

2019-2020

Jasper Ridge Biological Preserve Annual Report

Stanford | School of
Humanities and Sciences

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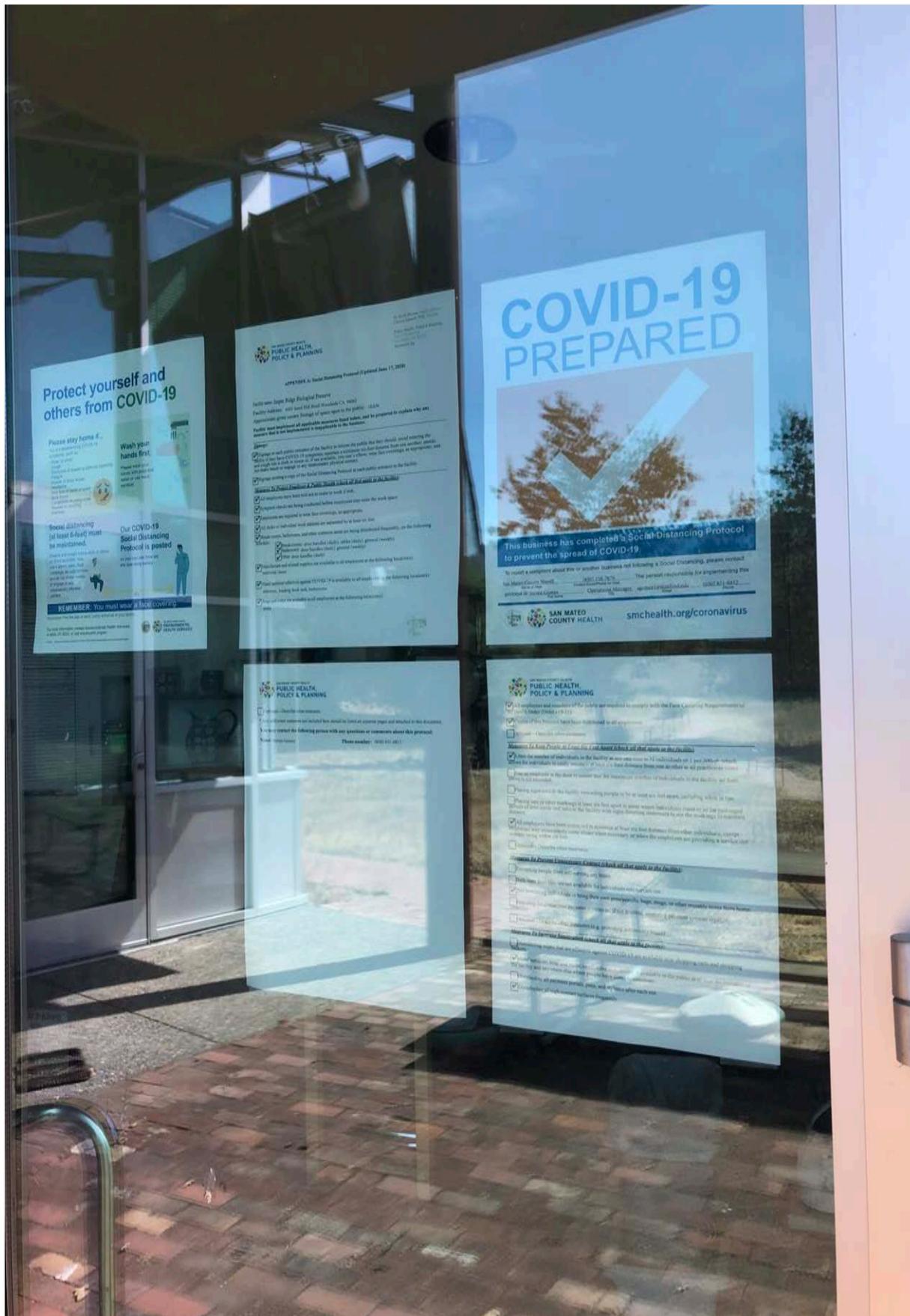
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An Unusual Year

The pandemic, extreme heat and drought, and surrounding wildfires forced new ways of thinking and doing.

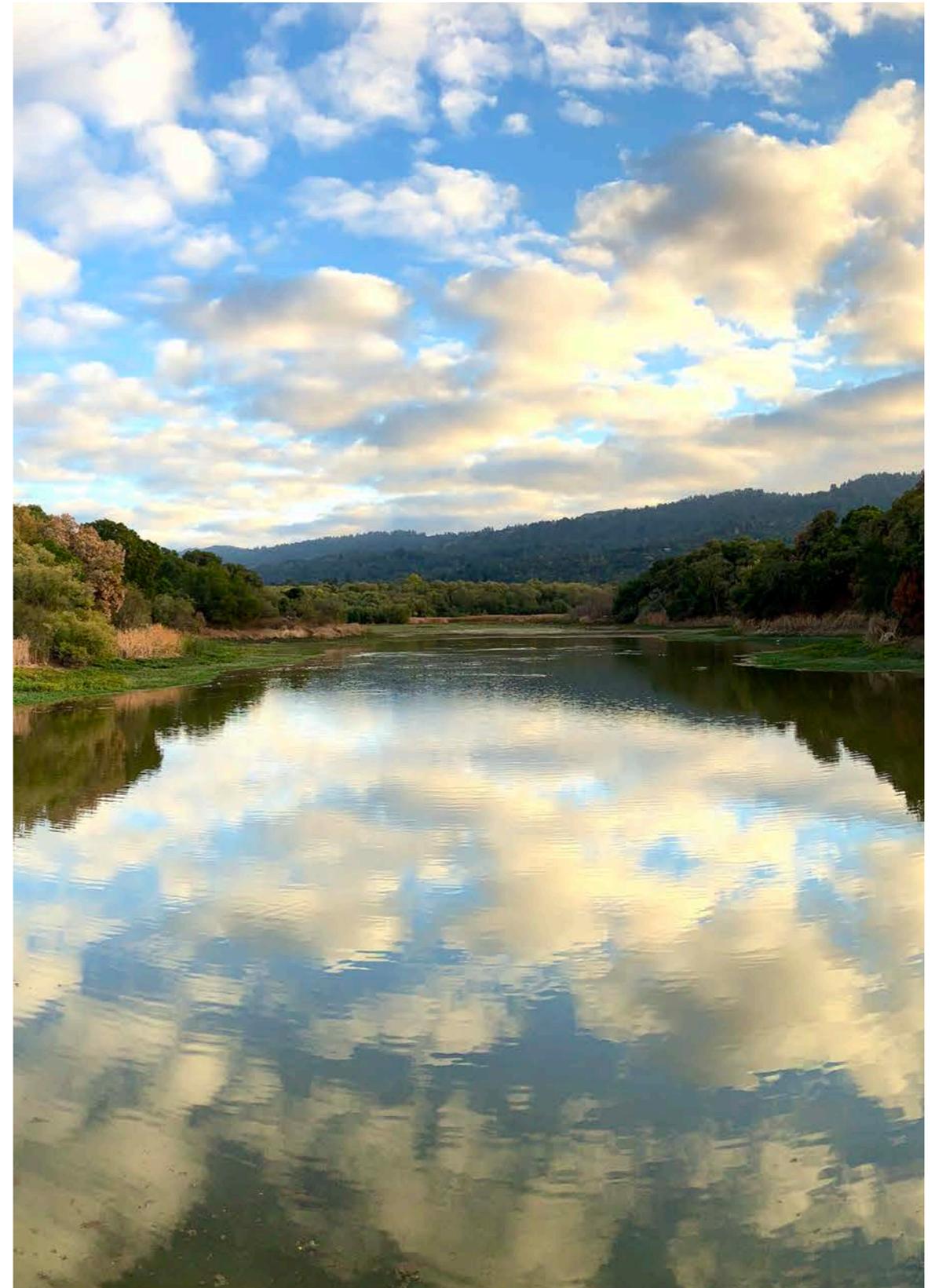


In this changing world, our mission, vision, and pledge are more important than ever:

- To contribute to the understanding of the Earth's natural systems through research, education, and protection of the preserve's resources.
- To be a leader for innovation in research, education, and communication on natural systems, through providing an interdisciplinary, cross-cultural, and place-based training ground for effective Earth stewardship by our community and the next generations of global leaders.
- To be a safe and welcoming place for discovery, discussion, and community for people of all cultures and identities.

We acknowledge and respect that:

- Jasper Ridge Biological Preserve sits on the ancestral land of the Muwekma Ohlone Tribe.
- This land continues to be of great importance to the Ohlone people.
- Consistent with our values of community and diversity, we have a responsibility to acknowledge, honor and make visible the university's relationship to Native peoples.



Jasper Ridge remains serene, despite the year's disruptions. Photos are JRBP staff photos unless otherwise noted.

From the Directors

It's safe to say that none of us have lived through a year like this one.

Pandemic, social isolation, wildfire, smoky skies, political upheaval—not a combination anybody was prepared for. Yet, life goes on, albeit in the context of a new normal to which we are all still adjusting. At Jasper Ridge, much has changed, but important things remain the same.

First the changes. We saw the full-stop of all but the most essential on-site activities in late March, in accordance with prevailing regulations. After that came mandatory face-covering on-site—making it easy to spot which pictures on the following pages were taken before the pandemic hit.

The biggest change of course involved replacing much of what we formally did on site with virtual activities. It has been no small feat to turn field experiences into something that can be effective through a video screen, yet our education teams have successfully done so. The virtual tours and activities that they've produced provide a way to bring Jasper Ridge to an even wider audience than we can reach with on-site activities.

Likewise, delivering our Tuesday afternoon social activities and seminars via Zoom video-conferencing has helped to keep our community connected, and provided venues for



Smoke from surrounding wildfires resulted in surreal landscapes for several days in August and September, turning skies gray (above) and orange (front and back covers). Also unusual, the upstream reach of Searsville Reservoir dried out this year (next page), a by-product of little rain and diverting water.

new kinds of interactions—such as sharing photos and stories about Jasper Ridge from our own living rooms.

Of course, there is no substitute for being together in person, and we all look forward to the day we can again do that safely. To that end we have been working with others in the university to develop protocols that will allow phasing in on-site activities. The first phase was resumption of essential long-term research maintenance and monitoring, which began in June.

What has remained the same? At the top of the list are the creativity and hard work of our talented staff and faculty, amazing students, and dedicated volunteers.



Their efforts have kept our vital research, education, and conservation programs thriving even through the shutdown, as you will read in the following pages.

Also unchanged is that at Jasper Ridge life goes on in all its vibrancy, even as the harbingers of the Anthropocene loom—which this year included drying out of Searsville Reservoir in its upstream reach, and surrounding wildfires that made it hard to breathe some days.

Through it all, we noticed little change in animal activity on our camera traps, a bit surprising given the decrease in human activity. It has been heartening to see that, despite the changes that upended our lives, wildflowers still bloomed, bees still visited the poppies, acorn woodpeckers still stashed their cache, deer still bedded down in the shade, and mountain lions continued to stalk the trails.

In short, the natural rhythm that is Jasper Ridge barely blinked its eyes at our human worries. That, perhaps, is the biggest lesson of this very strange year. This special place we call Jasper Ridge continues to remind us that there is something greater than ourselves that we nurture, and that we need to nurture us.

*Tony Barnosky, Executive Director
Liz Hadly, Faculty Director*

Education: Building Virtual Jasper Ridge

The pandemic forced temporary closure of Jasper Ridge to classes, tours, and outreach activities. The silver lining was innovation: We turned what we normally do in the field into virtual experiences that allowed our classes and community to continue learning at the preserve.

BIO / EARTHSYS 105, Ecology and Natural History of Jasper Ridge, began as normal: an excited group of docents-to-be ranging from freshmen to community members getting dirty in the field. Winter quarter saw the usual community-building and hands-on learning about soil profiling, piezometer reading, and plate tectonics as well as new additions to the curriculum such as using drones for ecological research. With the pandemic shelter-in-place order in March, the virtual world became real.



Before the pandemic students engaged in the traditional each-one teach-one experiential learning in the field (photos above) followed by on-site data analysis (next page, bottom). Lessons went virtual after the pandemic hit, with instructors finding innovative ways to deliver field lessons through computer screens (next page, top).



Rodolfo Dirzo and Jorge Ramos, with TAs Hanna Joy Payne and Julia Goolsby, brought the field into their students' homes. All of spring quarter was taught via virtual lectures, virtual field trips, and new innovative projects designed by the students. Student projects such as a new ant-survey guide, a new bird guide, and a new herbivory lesson for K-12 teachers, among many others, will provide lasting additions to Jasper Ridge educational resources. The capstone projects for BIO / EARTHSYS 105 resulted in the first-ever virtual tour of Jasper Ridge by its newly minted docents. The new virtual tour was unveiled to more than 70 Jasper Ridge affiliates who Zoomed in to congratulate the docent class of 2020.

Other Stanford classes also continued to thrive at Jasper Ridge, with instructors using on-site filming and other creative adaptations to immerse students in "field" work. These included BIO 47 (Introduction to Research in Ecology and Evolutionary Biology, taught by Tad Fukami, Jesse Miller, Daria Hekmat-Safe, and Shyamala Malladi); BIO 30 (Ecology for Everyone, Deborah Gordon); CEE 266C (Dams, Reservoirs and their Sustainability, David Freyberg) and GEOLSCI 42 (Moving and Shaking in the Bay Area, George Hilley). Students from EARTHSYS 10 and the Stanford Earth SURGE program also virtually learned at the preserve.

Reaching Out

Most of our educational programs remained active before and after the shelter-in-place order. Jasper Ridge continued to support the STEM Science Outreach Teachers Workshop this year with a lecture on defaunation by Rodolfo Dirzo and an interactive field trip of Jasper Ridge developed by Jorge Ramos. Late afternoon social events and seminars went virtual after the shutdown and included lectures by Allison Stegner, Rodrigo Sierra-Corona, David Tattoni, Maria Viteri, Kevin Leempoel, Megan M. Morris, and Patrick Archie, as well as the sharing of stories and photos by many of our Jasper Ridge affiliates.

The Continuing Education program included a geology session with Richard Nevle and mushroom exploration with Brooke Fabricant, among other short courses.

During January and February, high school students from regional Mid-Peninsula, Menlo Atherton, and Woodside High Schools experienced Jasper Ridge through long-standing cooperative programs. The 14-year tradition of working with the Redwood High School's REAL program and hosting their students for field-based learning continued thanks to the Stanford SEEDS Chapter led by Casey Mullins and Sydney Lee Schmitter. Santa Rosa Community College, Chaminade University of Honolulu and Arizona State University used Jasper Ridge to provide examples of STEM careers in conservation science. West Valley Community College



Above: Our community remained connected during the pandemic shutdown by virtual activities. Next page: BIO / EARTHSYS 105 students Niza Contreras, Anissa Foster, and Julien Ueda learning new field skills.

utilized our virtual resources to design their own bird field ecology exercises. These collaborations highlighted how Jasper Ridge exemplifies a site where a diverse team of scientists, educators and conservationists work together towards a common goal of biodiversity conservation in a rapidly changing world.

Nationally, Jasper Ridge contributed to scientific and other professional societies through activities showcased at the 2020 annual meetings of the Ecological Society of America (ESA), Undergraduate Field Experiences Research Network, and the Organization of Biological Field Stations (OBFS). The work with OBFS included contributing to the new [Virtual Field](#) website, which provides multiple resources for educators.



Many of our Jasper Ridge students and alumni of BIO / EARTHSYS 105 presented their research during the ESA annual meeting and were accepted to the national SEEDS mentoring program. Jasper Ridge also participated in the Diversity in STEM Conference of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) in Hawaii. Jorge Ramos served on a panel about careers in ecology in the SACNAS High School STEM conference, as a mentor in their Conversation with Ecologists session, and as a presenter in the science outreach and advocacy session in partnership with the Union of Concerned Scientists and March for Science leaders.

In addition, Jasper Ridge was invited to share information about its programs in two new interdisciplinary efforts. At the National Socio-Environmental Synthesis Center (SESYNC) and the SEEDS program, Jorge Ramos was invited as a key speaker in the first ever Graduate Student Workshop to Promote Increasing Diversity, Equity, and Inclusion in Interdisciplinary Research. He provided insights on linking interdisciplinary research and education to promote diversity, equity, inclusion, and justice. In the international webinar “Con-Ciencia en las Américas: Conversaciones en Español sobre Cambio Climático,” Rodolfo Dirzo and Jorge showcased—en Español—their research, education and mentoring activities at Jasper Ridge.



3709

Total Visits

2629

On site

1080

Virtual

1968

Visits for tours

923

Stanford student visits

19

Stanford classes

17

Stanford departments or programs

2119

Visits by learners outside Stanford

199

Visits for meeting venue

269

K-12 visits

178

Non-Stanford college-level student visits

7

High schools & middle schools

11

Non-Stanford universities or community colleges

By the Numbers Education & Outreach

Visitation and use dropped significantly this year because few people could be on-site during the pandemic shutdown. But virtual activities kept our community engaged.

By the Numbers

Research

95

Total researchers

73

Total projects

6

Academic departments

3

Schools plus LBRE

64

Stanford researchers

From Stanford

16

Faculty

14

Grad students

13

Undergrads

8

Postdocs

13

Other Stanford personnel



Above: Glade Dlott (Stanford Biology) collects cottonwood cuttings for greenhouse experiments. Previous page: Students describe Jasper Ridge soils.

Despite COVID-19, we maintained many essential research activities.

Research: Providing Safe Space

Jasper Ridge provided a safe outdoor space where some research was able to continue under health protocols designed to keep researchers and staff safe from COVID-19.

New projects were started to study ecological interactions, soundscapes, microbial ecology, genomics, remote sensing, geology, and historical ecological impacts. The list below and on pgs. 22-23 exemplifies many of these.

Rodolfo Dirzo and Tongbao Qo (Stanford Biology) began new tests of hypotheses about evolutionary relationships between mammalian and invertebrate herbivores.

Erin Mordecai, Lisa Couper, and Johannah Farner (Stanford Biology) initiated work on predator-prey and host-parasite interactions using tree-hole mosquitoes as a study system.

Kabir Peay (Stanford Biology) started new work on soil bacterial food webs.

Suzanne Ou (Stanford Biology) began studies of microbially-mediated plant-soil feedbacks.

Sarai Finks (UC Irvine) began assessing the diversity of bacterial communities on dry grasses in various habitats.



Above: Manzanita from Jasper Ridge was used in a genomic study. Next page, clockwise: An image from Krishna Rao's (Stanford Earth Systems Science) remote sensing study; David Freyberg (Stanford Civil and Environmental Engineering) recording piezometer readings; Emily Lacroix (Stanford Earth System Science) collecting soil cores.



Lauren O'Connell (Stanford Biology) organized the BioPOP project to introduce new doctoral students to field research through assessing the soil bacterial community in stands of conifers versus oaks.

Brett Furnas (CDFW) emplaced instrumentation to assess bird vocalizations in three dimensions.

Simon Morgan (Stanford Jasper Ridge) experimented with Audiomoth recorders to census birds.

Alejandro Velez Melendez (San Francisco State University) and **Lauren O'Connell** (Stanford Biology) laid the groundwork for a project on evolution, function, and mechanisms of sound communication in the Pacific Tree Frog and other anurans.

Yi Huang (UC Riverside) conducted genomic studies of Brittleleaf manzanita for inclusion in genomic delimitation of species of *Arctostaphylos*.

Bruce McCune (Oregon State University) took samples of *Leptogium lichenoides* for genomic study.

Krishna Rao (Stanford Earth Systems Science) employed microwave remote sensing to study oak woodland health.

Tanvi Dutta Gupta (Stanford Biology) examined the history and effects of mosquito abatement at Jasper Ridge.

Tyler McFadden and Julien Ueda (Stanford Biology) began analyzing the long-term bird census data for changes in species abundance over decades.

Sergio Redondo (Stanford Biology) analyzed mercury levels in the sediment cores from Searsville Reservoir and Upper Lake.

Wildfire: Detection and Prevention

This summer's surrounding wildfires highlighted the importance of detecting fires early, doing what we can to reduce risk, and working closely with emergency responders.

In August the Bay Area was hit with an unusually severe lightning storm, igniting wildfires throughout the region. Our camera traps recorded at least two strikes on the preserve (picture on next page), helping us to quickly check for potential ignitions. Luckily, neither strike resulted in a fire, but other parts of the Santa Cruz Mountains and Bay Area were not as fortunate. It was smoke from these surrounding fires that turned our skies orange, and that we watched move into Jasper Ridge by monitoring the ALERTWildfire cameras that were installed this year. These cameras are part of a first-alert fire detection system that now covers much of California and other states. The three cameras our staff installed—at Sun Field



Above: Trevor Hébert installs an ALERTWildfire camera at the Dish overlooking Jasper Ridge. Next page, clockwise: A Jasper Ridge camera records a lightning strike in the Boething area of the preserve; smoke rising from the CZU Fire; goats reducing fire fuels in the Boething area; Steven Gomez acquainting fire crews with Jasper Ridge access.



Station, the Stanford Dish, and Foothills Park—now provide nearly complete visual coverage of Jasper Ridge, as well as surrounding Stanford University lands and adjacent communities.

This year saw a significant increase in effort and expenditures directed toward fire prevention. To reduce fire fuels and to help ensure our neighbors can safely egress in case of a wildfire, we created buffer zones where the preserve borders Family Farm Road. Other fuel reduction efforts included bringing in a herd of some 400 goats and sheep to graze 12 acres of surface flash fuels in the Boething area; expanding our mowing program and creating fire breaks and defensible space to the extent that nearly 40 acres of the preserve were treated in 2020; and assessing treatment options for our Westridge fence line.

We also worked with Stanford Lands, Buildings and Real Estate (LBRE) and an outside consultant to begin developing a fire risk model and treatment plan. On the ground we hosted “fire tours” to familiarize Woodside fire crews with roads, vegetation, topography, and infrastructure, including providing them with specialized maps to facilitate emergency access and mitigate impacts on sensitive areas.

Conservation Highlights

Wildlife took the pandemic, wildfires, and smoky skies in stride, continuing to find refuge at Jasper Ridge. The dry year reduced the usual wildflower bloom in the serpentine, and opened up the Searsville Reservoir lakebed for colonization by new plants.

In December Jasper Ridge hosted a training workshop, organized by the Santa Cruz Mountains Stewardship Network, on using Calflora's WeedManager to map and manage invasive species. One of the first applications was a French Broom (*Genista monspessulana*) pull in January from two heavily invaded areas—the bench above the north bank of San Francisquito Creek at the low-flow crossing and an area just west of trail 18. Organized by Hanna Joy Payne and involving two dozen students and volunteers, this year's effort continued two decades of broom pulling throughout Jasper Ridge. Docent Rebecca Reynolds mapped and recorded the sites in WeedManager.



Above: A socially-distanced herbarium crew took advantage of the exceptionally dry year to survey the plants colonizing the parched upper reach of the Searsville Reservoir lakebed. Next page, bottom. The lakebed survey revealed a native species previously unrecorded at Jasper Ridge, *Sesuvium verrucosum*. Next page, top: A composite photo compares the size of the newly-arrived feral pig to one of our mountain lions. We suspect the pig entered from the Westridge area near Mapache gate.

Composite photo. The mountain lion and pig were photographed by the same camera on different nights.



We also managed to continue suppression of stinkwort (*Dittrichia graveolens*), following on many years of vigilance. We did not do as well with Yellow star-thistle (*Centaurea solstitialis*) due to a shortage of people-power at the critical time. However, star-thistle's seed bank is short-lived, and in coming years we may be able to catch up on the eradication effort.

This year Jasper Ridge saw the first confirmed entry of a feral pig. These large omnivores range through much of California, the wild descendants of escaped livestock and European pigs introduced for hunting. Their habit of rooting through soil can cause considerable damage. So far we are in a wait-and-see mode, keeping a close eye on pig activity with our cameras.

Due to an exceptionally dry winter and diversion of water to Felt Lake, water in Searsville Reservoir dropped even lower than in summer 2019, when it was at a historic low due to dewatering to facilitate a fish survey. Among the willows and species that typically colonize seasonally dry flats and the margins of saline wetlands was a native species not previously recorded at Jasper Ridge, *Sesuvium verrucosum* (Western sea-purslane). This is the first member of the ice-plant family recorded at the preserve. Other locally rare occurrences included the California native, *Malvella leprosa*, collected only twice before on the Stanford campus, in 1931 and 1961.

Affiliates

Big thanks to our hundreds of docents, volunteers, and other affiliates who are so essential for Jasper Ridge to accomplish its mission. They regularly lead tours for visitors, conduct wildlife and plant surveys, maintain the Oakmead herbarium, catalog archival materials, assist researchers in field and lab work, help teach classes, aid in conservation work, and help create a thriving community.

“ JRBP is an ecological jewel. It is an absolute delight and privilege to be a docent here and share this wonderful place with others. -Klaus Porzig

“ Every hike and experience is different. I love to listen to nature, learn from Jasper Ridge’s amazing team and talented co-docents, and lead groups of all ages, backgrounds and interests. -Katharina Stromeyer

Some highlights of affiliates’ research contributions this year include identifying birds in hundreds of hours of audio



Docents Jack Owicki and Klaus Porzig (right) contribute to research efforts of the Mordecai lab by surveying for tree-hole mosquito larvae.

recordings (Emily Kim) and camera trap photos (Malia DeFelice, Richard Jeffers, and Rachel Zinn) to help train AI systems; providing critical infrastructure and help (Kerry DeBenedetti) for a student researching bats; processing, visualizing, and managing vast amounts of acoustic bat data (Tom Malloy); surveying mosquitoes and collecting their larvae (Angie Nakano, Jack Owicki, Klaus Porzig), helping to set up a variety of field experiments (Bill Gomez); organizing the ant survey (Matt Bahls, Merav Vonshak, Angie Nakano) collecting data for non-Stanford researchers who could not be on-site during the pandemic shutdown (Scott Gould); and studying photochemistry of Searsville lake sediments (Ted Mill).

Education and outreach contributions included helping revise signage policy (Jerry Hearn, Betsy Morgenthaler, Diane Renshaw, Jeanne Sedgwick); providing photos for and managing the Birds of Jasper Ridge photo gallery (Peter and Diane Hart); providing photos for our social media postings (Dan Quinn, Jeff Schwegman, Alice Cummings, Natalie Downe, and others); running the Continuing Education series (Gary Nielsen); sharing natural history observations on our chat list (Targe Lindsay, Bob Dodge, Anne Rosenthal); and helping with live and virtual tours (Matt Bahls, Mary Bernstein, Alice Cummings, Bob Dodge, Bill Gomez, Scott Gould, Jerry Hearn, Sally Jackson, Laura Jones, Stuart Koretz, Jacob Kuppermann, Claire Josephine Lang-Ree, Targe Lindsay, Catherine Magill, Sonny Mencher, Jordana Meyer, Jesse Miller, Erin Mordecai, Simon Morgan, Jane

Moss, Casey Mullins, Dawn Neisser, Becca Nelson, Vivian Neou, Jack Owicki, Klaus Porzig, Dan Quinn, Sergio Redondo, Diane Renshaw, Rebecca Reynolds, Anne Rosenthal, Sydney Schmitter, Jeff Schwegman, Bob Siegel, Jonathan Siegel, Julia Simon, Katharina Stromeyer, Abby Varney, and Susan Walz, among others.

In conservation efforts, affiliates (Diane Renshaw, John Rawlings) guided non-Stanford vegetation researchers. Dozens of volunteers helped keep two invasive species at bay, as noted in the Conservation section.

Our volunteer bike rangers kept the preserve safe through monitoring trails, especially important this year with fewer people on site.

During the Shutdown

“ I miss the the weekly walks to monitor the plants with my botanizing friends in the Herbarium, the change of the seasons, and knowing how or if this smoky summer has affected different plants. I have also missed working with the high school and college students who are losing their experience of the outdoors at Jasper Ridge this year. Can't wait for the opening day. -Rebecca Reynolds

“ I've missed my weekly walks with the herbarium group, looking for, identifying and photographing various Jasper Ridge plants while socializing and learning from other group members. -Alice Cummings

“ I really miss the interactions that occur during study set up and data collection. -Bill Gomez

“ Nothing can replace the olfactory, visual, auditory and mental impact of being on a trail ... the [pandemic shutdown] leaves me without the inner support a natural surrounding provides me in my daily life. -Bob Dodge

“ We have missed the people...social gatherings, learning about nature from beautiful minds, and the time with visitors telling the Jasper Ridge story in all its complexities. -John Working



The herbarium team (Mary Bernstein, John Rawlings, Ann Lambrecht, Alice Cummings, Dawn Neisser, Paul Heiple, and Rebecca Reynolds, pictured, plus Carl Cheney, Toni Corelli, Philip Dibner, Diane Renshaw, and Vivian Neou) helps protect sensitive plants at Jasper Ridge. Photo: Vivian Neou

“ I miss the smells of the dry earth, the rustle of the leaves in the soft fall winds, the subtle turn of colors ... Knowing that the preserve will be there in the future, waiting for me, helps me look past today's challenges. -Jerry Hearn

“ I miss the weekly herbarium walks to see the changes through the year's seasons. -Paul Heiple

“ Staying connected through monthly Zoom seminars has helped me get to feel close to the docent community in a new way. I miss the luxurious peace and quiet that descends the minute I drive through the gate and enter 'Jasper Ridge time'. -Jane Moss

“ I have missed the opportunity to take people through the Preserve for their first visit. Introducing people to this amazing place, so special and so close to home, always brings me joy. -Christine Martens

“ I miss visiting the Ridge out of Escobar Gate each month with the bird transect crew. Traversing the same trails in the morning light, each month, seeing the changes and the constant aspects. Hearing and seeing birds, yes, and familiar colleagues — but mainly, watching the play of the seasons sweep over the Ridge, spring, summer, fall, rain, repeat. -Dan Quinn

“ I have really missed the birding transect with Phil Leighton's group from Escobar along the ridge. It is always a pleasant surprise to see the monthly changes along the route - the birds of course but also the seasonal changes in the vegetation and even the early morning light -Sara Timby

Strategic Initiatives

Work progressed on our Anthropocene Biodiversity, Science for Land Stewardship, and Out-of-the-Box-and-Into-the-Cloud Initiatives.

Anthropocene Biodiversity. In collaboration with Haus der Kulturen der Welt (HKW) in Berlin, Germany, the hundred-to-thousand year environmental history of Jasper Ridge is being integrated into a global examination of the scientific and cultural meaning of the Anthropocene. The effort is part of the [Anthropocene Curriculum](#) project spearheaded at HKW, which brings together scientists, artists, writers, historians, and others to explore and communicate the significance of the Anthropocene to a worldwide audience. The Jasper Ridge connection is provided through work underway on sediment cores from Upper Lake and Searsville Reservoir with our partners at the U.S. Geological Survey and at several collaborating labs in Europe and China.

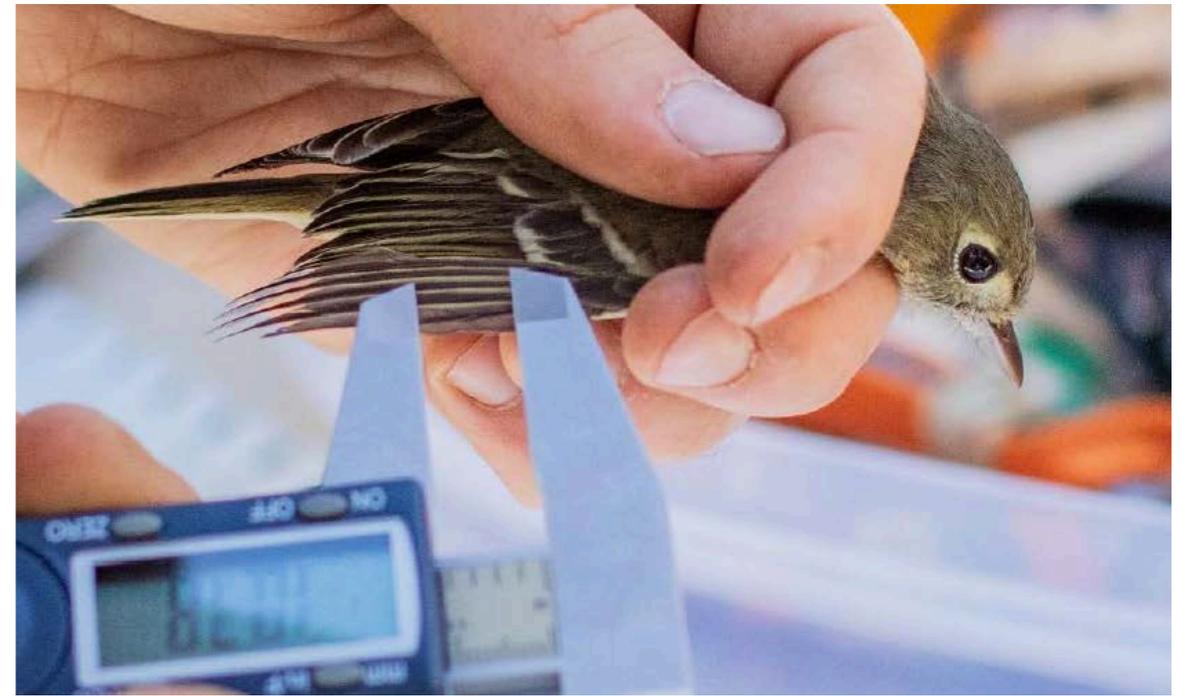


USGS scientists SeanPaul La Selle and Brandon Nasr recovering sediment cores from Upper Lake, to unlock the history of Jasper Ridge over thousands of years.

Science for Land Stewardship. We continue to work closely with the Santa Cruz Mountains Stewardship Network. A key product is the SCMSN Digital Atlas led by postdoc Kelly Chauvin. It now includes more than 200 layers in a GIS framework that allows visualization of parameters needed to plan for the future, such as land use and land cover, ecosystem integrity, water quality, trails, fire, wildlife infrastructure, and many others.

Newly launched this year is a collaboration to understand how land-use changes are affecting bird migration patterns and distributions. Funding from the National Science Foundation is facilitating building the San Francisco Bay Research Coordination Network for Student Opportunities in Avian Research to Enhance STEM Education (SOAR), in partnership with the San Francisco Bay Bird Observatory, Santa Clara University, San Jose State University, and West Valley Community College. A major goal is to embed students in this STEM activity, especially those from under-represented communities, blending research, education, and conservation approaches.

Out-of-the-Box-and-Into-the-Cloud. Advances this year included testing a fish-eye camera trap developed by Jasper Ridge personnel, a first of its kind which captures in a single image organisms as small as a mouse to as large as an elephant. Efforts to adapt AI techniques to identify birds



The new effort SOAR will involve students, faculty, staff, and volunteers from five institutions to monitor bird population dynamics through banding and other techniques, and provide new STEM opportunities for URM students. Photo: Peter Hart

from their vocalizations as recorded by Audiomoths or video cameras were initiated. On the eDNA front, Kevin Leempoel and colleagues demonstrated that identifiable eDNA is present even in the oldest (>100 years) levels of Searsville Reservoir cores, and that eDNA is as good (or even better) than camera traps for censusing animal biodiversity. Jordana Meyer and collaborators developed a rapid, low-cost technique to analyze DNA from animal scat and from that, to map networks of species interactions. As noted in the [Stanford Report](#), the techniques could “help redefine conservation as we know it, identify otherwise hard-to-find species and guide a global effort to re-wild vast areas.”

Congratulations

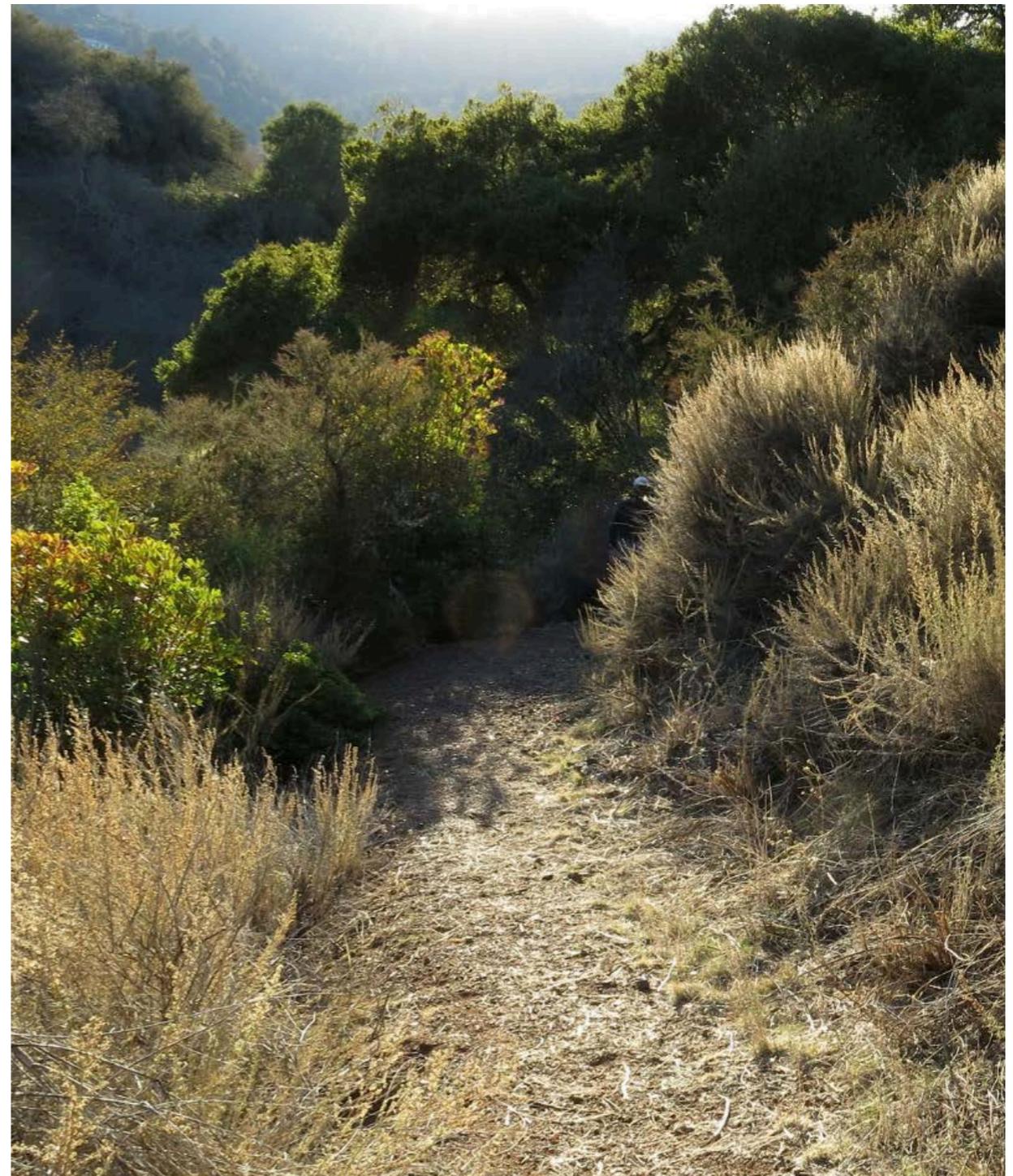
Philippe Cohen Graduate Fellowship

Two students are recipients of this year's Philippe Cohen Graduate Fellowship: Avery Hill and Kate Lagerstrom. Avery's work focuses on understanding the response of California vegetation, particularly the forest-shrub interface, to Anthropocene drivers such as climate change, fire, and urbanization. He uses statistical modeling techniques to characterize and help anticipate the movement of species range limits. He is a member of Chris Field's lab.

Kate's work aims to reveal the diversity and distribution of *E. coli* in wild animals. Hers is one of the very few studies that focuses on identifying how *E. coli* travels through wild systems, and the feedbacks between *E. coli* in the wild and in humans. Kate's fellowship this year continues from last year. She is a member of Liz Hadly's lab.

Mellon Grant

Lisa Couper was awarded a grant to investigate the likelihood of adaptation of mosquitoes to climate change using the western tree-hole mosquito, *Aedes sierrensis*, as a model system. She is assessing how well the tree-hole mosquitoes at Jasper Ridge and other localities are



Above: Avery Hill's work clarifies the response of California vegetation in the changing world of the Anthropocene (Photo: Alice Cummings). Next page, top—Erin Mordecai, Johannah Farner, and Lisa Couper (left to right) collect tree-hole mosquitoes. Lisa is studying climate adaptation in this disease vector. Next page, bottom—Kate Lagerstrom is analyzing scat from coyotes and other wildlife to understand the distribution and diversity of *E. coli* in the Jasper Ridge ecosystem.



adapted to their current temperature environment, and their capacity to adapt to warming. Lisa is a member of Erin Mordecai's Lab.

Bass Fellowships

Bass Fellowships are awarded by labs in the Biology Department to fund summer internships as part of diversity, equity, and inclusion initiatives. This year's Bass Fellows included several undergraduates from the Hadly Lab who conducted Jasper Ridge research remotely.

Rebecca Jia: Merriam's chipmunk at Jasper Ridge. *Rebecca used biodiversity databases to research the historical and modern day range of Merriam's chipmunks, which are found at Jasper Ridge.*

Ruslan AlJabari: Climate History of the San Francisco Peninsula. *Ruslan studied the climatic history of the San Francisco Peninsula, compiling disparate datasets like past storm event and stream flow data.*

Adonis Pugh: Geology of the San Francisquito Watershed. *Adonis learned GIS and worked to digitize a detailed geologic map of the San Francisquito watershed. Ultimately this data will be used to estimate the proportional bedrock composition of the sub-watersheds that feed into Searsville Reservoir.*



Bass Fellowships

Willow Bowen: Coyotes and Community Camera Traps. *Willow used camera traps hosted by community members to study the activity of coyotes in areas surrounding Jasper Ridge to understand how they are impacted by the presence or absence of mountain lions.*

B-SURP Internship

Biology Summer Undergraduate Research Program

Zack LaGrange: Mosquito and Odonata trait database. *Zack compiled life history and habitat information for mosquitoes, dragonflies, and damselflies found at Jasper Ridge. This information will be used to evaluate fluctuations in their abundance through time.*

VPUE Major Grant

VPUE Research Grants are awarded by the Vice Provost for Undergraduate Education

Vrinda Suresh: Bat diversity and diet at Jasper Ridge. *Vrinda is researching bat abundance around Jasper Ridge using audio recordings. With the help of community members, she is gathering bat guano for dietary analysis. She is analyzing insect biodiversity using public databases and previous studies at Jasper Ridge.*



Above: Larva of the tree-hole mosquito *Aedes sierrensis*. Mosquito species were the focus of three different research projects that started up this year, with investigations spearheaded by Zack LaGrange, Tanvi Gupta, and multiple projects in Erin Mordeciai's lab.



University Awards

Students whose work at Jasper Ridge helped earn them accolades from Stanford University

Casey Mullins (top photo) was honored with a Julie Kennedy Public Service Scholar Award in the School of Earth, Energy and Environmental Sciences. The award recognizes students who have engaged in meaningful public service activities. She received the award because of her active involvement in Stanford SEEDS, REAL, BioBlitz, and Jasper Ridge Biological Preserve.

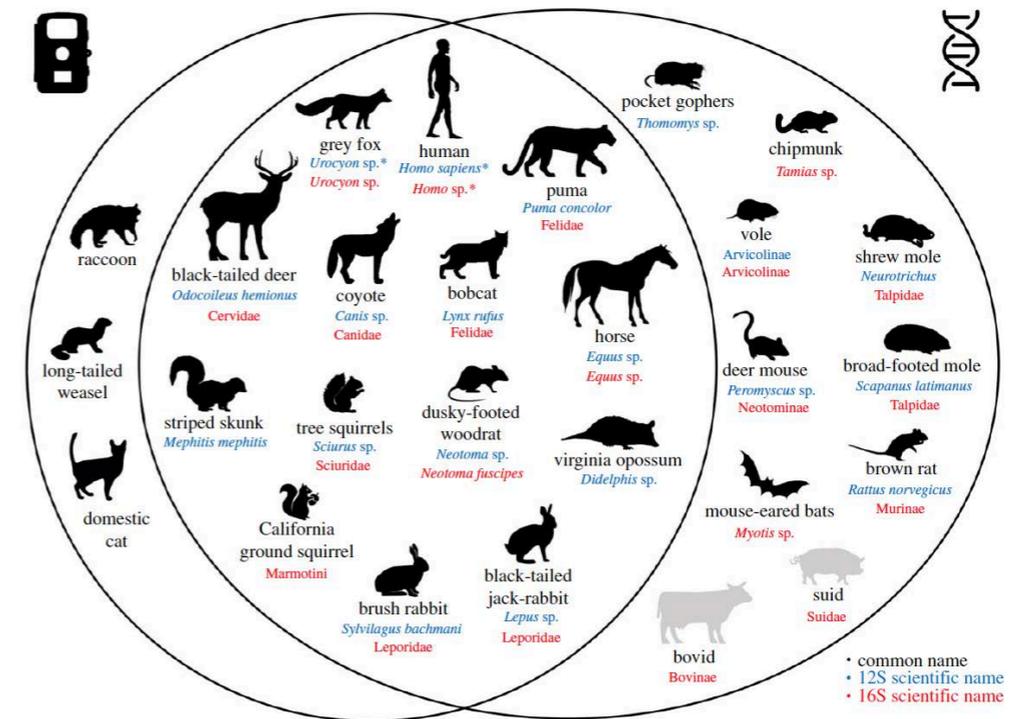
David Tattoni (middle) received a Firestone Medal for Excellence in Undergraduate Research. The Firestone Medal is awarded to students whose theses are judged to be in the top 10% of the graduating class. David's thesis in Earth Systems, "Riparian Avifauna of the San Francisco Bay Region: Population Dynamics and Future Outlooks with Anthropogenic Climate Change," was based largely on his work at Jasper Ridge. He was advised by Rodolfo Dirzo (Biology). Photo: Peter Hart

Rebecca Nelson (bottom) was a co-recipient of the Stephen Fox Award, by which the Department of Biology recognizes the most outstanding undergraduate in Biology. Becca's honors thesis "Variation in Insect Herbivory, Palatability, and Plant Defensive Traits across sympatric California Oak Species" was based at Jasper Ridge. She also received an Award for Excellence in Honors Thesis Presentation, which is coordinated by the Oral Communications Program and granted by departments and programs to students whose honors presentation exemplifies the highest standards. She was advised by Rodolfo Dirzo (Biology).

Congratulations Casey, David, and Becca!

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Venn diagram from Leempoel et al. publication no. 19, illustrating that eDNA provides a broader census of biodiversity than camera traps.

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Financials

Financial impacts of the pandemic have been severe. Jasper Ridge will see a 14% cut to its FY20-21 operating budget.



Expenditures \$1,474,192

Administration \$26,039

Operations \$76,884

Land Management \$15,402

Education \$45,099

*Research \$232,792

Staff salary & fringe \$1,077,976

Only includes funds controlled by JRBP in direct support of maintaining the preserve for users. Most users fund their work from non-JRBP sources. *Includes \$165,602 post-doctoral and research assistant salaries and \$6,139 administered by Biology but restricted for use by JRBP.

Revenues \$1,490,444

General Income \$16,319

University H&S \$202,102

Gifts \$65,217

Grants \$159,568

*Endowment Income \$1,047,238

*Includes \$141,483 from endowments administered by Biology but restricted for use by JRBP. Revenues and expenditures do not include student support provided by the Philippe Cohen Graduate Student Fellowship which is administered out of the Biology Department.

Community Coordinating Council

Advisors from Stanford and non-Stanford groups representing the broad range of organizations with which the preserve interacts. Provides advice and guidance to the directors on significant management challenges.

JESSICA SHORS APPEL - San Francisco Water Department; DON BULLARD - Woodside Fire Protection District; RICK DEBENEDETTI - Woodside Trail Club; DENNIS DEBROECK - Peninsula Open Space Trust, Board Chair; PIE Ranch, Board member, Retired Senior Corporate Partner, Fenwick & West LLP; DENISE ENEA - Woodside Fire Protection District (stepped down 2020); MARY ELLEN HANNIBAL - Citizen science, nature writer; JERRY HEARN - Acterra and Jasper Ridge docent; LAURA JONES - Stanford LBRE Archaeology; JEAN MCCOWN - Stanford University Government/ Community Relations; BETSY MORGENTHALER - Jasper Ridge docent; TRISH MULVEY - Palo Alto community volunteer; HELEN NUCKOLLS - SLAC National Accelerator Laboratory; DIANE RENSHAW - Jasper Ridge docent; HEYWARD ROBINSON - Vice President, Oakbio Products, former mayor of Menlo Park and former Chairman, San Francisquito Creek JPA; JEANNE SEDGWICK - Neighbor and Jasper Ridge docent; ANNE SCHULOCK - Assistant Vice President for the Arts,

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Composed of Stanford faculty and graduate students to provide high-level guidance on strategy and policy.

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