A Year of Discovery

ANNUAL REPORT 2018/19

Stanford | Jasper Ridge Biological Preserve
SCHOOL OF HUMANITIES AND SCIENCES

CONTENTS

Staff Reflections

"Every morning as I drive through the gates, I take a moment to open my senses to the beauty that is Jasper Ridge. As I look back on my first year working here, the most exciting part has been helping to facilitate the retreats and meetings we hold for our Stanford affiliates, sharing the calm, simple, natural tranquility of the preserve. Jasper Ridge is truly a beautiful, special place to spend time." *Dorian Golan, Administrative Program Manager*

FROM THE DIRECTORS

This year we went from talk to action on the three initiatives identified in our strategic plan, hosted new courses, and worked closely with our colleagues in LBRE and H&S to plan for upcoming infrastructure needs. We filled staff vacancies: Jorge Ramos as Associate Director of Environmental Education, and James Woodbury as Operations Assistant. We hired three postdoctoral scholars, whose work you will read about in the following pages. And we bid a fond farewell to Cindy Wilber, who retired after 20 years of building our education programs. All of this while continuing the many activities for which Jasper Ridge is renowned: flagship courses, world-class research in a variety of disciplines, and outreach to provide learning opportunities to our neighbors and the world at large. Concurrently, we've had many discussions with Stanford's Long-Range Planning design teams, highlighting the important role of Jasper Ridge in the university's identified priorities of "*Understanding the Natural World*" and "*Sustainability: Stanford as a Natural Lab*." Of course, the many accomplishments of the past year would not have happened without the hard work and support of the incredible JRBP staff and community. So thank you all for another great year!

Elizabeth A. Hadly, Faculty Director
Anthony D. Barnosky, Executive Director

In keeping with our philosophy of a light touch on the planet, again we are distributing our annual report electronically rather than as hard copy. A limited number of print copies are available for those who prefer to hold it in their hands. If you would like one, request a hard copy from dgolan@stanford.edu or (650) 851-6813.

Our Mission

To contribute to the understanding of the Earth's natural systems through research, education, and protection of the preserve's resoures.

Our Vision

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.

Our Pledge

To be a safe and welcoming place for discovery, discussion, and community for people of all cultures and identities.

At an EcoEvo retreat, Biology faculty, postdocs, and graduate students brainstormed about using JRBP for teaching and research, learned about field safety, and discussed equity and inclusion. JRBP staff photo

Students learn about the fish in Searsville Reservoir from LBRE's Associate Director of Conservation Planning Alan Launer in BIO/ESYS 105. JRBP staff photo

ANTHROPOCENE BIODIVERSITY

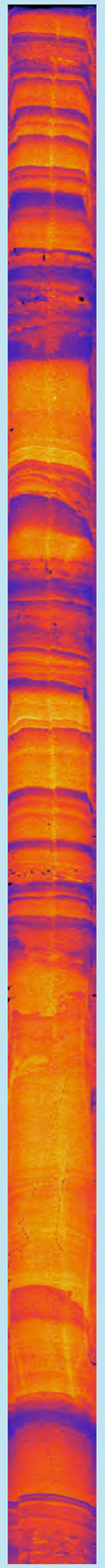
- **Aims to reveal first principles of maintenance and function of biodiversity in a human-dominated world**
- **Hub of interdisciplinary interaction for a diverse community studying how humans are rapidly transforming the planet we call home**

Staff Reflections

"One of the most surprisingly fun aspects of my work at Jasper Ridge over the last year has been finding the connections between my research and my personal history. Plants that are so familiar to me from my childhood growing up in California are also present in the sediment cores in the form of fossil pollen. My mother spent some of her early summers swimming at Searsville, and my father grew up riding horses in then-undeveloped Los Altos Hills. As I analyze geochemical and fossil data from the sediments, it's a rare and gratifying pleasure to connect scientific insight with so many memories and family stories." *Allison Stegner, Postdoctoral Scholar*

RESEARCH

Rather than moving to nature's past rhythms, ecosystems today are responding to a host of challenges that are shifting them into a new normal. Climate change, habitat fragmentation, and invasive species are but some of the human impacts pushing our planet into what is becoming recognized as a unique epoch in Earth's history, the Anthropocene. Here at JRBP, researchers are actively engaged in discovering what our changing world means for local ecosystems as well as what JRBP has to teach about the global transition underway. Postdoctoral scholar Allison Stegner is spearheading work on sediment cores from Searsville Reservoir and Upper Lake to establish the century to millennial-scale "range of normal" for JRBP ecosystems and how changes here correlate with global signals of the Anthropocene. In collaboration with scientists from the US Geological Survey and the Anthropocene Working Group—the international team of scholars charged with evaluating whether



Right: *A computerized tomography density scan of a portion of a Searsville sediment core representing about 20 years. The Searsville cores are so informative because of their incredible temporal resolution—about 6.7 cm of sediment per year, compared to what is typical for lake cores, about 0.1 cm. The high resolution offers the potential for reconstructing ecological changes seasonally for the last 123 years.*

the Anthropocene should be added to the official geological time scale—Allison is extracting such information as fossil pollen to understand vegetation change, elemental composition of sediments to identify annual nutrient flows, and geochemical markers to enable matching of data from the JRBP cores with potential markers of the Anthropocene that occur worldwide. Her work aims to help characterize the Anthropocene geologically and stratigraphically, pinpoint when it began, and identify the best place to anchor the "golden spike" that will be the global reference point for the world's transition into the Anthropocene. JRBP is one of only ten sites worldwide now being considered for the home of the golden spike.

Trevor Hébert, Allison Stegner, Brian Sherrod (USGS), and Liz Hadly take charcoal samples from a sediment test-core they recovered from Upper Lake. The sediment record dates older than a thousand years. JRBP staff photo

Anthropocene Biodiversity

EDUCATION

Solving Anthropocene problems requires cross-pollination of disciplines, ideas, methods, and skills from a diversity of perspectives, cultural backgrounds, and age groups. JRBP continues to provide a hub for those interactions through both formal and informal education activities. Besides providing the outdoor classroom for several natural-science courses, including our usual BIO/EARTHSYS 105 and BIO 47,

Maria Viteri, along with other students, postdocs, and staff learned about the uses of small-mammal trapping to assess biodiversity from one of the world's leading mammalogists, Jim Patton from UC Berkeley. JRBP staff photo

this year we also hosted classes that explored the Anthropocene through the lenses of nature writing and photography, both offered through Stanford Continuing Studies, bringing cohorts of learners from many different backgrounds and age groups. GK-12 activities included programs designed to introduce youth to STEM in a nature-rich setting, through our partnerships with the Redwood High School Environmental Academy of Leadership, the Menlo-Atherton Ecology Research Outdoors program for high-school English language learners, and Rodolfo Dirzo's program STEAM for Latina Girls, among others. And our JRBP docents continued to provide educational tours for hundreds of life-long learners from our region and beyond.

Professor Peter Vitousek engages with indigenous leaders at the opening ceremony of the First Nations' Futures Institute, an annual event at JRBP. The First Nations' Institute is part of a Woods Institute for the Environment program "intended to develop well-balanced First Nations' leaders." JRBP staff photo

Staff Reflections

"I helped a group of middle school Latina students set up camera traps at Jasper Ridge for their STEAM class led by Rodolfo Dirzo. The girls had high expectations, but I was a little nervous since there is no guarantee that you'll get anything when you put out a camera trap and they were placed close to the field station so I didn't know what to expect. Not only did we get a wide range of wildlife, but the cameras also captured a truly significant photo—a mountain lion with a wild turkey in its mouth, a first for Jasper Ridge! The girls were ecstatic and, I believe, empowered by their experience with camera trapping at the preserve."

Trevor Hébert, Academic Technology Specialist

JRBP staff photo

SCIENCE FOR LAND STEWARDSHIP

- **Enhances the scientific underpinning needed to effectively steward Stanford lands and the San Francisco Bay area's socioecological health**

Staff Reflections

"The first year of my post-doctoral fellowship has been full of excitement, but a real highlight has been the opportunity to see first-hand the wide range of land stewardship that occurs within the Santa Cruz Mountains region, from planning for trails and recreation, to managing agricultural leases and sustainable forestry, to stream restoration, to biological research and conservation. Jasper Ridge always provides a useful point of comparison and reflection."

Kelly McManus Chauvin, Postdoctoral Scholar

RESEARCH

The ecosystem of JRBP remains vibrant not only because it is protected against major human impacts, but also because the preserve is part of a regional matrix of nature-rich areas through which species can move as their needs demand. Important corridors include our bordering Stanford agricultural and SLAC lands as well as nearby open-space preserves, recreation areas, and working lands administered by a variety of land stewards. Postdoctoral scholar Kelly McManus Chauvin is now a year into a project that is helping to assemble and analyze the information needed to view the landscape used by JRBP species in the context of a socioecological matrix—that is, in a way that clarifies how the human and non-human components of the system are presently interacting, and how those interactions feed back on one another to affect both ecological and societal health in the Santa Cruz Mountains region. This work is funded by the S.D. Bechtel, Jr., Foundation and is in partnership with the Santa Cruz Mountains Stewardship Network (SCMSN), a cross-sector consortium of 23 entities (including JRBP) that collectively stewards more than 209,055 acres of land throughout the Santa Cruz Mountains. Kelly is using an ArcGIS platform to build a digital atlas of data that can then be used by the SCMSN to both visualize and analyze pertinent information at the scale of the entire Santa Cruz Mountains region. So far she has assembled a series of data layers that enable visualizing many

Above: *Setting nets to census fish at Searsville Reservoir in August 2019. More than 1300 fish representing nine species were identified. Eight of the species were non-native.*

Photo: Esther Cole

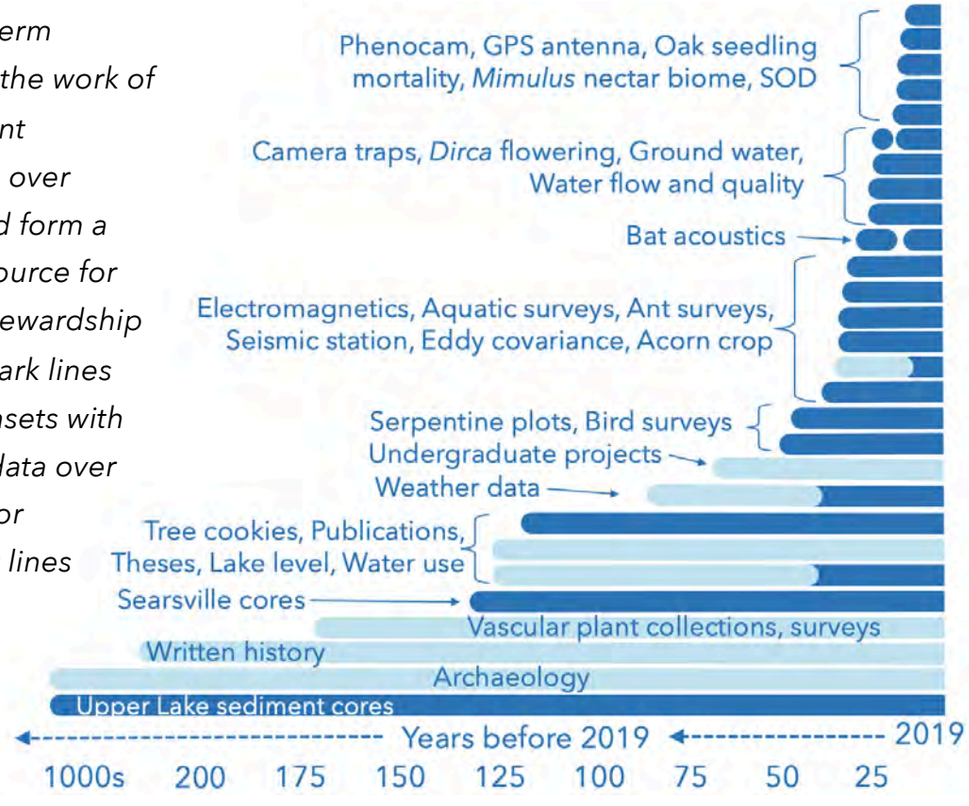
Right: *Searsville Reservoir on October 19, 2019. The dots show where cores were taken for the Anthropocene coring project (see page 4) in October 2018, before the drawdown exposed the sediments at the south end of the lake and caused a dramatic increase in habitat for shore and wading birds.*

JRBP staff photo

aspects of land use, land cover, recreation, biodiversity, soils, geology, terrain, water quality, climate, fire, invasive species, and infrastructure, and is working on analytical tools that will allow SCMSN members to more easily solve stewardship problems of common interest.

JRBP staff have been working closely with our counterparts in Stanford's Land, Buildings, and Real Estate (LBRE) group to conduct science aimed at effective land management. A key summer project was a drawdown of Searsville Reservoir, which began in August, partially for the purpose of concentrating fish in a smaller volume of water so they could be surveyed efficiently. The survey was carried out by LBRE, the Hadly Lab, and the environmental engineering firm AECOM. It yielded many non-native fish and a single native California species, *Orthodon microlepidotus* (Sacramento blackfish), a species found primarily in the Central Valley. While the species was recorded in some local watersheds two decades ago, the earliest record from Searsville Reservoir was 2017, and in the low-flow crossing after it was restored. In addition we worked with LBRE to assess the academic opportunities afforded by options for restoring fish passage above Searsville Dam, though neither the exact nature nor the timing of that project are as yet known.

We also began assessing the long-term data sets from JRBP –at least 28 of them, some going back over a century–that should prove useful in tracking ecosystem change as Anthropocene drivers play out.



These long-term datasets are the work of many different investigators over decades, and form a valuable resource for answering stewardship questions. Dark lines indicate datasets with continuous data over seven years or longer. Light lines indicate data that is intermittent.

Science for Land Stewardship

EDUCATION

An important outreach effort this year was hosting a Santa Cruz Mountains Stewardship Network (SCMSN) Spotlight Tour at JRBP. The SCMSN Spotlight Tour program "invites community leaders out onto the land to become familiar with important stewardship issues facing the Santa Cruz Mountains," in the form of a yearly six-session course that looks at issues such as water quality and availability, invasive species, fire management, climate change, biodiversity, and other Anthropocene pressures on nature. At the day-long JRBP session, participants learned how JRBP and Stanford are grappling with these and related issues as we think about the future, and how research taking place at the preserve is informing best practices. Conversely, participants shared their perspectives about dealing with the stewardship issues we all have in common. Our LBRE partners and our talented docents were instrumental in making the day such a success!

On a SCMSN Spotlight Tour, land managers from many agencies, policy makers, and government staff learn about land stewardship practices underway at Jasper Ridge and more broadly at Stanford. JRBP Staff photo

OUT OF THE BOX AND INTO THE CLOUD

- **Inventing and prototyping off-grid instrumentation that will improve conservation efforts locally and globally**
- **“If we can do it at Jasper Ridge, we can do it anywhere.”**

Staff Reflections

"For me, the regular sighting of mountain lions on cameras is the most exciting thing about Jasper Ridge. Each observation of a mother with her cubs and every discovery we make about their role in this reserve motivates me to document their activity further. Walking through their steps, a couple of hours after them, feels very special.” *Kevin Leempoel, Postdoctoral Scholar*

RESEARCH

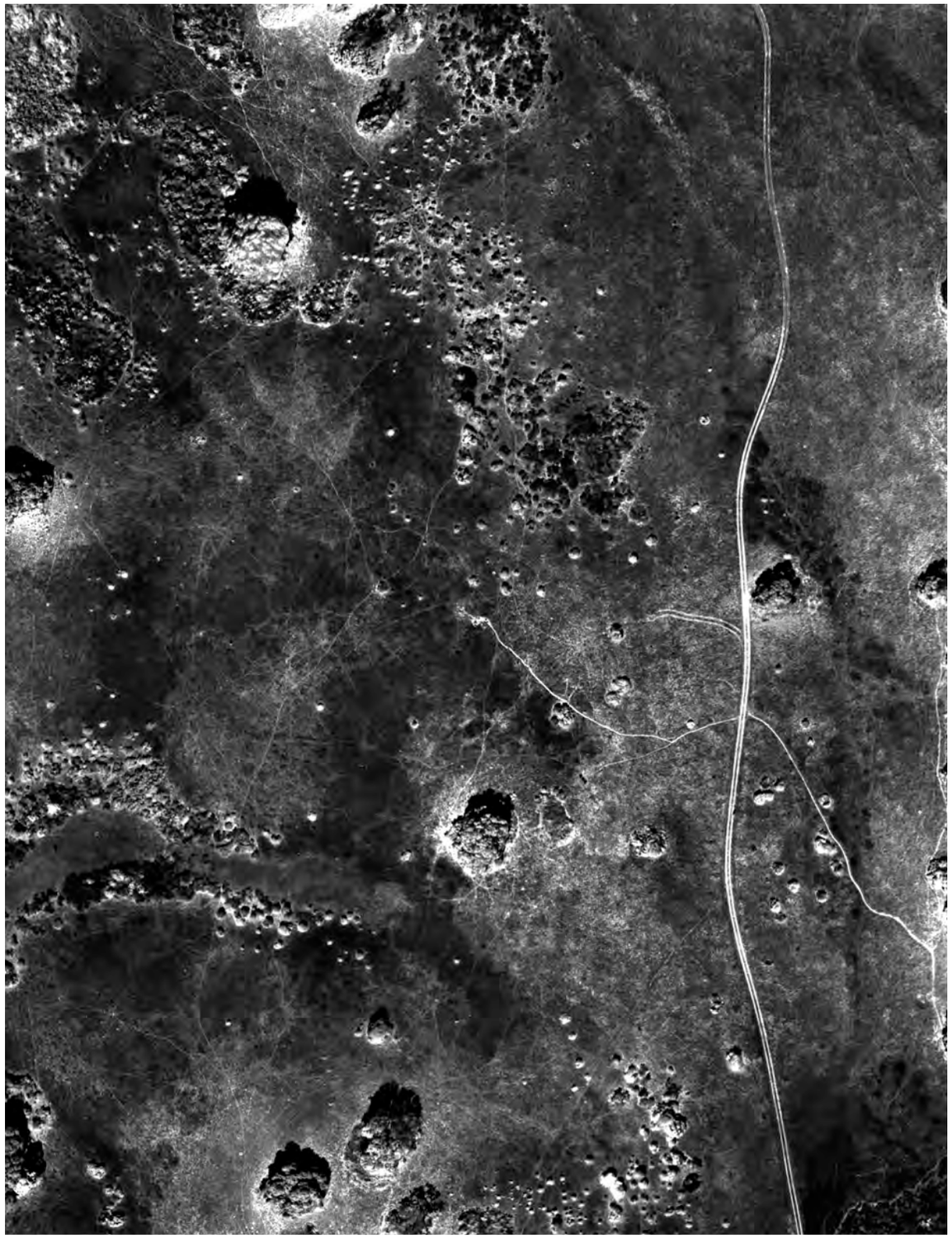
Efforts are focusing around conservation technology—that is, inventing, prototyping, and implementing research instrumentation and techniques that are inexpensive, operable off-grid, and will aid in wildlife conservation efforts not only at Jasper Ridge but worldwide. Postdoctoral scholar Kevin Leempoel has been experimenting with the use of environmental DNA (eDNA) as an efficient way to census biodiversity. His approach has included collecting soil samples in front of cameras that record images of wildlife and processing them to see if the animals shed their DNA into the soil as they pass by. He has found that indeed they do, and in addition, the eDNA samples reveal a wide spectrum of small animals that do not get recorded by camera traps—even insects and microbes. In a connected project, the Hadly Lab has teamed up with Stanford Medical School researcher Gavin Sherlock to develop inexpensive ways to obtain genomic data in the field. With careful planning and miniaturized portable sequencers, centrifuges, and other needed equipment, the team was able to sequence millions of genomic reads in the field—all without leaving JRBP! The cost was less than $5000—compared to the millions of dollars it takes to set up a full-blown genomics lab. On other fronts, JRBP saw installation of its first LoRa network, which has become the de facto technology for Internet of Things (IoT) networks worldwide

and allows low-cost, energy efficient sensors to be deployed for a wide range of environmental monitoring tasks, such as solar-powered LoRa GPS trackers and temperature sensors. The LoRa system is configured to make it as easy as possible for researchers and students to deploy their own sensors using the Jasper Ridge gateway and the free IOT network portal. We have also been experimenting with a fish-eye camera trap invented at JRBP to improve wildlife censusing, and with low-cost acoustic monitors called AudioMoths to characterize and understand the JRBP soundscape. AudioMoths now are being deployed at JRBP by Stanford PhD student Abigail Birnbaum to monitor bats via their echolocation calls. JRBP staff also deployed the devices in Garamba National Park in the Democratic Republic of the Congo in Africa to test their efficacy in a different ecosystem, in keeping with our aim to transfer technology to build conservation capacity in parts of the world that need it most.

Out of the Box and Into the Cloud

EDUCATION

Stanford CS 341 students developed a “smart” camera trap prototype for their class project that uses AI to identify species in real time and respond by sending a notification



High-resolution aerial photography from drones is helping us understand fine-scale vegetation distribution and the networks of animal trails that traverse through the varied habitats of Jasper Ridge. JRBP staff photo

(i.e., “coyote detected”) in addition to capturing a photo. The AI software runs continuously on the camera and automatically tries to identify species that pass into view. Because of power and speed constraints, the system was required to run with very low photo resolution but still managed to achieve acceptable levels of accuracy. When refined, these systems could be used to send real-time alerts to both detect and protect many endangered species throughout the world. It was also exciting to see the first results from JRBP’s Backyard Camera Trapping Project, a citizen-science approach in which neighbors set up their own camera traps on their property and send us the photos. By taking advantage of the automated processing workflow and AI species identification software developed for JRBP, we are able to quickly generate data from this treasure trove of information that is revealing local wildlife distributions.

Family moments revealed by our camera traps: a mountain lion with her year-old cub. This year our wireless camera traps identified a female with three very new cubs, information critical in managing trail use. JRBP staff photo

In this citizen science project neighbors have contributed more than 50,000 camera trap images of wildlife from neighborhoods adjacent to JRBP. At Sun Field Station participants learned how wildlife in their backyards compared to that in the preserve. JRBP staff photo

Staff Reflections

“It has been such a pleasure to see the enthusiasm of our surrounding community as they set up their own camera traps in their backyards as part of our Backyard Camera Trapping Project. It has been great to watch as this citizen science project grows organically through the neighboring wildlife landscape, and to see so many people contributing meaningful images. Can’t wait to see what the next quarter of images has to reveal!”

Simon Morgan, Special Projects Coordinator

CONSERVATION HIGHLIGHTS

Staff Reflections

"Given the grim wildfire outlook, Jasper Ridge has been working with Woodside Fire Marshal Denise Enea to expand fuel reduction, add additional fire staging areas, and expand fire breaks. Our biggest project has been working to clear trees and foliage from all of the preserve's main roads in order to conform with Woodside Fire regulations."

Steven Gomez, Operations Manager

"Migrating the energy monitoring system to use tiny $35 single board linux computers instead of windows-based desktop machines has been rewarding. Saving both money and energy with new tech is always exciting!"

Jeff Vance, Special Projects Technician

"We went further down the path of reducing fossil-fuel use with the purchase of EGO 56-volt trail-maintenance tools: an electric chainsaw, hedge trimmer, and line trimmer. Quieter, non-polluting, safer, and easily portable with the trail patrol bikes, these tools have changed my trail maintenance experience." *Brooke Fabricant, Resident Ranger*

This was our biggest year ever for fuel reduction to reduce fire risk. Trees were aggressively trimmed and debris chipped along every fire road. New fire-response staging areas were cleared, including one just inside the Main Gate. Woodside Fire Marshall Denise Enea spearheaded the removal of four massive *Eucalyptus* trees on Sand Hill Road, and the SLAC Linear Accelerator Center continued to prune or remove trees that pose a fire risk under the high voltage power line that crosses JRBP from the Main Gate to the Dennis Martin site.

As a result of the drawdown of Searsville Reservoir, shorebirds increased in number and included the Solitary Sandpiper, photographed by Peter Hart. Peter and Diane Hart also photographed a male Pileated Woodpecker, and a month later a female. This species has been recorded in the willow wetland occasionally but is locally rare. In Upper Lake, Peter also photographed at least four Soras (likely the first Sora photographs from the area) and three Virginia Rails. In the riparian woodland surrounding the major tributary to Searsville Reservoir, David Tattoni and volunteers banded more than 1000 individual birds and recorded more than 350 recaptures from May 2018 to October 2019.

Weed control focused on yellow starthistle and stinkwort this year. Removal of *Centaurea solstitialis* (yellow starthistle) expanded to include another three acres around the Sun

A female Pileated Woodpecker using the willow wetland habitat at the upstream end of Searsville Reservoir. A male was also observed and photographed.

Photo: Peter and Diane Hart

Field Station, where we selectively mowed to remove starthistle in a targeted, patch-based approach. Where starthistle is patchy, this strategy appears to be better than goat grazing in that it is cheaper, doesn't introduce new plants, and leaves standing dead litter, which can be important for arthropods. Our removal of *Dittrichia graveolens* (stinkwort) is maintaining our "near-clear" status. The quantity was somewhat less than last year—less than two dumpsters worth! A *Dittrichia* hotspot this year was the low-flow crossing restoration area; plants there were removed. Exceptionally high winds in late October likely dispersed stinkwort seeds into JRBP from miles around, highlighting the need for regional stewardship.

Conservation-noteworthy discoveries by the herbarium team this year included recording many-flowered brodiaea (*Dichelostemma multiflorum*)—known in the Santa Cruz Mountains bioregion from a very few plants at a single JRBP location. First reported by S. Burnham in 1907, Jasper Ridge is at the plant's southern limit of distribution. The team also found California shield fern (*Polystichum californicum*)—a purported sterile hybrid whose ancestors in our region are locally common—as well as Sword fern (*P. munitum*) and the less common Dudley's shield fern (*P. dudleyi*). All three species were found growing within a few

feet of one another. Also of interest is the report that the yellow monkey flower (formerly known as a single species *Mimulus guttatus*) has been split into two species of so-called common monkey flower, the perennial *Erythranthe guttata* and annual *E. microphylla,* both of which are present in JRBP. Narrow boisduvalia (*Epilobium torreyi*) was recorded this year—it was last reported in 1981. There are only two verified occurrences in the Santa Cruz Mountains in San Mateo and Santa Clara counties. Spreading wood fern (*Dryopteris expansa*) was found, a species previously known on the preserve only from a 1930 voucher specimen at Rancho Santa Ana Botanical Garden, Claremont. Two infrequently seen plants were especially striking this year: Griffin's bellflower (*Campanula griffinii*) known only from JRBP in the Santa Cruz Mountains bioregion, and California cottonrose (*Logfia filaginoides*), never before been reliably documented at JRBP.

We continued monitoring the preserve for *Phytophthora ramorum,* the agent of Sudden Oak Death (SOD), with volunteers helping to conduct JRBP's most extensive sampling of California Bay laurel trees since our participation in the SOD Blitz began in 2008. Although the wet spring was expected to encourage spread of the disease, none of the JRBP samples came back positive.

Left: *Many-flowered brodiaea* (Dichelostemma multiflorum). Photo: John Rawlings

Right: *Perennial common monkey flower* (Erythranthe guttata). Photo: Toni Corelli

Vigilance in invasive species management has caused Dittrichia *to decline in the Boething area of JRBP. However, the invader is spreading just outside our borders and needs regional control efforts.* JRBP staff photo

BY THE NUMBERS

94 Researchers

8 Countries

65 Total research projects

16 Research projects active for ≥ 10 years

Stanford Researchers

48 total from **3** Stanford Schools plus LBRE

17 Faculty **14** Grad students **7** Undergrads **10** Postdocs

13 New research projects

Abigail Birnbaum (PhD candidate, Gorelick): Interactions between hydrology and the food web of Searsville Reservoir.

AECOM: Surveys for sensitive species within the potential impact zone of Searsville dam modification.

Lisa Couper (PhD candidate, Mordecai): Tick surveillance and community engagement at Jasper Ridge.

Lia 'Bear' Kim (Undergrad): Environmental audio recording with a distributed network of AudioMoths.

Neal Kramer (Consulting Ecologist): Jasper Ridge vegetation mapping.

Emily Lacroix (PhD candidate, Fendorf): Quantifying anoxic protection of soil carbon in upland soils.

Kevin Leempoel (Postdoc, Hadly): Nanopore analysis of eDNA.

Kevin Leempoel (Postdoc, Hadly): Sequencing of reference genes (metabarcodes) from JRBP plants and arthropods endemic to the Bay area.

Simon Morgan, Hadly Lab, LBRE, AECOM: Survey of Searsville fish and sampling for diet analysis.

Stephanie Porter (Assistant Professor, Washington State University): Nickel adaptation in *Rhizobium* bacteria that associate with the legume *Acmispon*.

Allison Stegner (Postdoc, Hadly; Anthony Barnosky, Liz Hadly, SeanPaul LaSelle, Brian Sherrod): Geological signals of the Anthropocene in sediment cores from Searsville Reservoir.

Maria Viteri (PhD Candidate, Hadly): Golden eagle diet analysis from pellets and prey remains.

Miranda Vogt (Undergrad, Gordon): Comparative foraging behavior of the velvet ant *Liometopum occidentale*, at Jasper Ridge and on the main Stanford campus.

46 researchers from outside Stanford

More than **8167** educational visits

4753 Visits by Stanford students

28 Stanford courses

41 Stanford departments or programs

161 Education tours for the general public

76 Events using JRBP facilities

1677 Visits for meetings or workshops

1737 Visits by learners from outside Stanford

8 Non-Stanford universities or community colleges

836 Visits by students from universities or community colleges outside Stanford

10 High schools & middle schools

901 K-12 visits

Total Expenditures $1,540,006

Land Management	$28,846
Education / Outreach	$44,069
Administration	$91,530
Operations	$118,357
*Research	$180,609
Staff salary & fringe	$1,076,595

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 $144,219 postdoctoral researcher salaries and $80,479 administered by Biology but restricted for use by JRBP.

Total Revenues $1,730,331

General Income	$17,028
University H & S	$205,234
Gifts & Grants	$482,180
*Endowment Income	$1,025,889

*Includes $80,479 from endowments administered by Biology but restricted for use by JRBP.

KUDOS

Marsh O'Neill Award

Nona Chiariello, JRBP. For exceptional and enduring support of Stanford University's research enterprise.

Philippe Cohen Fellowship

Kate Marie Lagerstrom, Biology.

Mellon Grants

Lisa Isabel Couper, Biology. Tick-Borne Disease Research at Jasper Ridge.

Emily Morgan Lacroix, Earth System Science. Quantifying Anoxic Protection of Soil Carbon in Upland Soils.

Kate Marie Lagerstrom, Biology. The Wild Side of *E. coli*.

Stephanie Grace Sila, Biology. Parasite Diversity of Large Carnivores at Jasper Ridge Biological Preserve.

David Tattoni, Earth System Science. Bird Banding Training with the Institute for Bird Populations.

"My project aims to identify tick species and tick-borne pathogens present at Jasper Ridge to estimate the local human disease risk. We also launched a citizen science tick surveillance project. Visitors can submit ticks from the preserve to contribute to our growing understanding of local tick-borne disease risk. So far, we have found the Western black-legged tick (a vector of Lyme disease), and the Pacific coast tick to dominate at Jasper Ridge. No black-legged ticks so far have tested positive for the Lyme disease pathogen, but we urge visitors to continue taking precautions against ticks." *-Lisa Couper*

"Microbial respiration of soil organic carbon (C) accounts for over 25% of global carbon dioxide (CO_2) emissions. Recently anoxic microsites, tiny zones of oxygen depletion in upland soils, have been shown to "protect" soil C from microbial respiration. At JRBP, we collect soils from two different parent materials and perform incubation studies to gain insight as to how soil moisture, texture, organic matter content, and mineral surface area influence the extent to which anoxic microsites protect soil C. Results of this work will help us start to identify soils and soil types that are vulnerable to C loss upon climatic or physical disturbance." *-Emily Lacroix*

"It has been suggested that wild animals serve as "melting pots" for the creation of new harmful strains of *E. coli,* yet, very little work has ever been done on *E. coli* in wild animals. My project analyzes the genetic diversity of and distribution of *E. coli* from fecal samples of

bobcat, puma, coyote, fox, turkey and deer at Jasper Ridge. The study will provide insight into human impact on wild animals in the preserve and potentially aid in efforts to identify contamination sources in agricultural settings."

-Kate Lagerstrom

"Environmental stressors to wildlife combined with frequent encounters between wild and domesticated carnivores provide opportunities for parasite exchange. My work seeks to characterize the intestinal parasite diversity, distribution, and abundance of puma, bobcat, coyote, and grey fox at JRBP, using a noninvasive morphological and genetic approach. This project will provide new insight into the disease dynamics affecting wildlife communities in peri-urban environments like JRBP and beyond."

-Stephanie Sila

"We organized a five-day beginner bird-banding course taught by a trainer from the Institute for Bird Populations. Undergraduate students, graduate students, and JRBP docents had the opportunity to participate in field ornithology and begin to build a volunteer crew to assist with the JRBP bird banding station. Class participants learned about banding ethics and safety, banding protocols, opening and closing mist nets, and extracting and banding birds through hands-on training."

-David Tattoni

JRBP staff photo

Kevin Leempoel and Kate Lagerstrom prototyping the use of miniaturized, portable equipment to run a field genomics experiment at Sun Field Station.

Above: *Citizen scientists help collect data for Lisa Couper's tick disease-transmission project.*

Right: *Docents David Tattoni and Casey Mullins take JRBP outreach efforts to Atlanta for the Coalition for Public Understanding of Science annual meeting.* JRBP staff photos

PUBLICATIONS * 2018-19

Staff Reflections

"This year I was able to involve six members of the community as partners in drone operations for research. They contributed to safe operations in multiple ways, and each one contributed to a database of bird activity so we could track whether birds respond to either of two types of drones. It's been exciting to provide a cool and different view of Jasper Ridge, and also to contribute to drone usage that is avian-safe." *Nona Chiariello, Staff Scientist*

"Since joining the Jasper Ridge team this summer, it has been extremely exciting to witness how much our education and outreach programs engage and impact many different groups of people: Stanford students and faculty, regional GK-12 and community college students and educators, the Muwekma Ohlone Tribe of the San Francisco Bay Area, and our very own Stanford alumni and JRBP docent community! I look forward to continued learning and getting to know the rest of the friendly Jasper Ridge community! Gracias! "

Jorge Ramos, Associate Director for Environmental Education

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*** Incorporate JRBP data, samples, or field sites, or address JRBP education programs or management issues.**

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A baby rattlesnake giving fair warning. JRBP staff photo

A female and male black-headed grosbeak that were banded as part of David Tattoni's projects to understand how neotropical migrants use JRBP habitats and teach bird banding to students and docents. Photo: David Tattoni

Photo: Jack Owicki

JRBP staff photo

Menlo-Atherton high school students experience the joy of discovery at JRBP.

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JRBP staff photos

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- Staff
- Faculty
- Community

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SIMON MORGAN Special Projects Coordinator
JORGE RAMOS Associate Director for Environmental Education
ALLISON STEGNER Postdoctoral Scholar
JEFF VANCE Special Projects Technician
JAMES WOODBURY Operations Assistant

Staff Reflections

My favorite perk about the preserve is getting to be outside all day and having the opportunity to appreciate nature and the plethora of species I get to see. I literally stop and take a picture of every insect and vertebrate I haven't seen yet."

James Woodbury, Operations Assistant

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A committee composed of Stanford faculty and graduate students that provides high-level guidance on strategy and policy.

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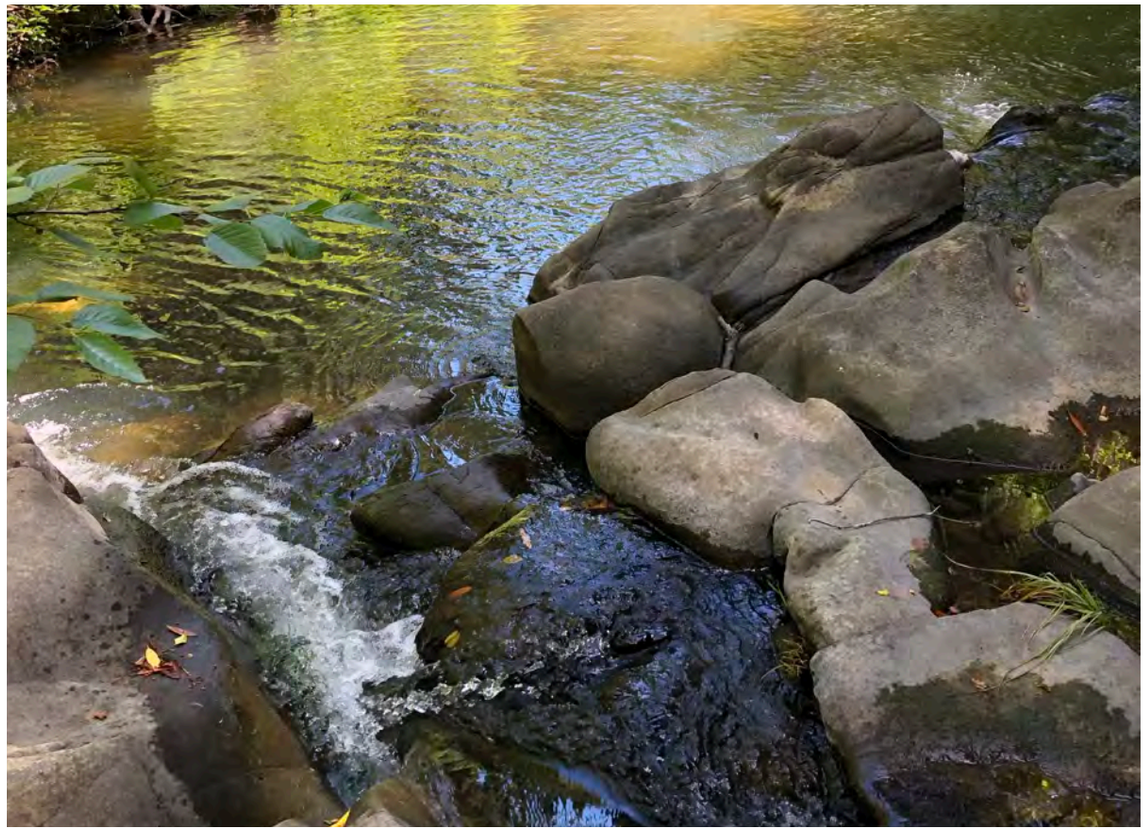

JASPER RIDGE BIOLOGICAL PRESERVE

- Discovering and communicating how nature works in a human-dominated world

JRBP staff photo

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