

A photograph of a woman with blonde hair, wearing a brown long-sleeved shirt and light-colored waders, standing in a shallow stream. She is leaning forward, using a yellow tool to work on the stream bed. The water is clear, reflecting the surrounding green foliage and trees. The scene is peaceful and natural.

- THE NATURE CONSERVANCY IN CALIFORNIA -

CONSERVATION SCIENCE CATALYST FUND

2018 Annual Report

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FROM THE DIRECTOR OF SCIENCE

Science equips The Nature Conservancy to find conservation solutions to today's most pressing environmental challenges. We use science not only to illuminate new ways of seeing the world, but to bring people together. TNC's history is filled with conservation breakthroughs that were catalyzed by people sitting around a table, looking at an analysis conducted by our scientists—and being compelled to take action.

The Conservation Science Catalyst Fund was established to make sure we have the resources to get TNC's science to that table. The fund enables our science team to mobilize quickly and to produce the information and insights needed to give nature a voice.

The results from our investments over the past year demonstrate the power of TNC's science. Thank you for your support of this critical work.

—Scott Morrison, Ph.D.

The Victor E. Shelford Director of Conservation Science, California

CATALYZING SCIENCE FOR CONSERVATION

Conservation needs cutting-edge science and technology to be successful in our increasingly crowded, complex, and constrained world. Effective conservation strategies demand innovation and evidence-based solutions. The Conservation Science Catalyst Fund supports the bold science needed to help set a global conservation agenda and position TNC for influence and impact. The Catalyst Fund empowers our scientists with the resources they need to quickly mobilize productive scientific initiatives to address emerging issues and opportunities and establish scientific foundations for conservation action—all with the aim of increasing the pace and scale of conservation.

Some of the key scientific questions facing conservation today include:

- How can we enhance the resiliency of nature 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, one that is distinct from the role of scientists in academia, government, or consultancies. We work at the interface of science and practice to elucidate the priority questions that must be addressed in order to make critical conservation decisions. We then convene the scientific collaborators we need to help us address those questions.

TNC attracts partners who share our desire to drive the science needed to inform conservation decision-making. The Catalyst Fund provides us with resources to incentivize this collaboration. Our research partners in turn 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 Catalyst Fund.



DEPLOYING “POSEIDON” TO MONITOR FISH STOCK HEALTH

\$42,105 (August 2018 – April 2019)

How are fish faring in a rapidly changing ocean? To answer that question and measure the health of important fish stocks, we need accurate and cost-effective technologies. Because data on the sizes of individual, harvested fish can provide a readily accessible indicator of the status of fish populations, TNC developed “Poseidon,” a software tool that uses computer vision to record fish length from digital images uploaded by citizen scientists and fishermen. Having successfully applied Poseidon in the red abalone fishery, TNC is exploring its use in other fisheries, including finfish. With the support of the Catalyst Fund, and in partnership with the state-run California Collaborative Fisheries Research Program, **TNC will deploy Poseidon to measure finfish inside and outside of California’s marine protected areas. These data will allow fisheries managers to understand the difference between fished and unfished populations** and adaptively manage these economically important resources.

ASSESSING THE HUMAN HEALTH IMPACTS OF FOREST FIRES

\$15,000 (August 2018 – December 2018)

Wildfires have been suppressed for decades across California’s Sierra Nevada range, resulting in forests that are thick with fuel like dead wood and brush, and at risk of large, high-severity wildfires. The consequences for both people and nature can be catastrophic. TNC has a strategy to restore the resilience of these forests, one that includes the reintroduction of more low- and moderate-severity fires through practices like prescribed burning. There is, however, concern about air quality and human health impacts resulting from these managed fires. With Catalyst Fund support, **TNC is working with the Stanford University School of Medicine to quantify the health impacts of prescribed, lower-severity fires compared to large, higher-severity fires.** Is there a difference and if so, how might this inform how and when forest managers conduct prescribed burns? These emerging partnerships with the medical and public health communities will inform the strategies we use to accelerate forest restoration and help prevent high-severity fires.

APPLYING EMERGING TECHNOLOGIES TO DIRECT DESERT CONSERVATION

\$99,145 (September 2018 – September 2019)

Encompassing 22.5 million acres, California's Desert Renewable Energy Conservation Plan conserves desert ecosystems while allowing for the development of renewable energy projects in appropriate places. To implement the plan, land managers like the Bureau of Land Management need information about the location and characteristics of desert springs, so they can manage and monitor groundwater resources. Unfortunately, on-the-ground surveys of springs can be difficult to conduct in remote locations and over such a large region. With the support of the Catalyst Fund, **TNC will deploy emerging technologies—namely, eDNA (DNA from the environment) analyses and remote sensing—to investigate the physical and ecological characteristics of springs across this region**, with the aim of producing a cost-effective tool for monitoring these systems into the future.

MEASURING ECOSYSTEM SERVICES FROM GROUNDWATER DEPENDENT ECOSYSTEMS

\$40,950 (February 2018 – May 2019)

With the signing of California's 2014 Sustainable Groundwater Management Act, California became the first state to include in legislation nature's need for groundwater. While this was an important first step, it set up a false dichotomy: groundwater for people or for nature. However, we know the two are inextricably linked. Just like some human communities, there are ecosystems that are completely dependent on groundwater. If water flows only to people and not to nature, these ecosystems will be threatened, and society will lose important services provided by groundwater, including recreational opportunities like fishing, birding, and water sports. With backing from the Catalyst Fund, **TNC is working with the Natural Capital Project to identify, measure, and map the services provided by these ecosystems so protection of those benefits can be included in groundwater allocation decisions.**



UPDATES ON 2017 PROJECTS

TRANSFORMING DATA COLLECTION WITH NEW TECHNOLOGY

\$10,000 (June – December 2017)

With support from the Catalyst Fund in 2017, **TNC scientists and partners developed a cost-effective application, AbRuler, for collecting much-needed data on abalone size using image-recognition technology.** The team tested and proved the effectiveness of this new technology, working closely with abalone fishermen. We continue to work to integrate this tool into the State of California's abalone management plan. Once the plan is implemented, it will mark the first time citizen-collected data have been used in fisheries management. To build off this success, the team has engaged three other fisheries to adapt the AbRuler software and data collection methodology to generate management-ready datasets for each of those fisheries.

DEPLOYING A DETECTION DOG FOR CONSERVATION

\$82,924 (June – December 2017)

TNC scientists created a cutting-edge method for eradicating invasive Argentine ants on Santa Cruz Island, and it appears to have been successful. Yet, how can we know for sure they are indeed gone, given how difficult they are to detect? Standard detection methods are extremely time-consuming. The Catalyst Fund **allowed scientists to test a new approach: training a dog to detect this specific species of ant.** In 2017, the dog-and-handler team detected no Argentine ant colonies in an area where there had been a very large infestation—which is further evidence that our eradication method worked. We are now sharing our method with conservationists throughout the Channel Islands and around the world to help local communities whose resources and livelihoods are threatened by these pests.

CONSERVING OUR COASTLINES IN THE FACE OF SEA LEVEL RISE

\$66,593 (October 2017 – October 2018)

In 2017, with support from the Catalyst Fund, **TNC joined the California State Coastal Conservancy to produce the first statewide, comprehensive assessment of the vulnerability of California's coastal habitats, imperiled species, and conservation lands to sea level rise.** The resulting report, *Conserving California's Coastal Habitats: A Legacy and a Future with Sea Level Rise*, serves as a conservation blueprint that government agencies and private conservation planners can use to take immediate, coordinated, and sustained action to conserve California's coastal habitats. By September

2018, a coalition of California state, federal, and local coastal managers led by California Secretary for Natural Resources John Laird had adopted TNC's *Hope for the Coast* vision, based on the findings of the report.

BUILDING A BIOECONOMIC MODEL FOR TUNA IN THE PACIFIC

\$140,000 (January – December 2017)

The Pacific tuna fishery is one of the most valuable fisheries in the world, but it faces a number of challenges, including high rates of bycatch, the accidental catch of non-target species. To improve the sustainability of the fishery, and with support from the Catalyst Fund, TNC staff and collaborators at the University of California, Santa Barbara, **examined alternative management options for Pacific tuna fisheries, comparing the current scheme of regulating fishing effort (the number of days fished) to one that regulates catch (the number of fish caught)**. The researchers found that the current effort-based management is at least as efficient as, if not economically superior to, the approach that regulates catch. These findings help TNC better understand the economic

and environmental impacts of these management strategies and demonstrate the value of improving the accuracy of various data streams to drive better decision making.

MULTI-BENEFIT TARGETING AND ASSESSMENT OF STRATEGIC LAND RETIREMENT

\$83,400 (June 2017 – April 2018)

Intensive agriculture has expanded dramatically in the major river valleys of California. New groundwater sustainability policies, however, are going to shift land use in these landscapes over coming decades. The San Joaquin Valley is the epicenter of these changes, where groundwater regulations will lead to roughly 50 percent of irrigated land coming out of production in certain water districts. With backing from the Catalyst Fund, TNC staff are building models that select lands for retirement and restoration based on optimizing water sustainability and habitat value. This project will provide the foundational science needed to maximize the outcomes for both nature and people, as well as the information needed to structure financial incentives based on ecosystem service benefits.

CATALYST FUND IN ACTION

Science Impact Through Policy

California is renowned for its leadership in climate policy. And TNC teams have also been at that forefront, helping the state government make sure its policies not only meet nature's needs, but actually *deploy* nature to help solve the climate crisis. In 2016, the Science Catalyst Fund funded a two-year climate science fellowship that focused on—among other things—quantifying the carbon sequestration potential of California's diverse landscapes. That analysis, published in the *Proceedings of the National Academy of Sciences*, was instrumental in shaping the way the state allocates revenues from its carbon cap-and-trade system. Ultimately, it helped ensure that protecting and improving the management of natural lands became integral components of California's strategy to address climate change.



"The opportunity to work with TNC policy experts and learn what makes science relevant in policy discussions was truly eye-opening for me. It has made me a better scientist—and conservationist."

— David Marvin, Ph.D., Climate Change Science Fellow 2016-2018



"The Catalyst Fund's support of this fellowship could not have been better timed. Dave provided the analytical skills we needed to show the power of nature-based solutions—and in time to turn those insights into real policy outcomes."

— Michelle Passero, Director of Climate Policy, California



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