

# California Conservation Science Catalyst Fund

2023 Annual Report | March 2024



## From the Director of Conservation Science

Science is the foundation of all our conservation strategies at The Nature Conservancy (TNC). But what does that really mean, and what does it look like in practice?

One of the hallmarks of TNC science is that it is always framed around a problem. *What is getting in the way of a more sustainable, resilient, and biodiverse future—and how can science help us overcome it?*

Each of the Conservation Science Catalyst Fund investments over the past year started with one of our scientists identifying a problem and asking, *How can science lead us to a solution?* In some cases, we needed to better understand how an ecosystem functions so that we can design management interventions more strategically. In other cases, we needed to better characterize the multiple benefits that conservation can provide for society, so that we can marshal the stakeholder support we need to scale up our efforts. And in others, we needed to develop new technology so that we can monitor ecosystems and species of concern more efficiently.

Our applied science team in California works to develop and test solutions that we need to increase the pace, scale, and effectiveness of conservation. The Science Catalyst Fund makes this work possible. Thank you for your interest in and support of TNC's science and the innovative conservation strategies and tools that it drives.

—Scott Morrison, Ph.D.

The Victor E. Shelford Director of Conservation Science



## CATALYZING SCIENCE FOR CONSERVATION

To be successful in our increasingly crowded and constrained world, conservation needs cutting-edge science and technology. The Science Catalyst Fund supports the bold and innovative science needed to help set a global conservation agenda and position TNC for influence and impact. The fund provides our science teams with the resources to quickly launch projects in response to emerging opportunities and urgent environmental issues, ultimately accelerating the pace and expanding the scale of TNC's work.

Some of the key scientific questions facing conservation today include:

- How can we enhance nature's resilience in the face of a changing climate?
- How can we leverage emerging technologies to make conservation more efficient and effective?
- How are nature and conservation relevant to people and human well-being?

## SCIENCE LEADERSHIP

TNC scientists play a unique role in the conservation science community. We work at the interface of science and practice to elucidate questions that inform critical conservation decisions. We then convene the scientific collaborators we need to address those questions.

The Science Catalyst Fund provides us with resources to incentivize collaboration with leading-edge partners. In turn, our research partners often augment our investment with resources from their own institutions. The resulting collaborative research enterprise frequently continues well past a given project, branching off to address other important questions. A strong network of productive scientific partnerships is an enduring legacy of the fund.

TNC scientists collect soil samples at California's Staten Island Preserve. © TNC



# New Projects: 2023

## Siting Beaver-Assisted Restoration in California

\$92,673 (January 2024–December 2026)

Beavers have long been recognized as industrious dam builders, and in recent years, the conservation community has increasingly focused its attention on how we can leverage this behavior to accelerate restoration of degraded wetlands. “Beaver-based restoration” uses beavers as ecosystem engineers to efficiently and cost-effectively restore ecosystem processes and habitats. In 2020, TNC and partners mapped where in California conservation could be best achieved with the beavers’ assistance and developed the Beaver Restoration Assessment Tool, or BRAT, a freely available online tool that has been used broadly in nine western states to identify stream reaches suitable for beaver-based restoration, based on factors like stream size, stream flows, and availability of woody building materials. The next step is to add the current locations of beaver dams in California to this tool. **Funding from the Science Catalyst Fund will allow TNC to partner with leading beaver researchers to create this more complete and robust science foundation for beaver restoration, translocation, and conservation work in the state.** Using aerial and satellite imagery and the help of machine learning, we will pinpoint the ideal locations to focus future strategic interventions in support of these adept engineers.



The first beaver translocation in California since the 1940s, conducted by California Department of Fish and Wildlife in 2023, in a meadow in the northern Sierra Nevada.

## Calibrating Risk Tolerance to Accelerate Conservation

\$50,000 (December 2023–December 2024)

The pace of ecological and global change is staggering, and the conservation community needs to act quickly to minimize biodiversity loss and climate change impacts. Land and water managers often have very limited information available to them

as they make high-stakes conservation management decisions, and they are not always able to fully evaluate the risks and benefits of various interventions. When there is uncertainty about benefit relative to risk, resource managers consistently demonstrate strong risk aversion, choosing interventions with a higher certainty of success over less-certain options, even when the less-certain option may be of greater benefit. **With the support of the Science Catalyst Fund, TNC will identify bottlenecks and propose solutions to prevent risk aversion and status quo decision making from stymying innovation in conservation.** TNC will then leverage these findings to seek policy solutions to overcome risk-related bottlenecks preventing the application of innovative conservation interventions in California. We expect this framework to be transferable to land, freshwater, and climate decisions.

## Understanding the Role of Land Crabs in Atoll Ecosystem Connectivity and Resilience

\$75,000 (July 2022–October 2023)

Several decades of research show that seabirds provide a connection between land and sea that is critical for establishing and maintaining maritime forests, supporting terrestrial biodiversity, developing soil communities, and even supporting healthy coral reefs and large species like whales and sharks—all of which are essential for promoting the long-term resilience of atoll ecosystems. Due to their abundance, diverse ecological roles, marine and terrestrial life stages, and tendency towards ecosystem engineering, land crabs may play an equally large, if not larger, role as seabirds in the movement of biologically important nutrients, including carbon and nitrogen, between terrestrial and marine environments. But the functional role of land crabs in atoll ecosystems is overlooked and understudied. **With the support of the Science Catalyst Fund and in collaboration with the University of California, Santa Barbara, we initiated a novel investigation of the effects of land crabs on land-sea connectivity and nutrient cycling at Palmyra Atoll, a TNC preserve in the Northern Line Islands, and Tetiaroa Atoll in the Society Islands.** With 40% of the world’s atolls within the geography covered by TNC’s California, Hawai’i and Pacific Division, we are uniquely positioned to advance the conservation of atoll ecosystems, and this study is foundational to that goal.



*Cardisoma carnifex*, a common burrowing land crab in atoll ecosystems.

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## Quantifying the Fish Production Potential of Restored Eelgrass Habitats in Southern California

\$25,000 (October 2023–June 2024)

Eelgrass meadows are one of the most biodiverse, productive, and ecologically important ecosystems in the nearshore environment. Unfortunately, California has lost more than 90% of its eelgrass beds due to sedimentation, development, and pollution. TNC is working to lay the scientific foundation for recovering eelgrass throughout the state. A critical first step is to quantify the ecosystem services associated with restoration of eelgrass habitat, which helps us set and realize restoration and conservation goals. However, that analysis cannot be completed yet, because we lack estimates of how productive (in terms of fish biomass) an acre of eelgrass habitat is. **With the support of the Science Catalyst Fund, TNC will lead an effort to quantify the fish enhancement values from seagrass habitats in southern California. Upon completion, we will establish an estimate of fish biomass, per species, produced from an acre of restored eelgrass habitat.** This information will be used to show managers, fishers, and the public the importance of restoring eelgrass meadows.

## Water for Pronghorn and Other Wildlife

\$48,000 (August 2022–June 2023)



Pronghorn enjoy a trough installed as part of a “water for wildlife” project.

© Russ Namitz, Bureau of Land Management

Groundwater pumping, more frequent and severe droughts, and climate change have combined to reduce the availability of season-long free-standing water for wildlife across California, especially in its southern deserts, including the Carrizo Plain and surrounding San Joaquin Desert. Pronghorn, an iconic migratory species that was once widespread across California, has seen its population plummet, especially in the Carrizo Plain, where only approximately 50 animals remain. **This past year, with the support of the Science Catalyst Fund, TNC and partners published a systematic review of the literature identifying the main drivers of pronghorn decline across California, with the goal of enabling management solutions on-the-ground. We then published**



**future habitat suitability models to identify where TNC and partners can create pronghorn strongholds in the future.** Leveraging the results of these projects, TNC and partners—the Bureau of Land Management, California Department of Fish and Wildlife, Sequoia Riverlands Trust, and California Polytechnic State University, San Luis Obispo—launched “water for wildlife” projects across more than 100,000 acres of potentially suitable land for pronghorn, from TNC’s Las Piletas Ranch to the Carrizo Plain Ecological Reserve and Carrizo Plain National Monument. These projects added more than 75 water sources, each being monitored for wildlife usage with cameras connected to TNC’s camera trap data management platform, Animl. This network of wildlife cameras will inform management actions beyond those needed for pronghorn, helping us identify how other important wide-ranging wildlife in the region, including tule elk and San Joaquin kit fox, are using and moving through these landscapes.

report available on [scienceforconservation.org](https://scienceforconservation.org) that will help improve the management of ecosystems both at the preserve and throughout the Amargosa region as climate and other conditions change.

*\*An Expert BioBlitz is an intensive field survey within a specific geographic area that involves a team of scientists representing a diversity of disciplines working collaboratively to rapidly generate conservation-relevant data on multiple plant and animal populations and resources, and to catalyze ongoing research in the region.*



With the support of the Conservation Science Catalyst Fund, TNC scientists in California and Nevada led an Expert BioBlitz at the Atwood Preserve at the headwaters of the Amargosa River, cataloging an inventory of 264 species of plants and animals.

## Assessment of Oak Status Across TNC’s Conservation Estate

\$60,000 (February 2023–January 2025)

TNC’s conservation estate in California, which covers more than 400,000 acres, affords us the unique opportunity to assess the impacts of climate change on a diversity of plants and wildlife. Oaks are a foundational species across California, but they are in decline. **With the support of the Science Catalyst Fund, 15 staff from TNC, along with partners at the University of California, Los Angeles, launched a statewide assessment of blue and coast live oaks using conservation genomics.** We collected more than 340 individual samples from oak trees across 17 sites stretching from San Diego to Napa County and from the coast to the Sierra foothills. Conservation genomics allows us to assess the health and potential climate resilience of oak species across large landscapes and to identify populations more resilient to changing temperatures and precipitation patterns. TNC plans to use this information to inform land management, future land acquisitions, and oak restoration projects.

## Updates on 2022 Projects

### Expert Bioblitz at the Amargosa Headwaters

\$27,500 (November 2022–June 2024)

The Amargosa River and associated wetlands originate in Nevada and terminate in California’s Death Valley. This largely underground river system in the Mojave Desert creates an archipelago of aquatic and groundwater-dependent habitats that support a number of imperiled species that can be found nowhere else in the world. Land-use change and decreasing water levels caused by groundwater pumping constitute significant threats to this system. In 2019, TNC acquired what is now the Atwood Preserve in the headwaters of the Amargosa River, including 900 acres in fee title and a 280,000-acre grazing allotment on Bureau of Land Management lands. Because these lands are in the headwaters, their management has the potential to improve flows downstream, influencing the overall condition of the river and the biodiversity it supports. **With the support of the Science Catalyst Fund, TNC led an Expert BioBlitz\* to explore the Atwood Preserve and its associated grazing allotment lands. During this event, 23 participating scientists from TNC and other institutions observed and cataloged an inventory of 264 species of plants and animals that occupy this critically important reach of the river.** This endeavor also included sediment coring to better understand the age of rare, spring-fed, groundwater-dependent meadows at the preserve. The outcomes include a

**COVER PHOTO:** TNC scientists and partners engage in “beaver-based restoration” to accelerate degraded wetland recovery. © Kristen Wilson/TNC