. In addition to work and research, Dylan spends a lot of time hiking, mountaineering, snorkeling, spear fishing, and photographing nature. He is an expert on all aspects of the California flora, and seems to have a photographic memory for plant identification!

One of the goals of the La Kretz Field Station is to provide a convenient, inexpensive place for researchers like Dylan to live and conduct their work. Let us know if we can help you achieve your conservation goals.

## Stunt Ranch Reserve



## Stunt Ranch Reserve attracts new researchers and young scientists

Stunt Ranch Reserve strives to help new researchers and young scientists looking to understand the ways climate change, urbanization, introduced species, and drought are affecting our ecosystem health.

Year after year, researchers at Stunt Ranch have established unique field-based experimental studies and environmental and ecological monitoring programs. In 2017 we hosted

two new researchers performing long term studies of how climate change and introduced species affect hummingbird and bee migration patterns and behaviors. Other new young scientists are studying whether mainland sparrow species have evolved physiological differences compared to Channel Islands populations. Researchers also began a new study to understand what drives plant biodiversity patterns in our unique Mediterranean climate.

*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 39 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 2017, there were 168 active researchers on the reserve, up from 71 in the previous year. A total of 1,145 people visited the reserve on 2,993 user days.

Contact Gary Bucciarelli, Research Director, or visit our [website](#) for more information about Stunt Ranch Reserve.

## K-12 outreach is a hallmark of the reserve

Along with our Cold Creek Docent program for K-12 students, we have partnered with local high schools to provide a place for advanced students to conduct independent research projects under the mentorship of graduate students, postdoctoral researchers, and young faculty. This new model of outreach and education at Stunt is just taking off, but the first major project to study native plants and pollinators has already been a tremendous success.

## Cold Creek Docent Maestro Nancy Helsley

The Cold Creek Docents, led by Nancy Helsley, is a group of volunteers that have created an outdoor learning program for K-12 students to experience the natural history of the Santa Monica Mountains. Nancy is a retired grade school teacher who has dedicated over 20 years of her life to supporting outdoor education through the Cold Creek Docents. She earned a degree in Geology and has always been interested by the unique landscape and history of the area. She has tirelessly organized and led thousands of visits for tens of thousands of K-12 students through the Reserve to engage in the Cold Creek Docents program (over the last decade, on average, approximately 3,000 student visits each academic year!). Nancy has done a stellar job leading the educational design of this transformative learning experience, with topics ranging from chaparral ecology to early Chumash and Tongva culture to soil science, regional geology, and watershed stewardship. Nancy's commitment to serving the public and helping to educate tomorrow's conservation leaders at Stunt Ranch is an inspiration to all of us! For more information about the Cold Creek Docents visit us at <http://stuntranch.ucnrs.org/>.



## Pollinator interaction at shared floral resources

In collaboration with the UC Riverside Macrosystems project, Dr. Jenny Hazlehurst is studying how different pollinator species, especially hummingbirds and bees, interact at shared floral resources. She uses DNA metabarcoding techniques in combination with direct observations to determine what plants these pollinators have been feeding on. Stunt Ranch Reserve is an ideal field site for her, as it is a stopover site for migratory hummingbirds like the Rufous hummingbird, as well as home to resident hummingbird and native bee populations.

## Song sparrow adaptation to climate change

Maybellene Gamboa (Colorado State University) works on evolution and adaptation in Channel Island and mainland song sparrows in response to climate change to inform conservation management. She employs field and lab techniques to identify morphological and physiological adaptations to temperature in these widespread birds, and to determine the extent to which these adaptations are genetically controlled. Stunt Ranch Reserve is centrally-located in the Santa Monica Mountains, close to many riparian areas where she and her team often find song sparrows, and has open and accessible lab space that is great for running her experiments.

## Stunt Ranch Researchers

### Sarah Helman

As a veterinarian passionate about understanding the intersection between wildlife, pet and human health, UCLA PhD student Sarah Helman is excited to be conducting research on diseases that can affect both people and wild mammals in the Los Angeles region. By utilizing the Stunt Ranch Reserve as one of her research bases, Sarah is able to conduct large scale sampling efforts with local wildlife agencies to better understand the densities of common wild mammals and their pathogens within the broader urban ecosystem.

### Sasha Wright

Dr. Sasha Wright (California State University, Los Angeles) is working at Stunt Ranch to: (1) assess the competitive ability of the slender wild oat in higher diversity vs. lower diversity native plant communities, (2) evaluate how this may shift in wetter vs. drier conditions, and (3) quantify the role of microclimate (temperature and humidity) in determining plant performance in these experimental grasslands. The heavily invaded grasslands at Stunt Ranch are a perfect place to answer her research questions, and the proximity to downtown LA means that she can use the site on a regular basis to get more students involved in high profile plant ecology research.

## Public Outreach



## Our National Parks at 100: Confronting Change and Committing to Science

Ray Sauvajot, Director of Natural Resource Stewardship and Science for the United States National Park Service, presented the 8th Annual La Kretz Public Lecture, "Our National Parks at 100: Confronting Change and Committing to Science," followed by a panel discussion with La Kretz Director Brad Shaffer and David Szymanski, superintendent of the Santa Monica Mountains National Recreation Area. Ray, who received his

PhD at UC Davis, worked for a decade at the Santa Monica Mountains National Recreation Area before assuming his current position in DC.

The NPS is one of the leading conservation agencies in the world, and we were thrilled to have Ray as our annual speaker. After his talk, Ray joined us for a "dinner under the stars" at the Field Station for a stimulating evening discussion of US conservation policy.

*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 2018 La Kretz Annual Lecture on April 29<sup>th</sup>

Our 2018 Annual Public Lecture will be presented by Professor Susan Kidwell from the University of Chicago. Sue's talk, entitled "'Fossils as a tool for marine restoration: Old shells provide new insights for Santa Monica Bay", highlights her work as a paleo-conservation biologist in our local marine ecosystems.

Conservation often involves having a target—we want a habitat or ecosystem or species to resemble its "natural state" before humans. But what is that state in a place like Southern California, which has had human occupants for thousands of years? And is that the ecosystem we actually want?

Sue Kidwell uses the abundant, recent fossil shells that cover Santa Monica Bay to tell us what it was like "before LA", and ponder how that can guide effective conservation.

Please join us for a stimulating, fun event!

## Workshops, discussions, science fairs

2017 was a great year for our involvement in public events that taught cutting edge genomics to graduate students from around the world, conservation to local elementary school students, and everyone in between. A few highlights:

- 5th Annual California Conservation Genomics Workshop

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

- Tale of two cities in a hotter world

In a panel discussion at the La Brea Tar pits, La Kretz Center Director Brad Shaffer discussed how climate change will affect biodiversity in two of the greatest cities in the world, Los Angeles and Beijing. This discussion was one of a four-part climate series sponsored by the UCLA Institute of the Environment and Sustainability. [Watch the video](#)>

- K-12 Outreach

The La Kretz Center sponsored booths at Pepperdine University Earth Day Science Festival, Santa Monica Mountains Science Day Fair, UCLA's Explore Your Universe Festival, and Los Angeles Natural History Museum Nature Festival. Good times were had by all.

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Pivovarov AL, Burlett R, Lavigne B, Cochard H, Santiago LS, Delzon S. 2016. Testing the ‘microbubble effect’ using the Cavitron technique to measure xylem water extraction curves. *AoB PLANTS* 8: plw011; doi:10.1093/aobpla/plw011

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Shaffer HB, McCartney-Melstad E, Ralph P, Bradburd G, Lundgren E, Vu J, Hagerty B, Sandmeier F, Weitzman C, Tracy CR. 2017. Desert tortoises in the genomic age: population genomics and the landscape. bioRxiv 195743. doi: 10.1101/195743.

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Valliere JM, Irvine IC, Santiago L, Allen EB. High N, dry: Experimental nitrogen deposition exacerbates native shrub loss and nonnative plant invasion during extreme drought. *Glob Change Biol*. 2017;00:1–13. <https://doi.org/10.1111/gcb.13694>

Wang, I.J. and H.B. Shaffer. 2017. Population genetic and field-ecological analyses return similar estimates of dispersal over space and time in an endangered amphibian. *Evolutionary Applications* 10:630-639.

## Publications



### Turtles of the World

Turtle Taxonomy Working Group [A.G.J. Rhodin, J.B. Iverson, R. Bour, U. Fritz, A. Georges, H.B. Shaffer, and P.P. van Dijk]. 2017. [Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status \(8th Ed.\)](#). In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., Pritchard, P.C.H., and Mittermeier, R.A. (Eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. Chelonian Research Monographs 7:1–292. doi: 10.3854/crm.7.checklist.atlas.v8.2 017.

## Contact Us

### UCLA La Kretz Center for California Conservation Science

La Kretz Hall, Suite 300 Box 951496  
Los Angeles, CA 90095-1496  
(310) 825-5008 phone  
(310) 825-9663 fax  
lakretz@ioes.ucla.edu  
<https://www.ioes.ucla.edu/lakretz/>

Brad Shaffer  
Professor and Director  
Email: [brad.shaffer@ucla.edu](mailto:brad.shaffer@ucla.edu)

Gary Bucciarelli  
Stunt Ranch Research Director  
Email: [garyb@ucla.edu](mailto:garyb@ucla.edu)

William Wei Zou  
Administrative Assistant

Mario Colon  
Past Administrative Assistant, is now a  
Master's student at UCSB Bren School of  
Environment and Management

Sid Shah  
Past Project Coordinator, is now a Master's  
student in Environmental Science and  
Policy at Columbia University



*The La Kretz Center, a research unit of the  
UCLA Institute of Environment and  
Sustainability, is jointly administered by  
UCLA College, Division of Life Sciences.*

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Recreation Area National Park  
Service

## 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, and the US Bureau of Land Management to protect and restore California's biodiversity resources.

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