- THE NATURE CONSERVANCY IN CALIFORNIA -

TECHNOLOGY CATALYST FUND

2019 Annual Report

© Kelly Easterday

FROM THE CHIEF TECHNOLOGY OFFICER

Science has shown that we have 10 years to alter the trajectory of climate change and set our world on a sustainable path.

To rise to this urgent task, The Nature Conservancy needs an agile technology team that can rapidly evaluate and deploy innovations that are remaking industries, economies, and even societies. At the core of this revolution are advances in data, artificial intelligence (AI), connectivity, and mobile computing. Our goal is to utilize these technologies to scale TNC's conservation strategies.

The Technology Catalyst Fund was made to ensure that TNC has the resources to mobilize the technology we need to address the unprecedented challenges of our time. The results from our investments over the past year demonstrate the power of this transformative resource.

Thank you for your support of this critical work.

—Matt Merrifield
Chief Technology Officer, California Chapter

HARNESSING TECHNOLOGY FOR CONSERVATION

Conservation needs to harness technology to meet the complex challenges of today's world. The Technology Catalyst Fund provides early stage resources to investigate and prototype technologies that have high potential for impact and have effectively disrupted the status quo in other sectors. The Fund empowers small, effective teams with the resources they need to undertake a lean approach to technology solutions that encourages design thinking, rapid feedback cycles, and prototyping. All the investments operate with the basic premise of identifying and deploying technology that takes conservation actions to scale.

Technology Catalyst Fund projects utilize the following techniques:

- Provide an "innovation window" that allows for experimentation to find the best solution,
- Find technology solutions that expand the geographic footprint of a current strategy, and
- Reduce costs and increase the pace of action through efficiency.

EMBRACING INNOVATION

Many of our teams are looking to tackle technology-driven projects to accelerate their work, but it is often difficult to know where to start, how to get stakeholders aligned, or how to best utilize resources to get there. In short, we need to execute our technology projects using a modern methodology. Methods like design thinking and iterative solutions-based problem solving have proven to be beneficial to other sectors. Conservation should be taking advantage of this approach. The Technology Catalyst Fund helps projects utilize approaches that are designed to move faster, absorb risk through iterations, and bring together disparate methods by focusing on impact.

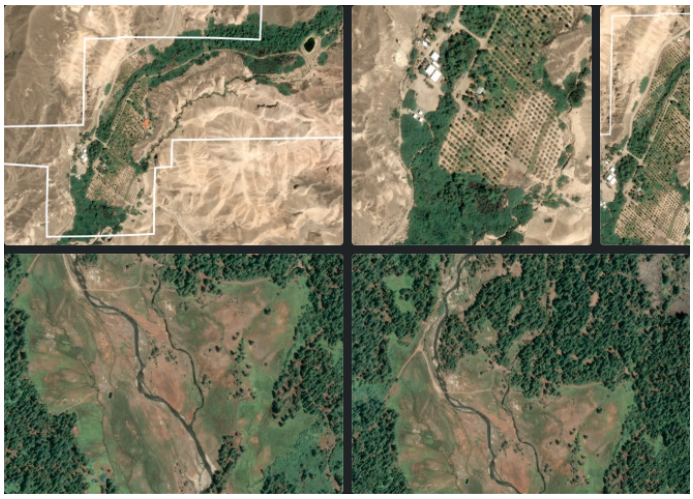
© Jordan Plotsky

© Lain Graham

MONITORING TNC PROPERTIES WITH SATELLITES: PROJECT LENS

$40,000 (August–December 2019)

TNC is facing a challenge: with hundreds of properties spread across the state, getting to each site for annual monitoring is time-consuming and expensive. Even during field visits, monitors cannot always capture views of an entire property. To address this challenge, we have been investing in satellite imagery and artificial intelligence (AI) to augment the task of property monitoring for TNC in California and other states. We have partnered with Upstream Tech to build a web-based collaboration platform for viewing, analyzing, and reporting that uses high-resolution imagery from multiple sources. The app allows us to monitor our entire portfolio of properties and easily detect changes and violations by comparing current and historical imagery. The Technology Catalyst Fund's investment in seed funding for Project Lens is proving to be impactful beyond California, as many other state programs within TNC and many land trusts struggle with the same monitoring problem. The California Chapter will use this tool in its 2020 monitoring season, and we are on track to pilot the technology with three other TNC chapters this year.

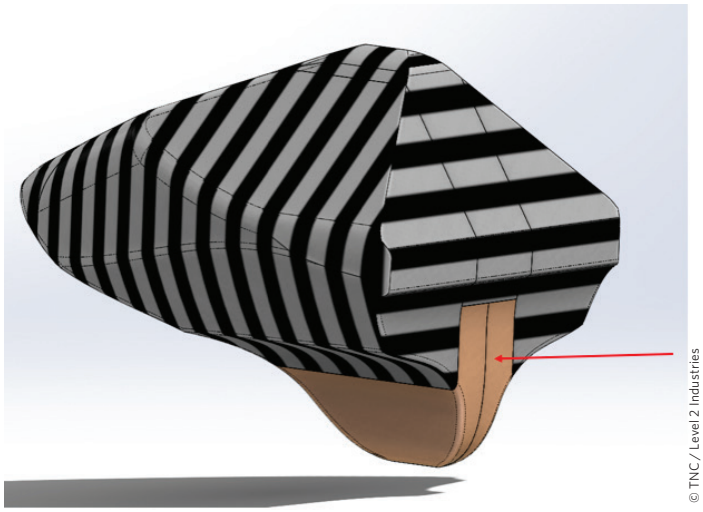


© TNC / Upstream.tech

TRACKING ENTANGLED WHALES: PAIKEA

$25,000 (March 2019–Ongoing)

Whales are getting tangled up in fishing gear, but tracking an entangled whale while rescue teams mobilize is a tricky problem. The tracking hardware currently used by the National Oceanic and Atmospheric Administration (NOAA) and other agencies that are responsible for recovery efforts is more akin to a ball and chain than a GPS unit. The hardware, developed in an ad-hoc manner over 10 years, was essentially a repurposed 50-pound fishing buoy. We knew there was a better way, so the Technology Catalyst Fund provided resources for TNC to partner with IDEO and execute a design sprint—a fast-paced, iterative workshop with a tight structure—for stakeholders to rethink entangled whale tracking. That process resulted in a radically improved design, pictured below. We have since hired mechanical engineers at Level 2 Industries and worked with fluid mechanics researchers at The Splash Lab to build the prototype. The initial prototype is promising—it is a fraction of the weight, drag, and cost of the original gear, and we have reworked the electronics to be modular and reusable in other tracking devices. Paikea, named for the mythical whale rider of the Māori, is set for sea trials with NOAA recovery teams in spring 2020, and we have a commitment from NOAA leadership to purchase 100 units, assuming field tests are successful.

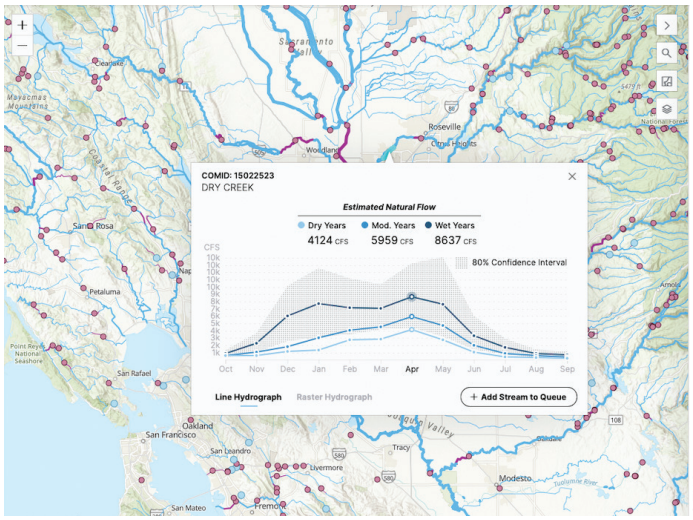


© TNC / Level 2 Industries

DATA SCIENCE MEETS WATER MANAGEMENT: NATURAL FLOWS WEB APP

$30,000 (January 2019–Ongoing)

Water is essential for California's citizens, economy, and environment. Centuries of water management through dams and diversion have altered the flows in many streams and rivers, which can harm freshwater ecosystems. TNC partnered with the United States Geological Survey to generate estimates of natural flows (expected streamflow in the absence of human modification) in all the streams and rivers in California from 1950-2015. We used machine learning to estimate natural flows, which provide critical information that water managers use to identify and manage instream flows for the benefit of native freshwater species. These data are large and complex,



© TNC

so we needed a simple way for users to visualize and access the information. To that end, we built a web application and RESTful API—a software architectural style—that allows users of any expertise to query, visualize, and export the data for decision making. In 2019, the site had over 6,400 views, with an average of 59 active monthly users. These users are largely made up of government agency staff such as managers at the Department of Water Resources and the California Department of Fish and Wildlife.

KELP WATCH

$25,000 (January–July 2019)

Kelp forests provide myriad benefits to nature and people in oceans around the world. They form the backbone of productive and diverse ecosystems, providing habitat and food for thousands of species. But studies show that our kelp forests are diminishing due to increased threats driven by climate change, overfishing, and harvesting. On California's North Coast, warming waters, the introduction of disease, and the loss of a key predator have led to a 93% reduction in bull kelp forests in less than a decade. Unfortunately, our methods of tracking changes in kelp health have not kept pace with modern technology, and in order to protect and conserve these critical ecosystems, we must improve the way we map and monitor them. Thanks to the Technology Catalyst Fund, TNC is supporting research into a proven, cost-effective approach to mapping kelp abundance in near-real-time

© Kirk Klausmeyer / TNC

using satellite imagery and machine learning. To make those data mainstream, we are building a powerful visualization platform that allows managers to understand where the biggest impacts are in California. The first phase of this work will establish a methodology in our state, then subsequent phases will replicate the method and publish data in other critical geographies around the world. Rebecca Flores Miller of the California Department of Fish and Wildlife says, "We are blown away by Kelp Watch; we can already see how it can be a really useful tool for managers."

PRODUCT INNOVATION FELLOWSHIP

$10,000 (October 2019–June 2020)

TNC's Conservation Tech team is product driven, but building a great product is only the first goal. Ensuring that a product gets to scale is how we truly achieve impact. That is why we are working to leverage the power of markets to scale innovative technologies. We realized we needed someone dedicated to increasing impact and scale across all of our projects, if this technique was going to be successful. In October 2019, we created a fellowship position to fill this gap and drive a body of work focused on innovation in practice. From design thinking to using lean methods, we needed someone responsible for accessing the processes that have allowed so many groups to succeed in other sectors. We hired Sue Pollock to fill this role. Sue has 12 years of experience working on matrixed teams in a variety of functions at TNC, and she holds an MBA in design strategy. The Technology Catalyst Fund is providing resources for Sue and teams to run professionally facilitated workshops that seek to clearly identify solutions, leveraging time spent with rapid feedback and meaningful results.

OCEAN PLASTICS DESIGN SPRINT WITH IDEO

$70,000 (September 2019–June 2020)

© IDEO

The scale of ocean plastic pollution is staggering. Recent estimates show that about 8 million metric tons of plastic pollution enter the ocean each year, and plastics have been identified in nearly every marine water body in the world. As plastic use increases with a growing human population, negative impacts continue to multiply. It is hard to overstate the threats that plastics pose to marine ecosystems, livelihoods, and sustainable food systems around the globe. This type of problem requires an innovation mindset, and to that end, the Technology Catalyst Fund is supporting work with IDEO to apply human-centered design to draw out solutions across the plastic lifecycle: reducing the creation and consumption of plastic, monitoring plastic waste flows, improving waste practices, and recovering plastic already polluting natural systems. IDEO brings an impressive body of work in this arena, and together, we have an unparalleled ability to convene a set of industry stakeholders to think through solutions. TNC and IDEO will be running three design sprints to explore these issues with stakeholders across sectors. The goal of these sprints is to deliver strategy briefs and clear action plans geared to TNC's unique strengths from each sector involved.

The Nature Conservancy | CALIFORNIA conservation science
scienceforconservation.org

Matt Merrifield
Chief Technology Officer
mmerrifield@tnc.org

THE NATURE CONSERVANCY
201 Mission Street, 4th Floor . San Francisco, CA 94105