

- THE NATURE CONSERVANCY -

# THE JACK AND LAURA DANGERMOND PRESERVE ANNUAL REPORT

October 2022



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## YEAR IN REVIEW

The pace of conservation tends to be measured in increments and over decades, on the timescale at which trees grow and threatened species gradually rebound. Often, our accomplishments are charted in scenarios that are avoided rather than in landmark events. But the past year of conservation, both at the Jack and Laura Dangermond Preserve and elsewhere throughout the state, has been anything but slow or uneventful. In recent months at the preserve, our staff has grown significantly, researchers have made discoveries with huge implications for the future of water conservation, and we have solidified partnerships that are rapidly expanding our influence as a hub for environmental science and education.

All this has been accomplished during a year of historic investments to address the climate crisis, a year in which The Nature Conservancy (TNC) played a role in shaping a California state budget that allocated \$54 billion to addressing climate change and in helping to pass a state law that will do more to limit plastic pollution than any legislation in U.S. history. Amid unprecedented commitments to climate action from the state and federal government, our work to advance new strategies for protecting the natural world has more potential to mobilize widespread change than ever before. We are proud to share this update on the progress your support has helped us achieve over the past year.



© Laura Riege/TNC | The coastline at Dangermond Preserve.





© Laura Cunningham | An illustration of what a restored landscape at Point Conception might one day look like.

## MOBILIZING SCIENCE TO ADDRESS A GROWING WATER CRISIS

Over the course of the nearly five years since we launched the Jack and Laura Dangermond Preserve, California has experienced dramatic changes. Water levels at many critical reservoirs have reached all-time lows, rivers are running dry, and aquifers throughout the state are being dangerously depleted—all while the increasing length and intensity of heatwaves continue to make California hotter and drier. The result is a mounting water crisis that is now having serious repercussions for many communities and the state’s massive agricultural industry.

The need for better water management has become acute. But it is impossible for water managers to put effective policies in place without a robust scientific understanding of the amount of water available, the amount needed in waterways and aquifers for ecosystems to remain healthy, and the dynamics by which aquifers absorb and release water. That is why recent research at the Dangermond Preserve has been so exciting. A team led by University of California, Santa Barbara (UCSB) professor Scott Jesechko recently conducted a radioactive isotope study that found that water being discharged into Escondido Creek from the aquifer beneath Dangermond Preserve is over 70 years old. This tells us that climate conditions over seven decades ago are influencing the flows in Jalama Creek today and provides critical insights into how we can better manage groundwater and plan for future water needs based on current precipitation patterns.

Because the fractured rock aquifer system beneath the preserve is a type of aquifer that is currently unregulated in California—despite being the same aquifer type that holds about 40% of the state’s groundwater—this research is an invaluable step toward helping conservationists develop more comprehensive water management policies that will help Californians adapt our water usage to the changing climate.

## PIONEERING CONSERVATION TECHNOLOGY

One of the Dangermond Preserve's core goals is to serve as a springboard for technologies that will make conservationists more effective in their work. Led by our team at the Point Conception Institute (PCI), we made substantial progress in that effort this year through an influential partnership with NASA, the expansion of an instrumentation network that allows us to monitor a huge array of environmental conditions across the landscape in real-time, and the continued growth of collaborative research initiatives.

## NETWORKING NATURE

Climate change is reshaping California's ecosystems in ways that will have far-ranging impacts on the state's species and natural resources. But understanding the implications of these changes, and responding in ways that will continue to be effective under future conditions, is a serious challenge for conservationists. To address that challenge, we need a clearer picture of how ecosystems are changing. So, TNC has turned the Dangermond Preserve into a living laboratory by deploying a broad network of sensors and instruments to monitor environmental change in near-real-time.

This year, we continued to expand that network by deploying several new technologies. These included a radio tower that is part of a continent-wide study of bird migration patterns, and which receives and logs signals from birds tagged with tiny transmitters—some small enough to be put on birds that weigh just a few ounces. This study is the largest of its kind and will provide data that is especially urgent as wetland habitat and deepening drought increasingly imperil migratory birds.

We also began deploying sensors to monitor water tank levels, installed tracking beacons on the preserve's vehicles, and tested the use of GPS tags on cattle to help us build a more robust picture of our on-site operations and develop tools with which to better steward the land. Working with local researchers, we installed 14 additional wildlife cameras on the coast, increased our number of groundwater sensors in the Jalama Creek watershed to a total of 19, and deployed five new weather stations.

This growing instrumentation network is fueling dozens of exciting science projects at the preserve and is one of the primary reasons PCI has been so

successful in attracting research partnerships—an accomplishment that was apparent at the Visioning Workshop PCI hosted in March, which was attended by our partners from the Smithsonian Institution, the World Wildlife Fund, NASA, Esri, and several local universities.

## PARTNERSHIP WITH NASA

In one of the largest-ever studies of global climate shifts, NASA's Surface Biology and Geology Mission is using satellite imagery and airplanes equipped with infrared sensors to monitor ecological changes on a planetary scale. In California, the Dangermond Preserve has become a key partner in helping to calibrate NASA's instruments with data from our science teams working on the ground. After a successful year of collaborative work, NASA awarded PCI with a nearly \$300,000 grant to expand our technology team and launch a project that will leverage the groundwater research we are doing across the Jalama Creek watershed to explore how fire risk can be assessed via aerial imagery. By comparing groundwater and soil moisture levels with images taken from the sky, we hope to develop systems that could one day enable researchers to determine the risk of wildfire in real-time using remote monitoring, allowing land managers around the world to respond to threats and better avoid disastrous fires.



### Introducing Ben Miner

*As the Dangermond Preserve's new director*

We are thrilled to announce that TNC hired a new director this year to lead our operations at the Dangermond Preserve. Ben Miner, who started in July 2022, was formerly the chair of the Biology Department at Western Washington University. He brings a wealth of experience as a professor, researcher, and administrator, while also having a background in construction and infrastructure management. Ben's unique skill set as a scientist, educator, and project manager make him a perfect fit for this complex role, and we are excited to see our programming and operations continue to grow and evolve under his leadership.



## SUPPORTING FUTURE ENVIRONMENTAL LEADERS

Solving the twin crises of climate change and biodiversity loss will require major transformations in nearly every aspect of human life. Those changes will only be possible through the leadership of today's youth, who will play an essential role in finding ways to realize a more sustainable future. To support those future leaders, TNC is using the Dangermond Preserve as a platform to educate, inspire, and advance the budding careers of young people.

### YOUTH ENVIRONMENTAL EDUCATION

After years in which COVID-19 precautions limited the in-person events we could host at the preserve, we have been able to restart a series of day and overnight trips for local middle and high school students. The day trips included hikes along three different trail routes, as well as curriculum focused on biodiversity, climate change, and the preserve's significance for conservation and science. On the overnight field trips, students were able to participate in some of our ongoing habitat restoration work and conduct biodiversity transects to explore the richness of species found in the preserve's grasslands and oak woodlands.

Working with the nonprofit education group NatureBridge to develop these field trips and related in-classroom curriculum, we have now reached over 600 participants—with about 300 of those just in the past year. For many local students, the trip to Dangermond was the only field trip of their entire high

school careers, and the enthusiasm we have seen from students has been a testament to how important such trips can be. We are also excited to have finalized an agreement with the Lompoc Unified School District, which included our environmental education program in their strategic plan this year, meaning that field trips and environmental curricula will be an enduring part of the learning experience for local middle and high schoolers for years to come.

### UNIVERSITY PARTNERSHIPS

For university students preparing to launch careers with an environmental focus, we also continued to offer numerous research positions, internships, and fellowships this year. For the third consecutive year, undergraduate students from Cal Poly Pomona's College of Environmental Design helped design infrastructure to support the preserve's visitation goals, identifying routes where students hike during field trips while leaving a minimal ecological footprint and devising educational activities we can do with students based on flora and natural features along the route.

We also offered summer internships to graduate student researchers from UCSB, who recently completed a capstone project exploring the behaviors of coastal carnivores and are working on another project to identify conservation priorities along the Gaviota Coast. Other UCSB graduate students from the Bren School of Environmental Science and Management are also working on a study of invasive wild pig populations at the preserve.



© Amelia Remeta/TNC | A student group from Lompoc Unified School District during a field trip to the preserve.

## RESTORING A WILD AND RESILIENT COAST

Since establishing the Dangermond Preserve in 2017, TNC has embarked on several major restoration projects to return local ecosystems to a wild and climate-resilient state. Several of these projects were required by the California Coastal Commission (CCC) to remedy unpermitted construction that was done by the previous owner. As a regulatory agency, the CCC adopts a strict enforcement approach, and our initial work with them was challenging, particularly as we sought to align our research and long-term conservation goals with the required projects.

As the work has proceeded, though, we have built a warm and highly collaborative relationship with the CCC—one that has enabled us to work together to cost effectively meet their remediation requirements. Working with the agency this year, we began restoring the Jalachichi Pond complex, a project that will remove an unpermitted stock pond and its concrete spillway, reconnecting it to a seasonal creek and replanting the area with native vegetation that will benefit birds, frogs, and turtles. Our collaborative relationship has also helped us develop a lower-impact approach to restoring inland roads and has led the CCC to join our Science Working Group that is evaluating approaches to removing invasive ice plant at scale.

These collaborations with the CCC are significant steps forward in our work to restore the full function of the preserve's natural systems, but they are also just a handful of the growing number of transformative restoration projects we now have underway.

## RECONNECTING REGIONAL ECOSYSTEMS

The degree to which healthy ecosystems are connected to one another, allowing for animals to move between habitats and over long distances, is one of the most important factors in conservation. So, to help increase the resilience of species in the Point Conception region, we are working with partners across the Central Coast to study animal movement patterns and implement solutions to increase the connectivity between coastal, terrestrial, and marine ecosystems.

At the Dangermond Preserve, this effort is being led by the groundbreaking work of wildlife ecologist Dr. Rae Wynn-Grant, who is studying how human activity, landscape connectivity, and protected areas influence carnivore behavior on California's Central Coast.

Dr. Wynn-Grant—who is a faculty member at the Bren School of Environmental Science and Management, a National Geographic Society research fellow, and visiting scientist at the American Museum of Natural History—is tracking carnivores using GPS collars and leading a multidisciplinary research initiative that will play a major role in guiding regional restoration projects, land management strategies, and the possible translocating of threatened carnivore populations over the next decade.



### Introducing Dr. Elizabeth Hiroyasu

*As Dangermond Preserve's  
new scientist*

Our scientific and restoration work have benefited tremendously from our hiring this year of Dr. Elizabeth Hiroyasu, who has a particular expertise in studying invasive species and the relationships between human and wildlife communities. Before joining the Dangermond team, she led scientific efforts on TNC's Climate team in California and holds a PhD from UCSB's Bren School of Environmental Science and Management. In addition to her research, Elizabeth has experience wrangling 90 scientist authors as the managing editor of a book focused on how climate change impacts biodiversity. She has also worked to assess the potential for grizzly bear reintroduction in California.



© Jay Carlson/TNC | Deer grazing at the Point Conception headland dunes.



## PROGRESS WITH ICE PLANT AND OAKS

The two restoration projects that cover the most acreage at the preserve involve removing about 1,000 acres of invasive ice plant and regrowing 150 acres of coast live oaks. Ice plant was originally introduced to the area to keep sand from blowing onto the railroad tracks that cut along the coast. But as this nonnative plant grew out of control, it has smothered the dunes at Point Conception, stopping a critical process by which sand blows over the point and replenishes beaches to the south in Santa Barbara and Ventura—contributing to increased coastal erosion.

Removing the ice plant is therefore critically important, but in addition to being a massive undertaking over such a wide area, is also delicate because the project site is rich in rare and endangered plant and bird species. To find the best restoration methods, we have undertaken a years' long suite of experiments to trial various techniques, from removing ice plant by hand to



© Laura Riege/TNC | Oak saplings growing at one of the Dangermond Preserve's restoration sites.

smothering it with plastic sheeting to using low-impact herbicides. After determining which solution is safest and most effective, we will implement it across the full 1,000-acre area.

We are also continuing to advance our work to restore vast oak groves across the landscape. Having planted over 6,000 acorns, seedlings, and saplings, our Oak Science Working Group led by some of the top oak researchers in California is now conducting experiments to determine how to best support the natural recruitment of new trees from the acorns dropped by existing ones. The studies involve everything from how

prescribed fire can promote recruitment to gathering data on which soil types and slope angles lead to the best outcomes. Because planting oak saplings is a prohibitively expensive restoration technique, we expect these studies to provide more affordable solutions that land managers can use to bolster oak populations throughout the state amid the many threats they now face from a changing climate.

## STEELHEAD RECOVERY

Our ongoing project to restore a thriving population of steelhead to Jalama Creek has made significant progress over the past year. By removing two barriers that prevent fish from making their way upstream to spawn, we hope to bring back this keystone species and fill an important restoration gap between other waterways to the north and south of the preserve that have already been restored. We have now nearly completed engineering designs for the work to remove the two barriers and have applied for governmental funding to implement the project. We anticipate beginning construction in 2023.

## PRESERVE OPERATIONS

The logistical and operational demands of running a nearly 25,000-acre preserve—at which we are currently collaborating with over 22 other institutions on more than 70 research projects—are immense. From providing facilities for the many kinds of work we have ongoing to maintaining roads to managing the land in ways that reduce fire risk, TNC staff work tirelessly to ensure the smooth day-to-day functioning of the preserve.

## INFRASTRUCTURE

As our operations and programs have grown, we have also been making considerable progress renovating facilities across the preserve that support our world-class science, education, and restoration work. At our Cojo Headquarters, we are entering the final phase of construction with the PCI complex. We expect to have furniture installed in the PCI complex by the end of the year and to complete landscaping in early 2023.

The completion of the PCI facilities will mark a major milestone in our years-long effort to renovate the preserve's ranch buildings and establish the housing, offices, and scientific facilities needed for our ambitious projects.



Up at our Jalama Ranch Headquarters, we have also made progress over the past year toward securing historic review and permits that will enable us to complete work on the 1913 ranch house and the schoolhouse. With our construction plans for both buildings now complete, we expect to secure permits and break ground by spring 2023. These facilities will provide essential housing and be a gathering space for visiting researchers, educators, staff, and partners.

### ECOLOGICAL GRAZING

Cattle play an important ecological role at the Dangermond Preserve. The property has been a working ranch since the 1800s, and we have kept a herd on the land, which we graze in accordance with

a carefully devised Rangeland Management Plan. Our grazing schedule ensures the livestock do not disturb sensitive habitat while they help manage invasive plants and reduce the risk of wildfire by keeping dry grasses from becoming overgrown. In a major milestone this year, we began leasing the cattle operation to our neighbor, Rancho San Julian, meaning they will implement our ecological grazing schedule in close collaboration with the TNC preserve team.

This development will not only help us more effectively manage the herd and mitigate fire risks, but it also deepens TNC's relationship with the region's ranching community and neighboring landowners.



© Jay Carlson/TNC | Happy cows come from Dangermond Preserve.



## Welcoming Jinsu Elhance

*As PCI's new technology associate*

As we expand our partnership with NASA and deepen our investment in using data science to advance conservation efforts, we have been extremely grateful this year to have Jinsu Elhance join the team at PCI. With degrees from Kings College in London and University of California, Berkeley, Jinsu's work focuses on the integration of remote sensing and GIS mapping—an expertise that will be invaluable in supporting the restoration projects and climate research being conducted across the preserve.

## LOOKING AHEAD

Over the coming year, in addition to the many projects already ongoing, we look forward to several exciting developments. Working with our partners at NatureBridge, we will be rolling out new environmental education programming for middle school students and launching a Conservation Scholars Program that will select a small cohort of high school students through a competitive application process to participate in a four-month paid internship where they will work with TNC scientists and complete a capstone science project.

In November 2022, we will also be hosting a Prescribed Fire Training Exchange (TREN) that will bring together numerous partners, including Vandenberg Space Force Base and the Santa Ynez Band of Chumash Indians, to build local capacity for prescribed burning as a tool to reduce wildfire risk.

Under the leadership of our new preserve director, Ben Miner, we are also excited to continue expanding our research partnerships and launching a project to explore the potential for future renovations that would enable us to utilize the Point Conception Lighthouse as a facility for research and education.



## Conservation in Practice

In 2009, black abalone became the first marine invertebrate placed on the endangered species list. Once numbering in the millions along the California coast, the species was sustainably harvested for thousands of years by Indigenous communities. But disease and commercial fishing pressure over recent decades caused the population to collapse. Scientists documented black abalone's disappearance from the waters of Point Conception, eventually finding that there were only one or two individuals left off the coast of what is now the Dangermond Preserve.

Recent conservation efforts have shown promising results, though, and our work at the preserve is helping create conditions for black abalone to reestablish a foothold in Southern California, where their disappearance has been especially dramatic. This year, a team of researchers found that there are now an estimated 30–40 black abalone at Point Conception, marking a turning point for the species and showing that the Dangermond Preserve has an important role to play in its ongoing recovery.

## YOUR INVESTMENT

This past year, the news has been filled with constant reminders of how climate change is reshaping the world. As it does, communities everywhere are mobilizing to address the growing crisis, finding ways to innovate and adapt to protect people and the natural systems upon which all life depends. At TNC, we are proud to play an important role in pushing forward the science and practice of conservation in order to safeguard the environment for future generations.

Your generous support is helping us expand the scale and influence of our conservation efforts—both here in California and around the world. We are tremendously grateful for your investment, which is helping to ensure that the Jack and Laura Dangermond Preserve has an impact that will echo for generations and serve as a springboard for solving some of the world's most urgent conservation challenges.