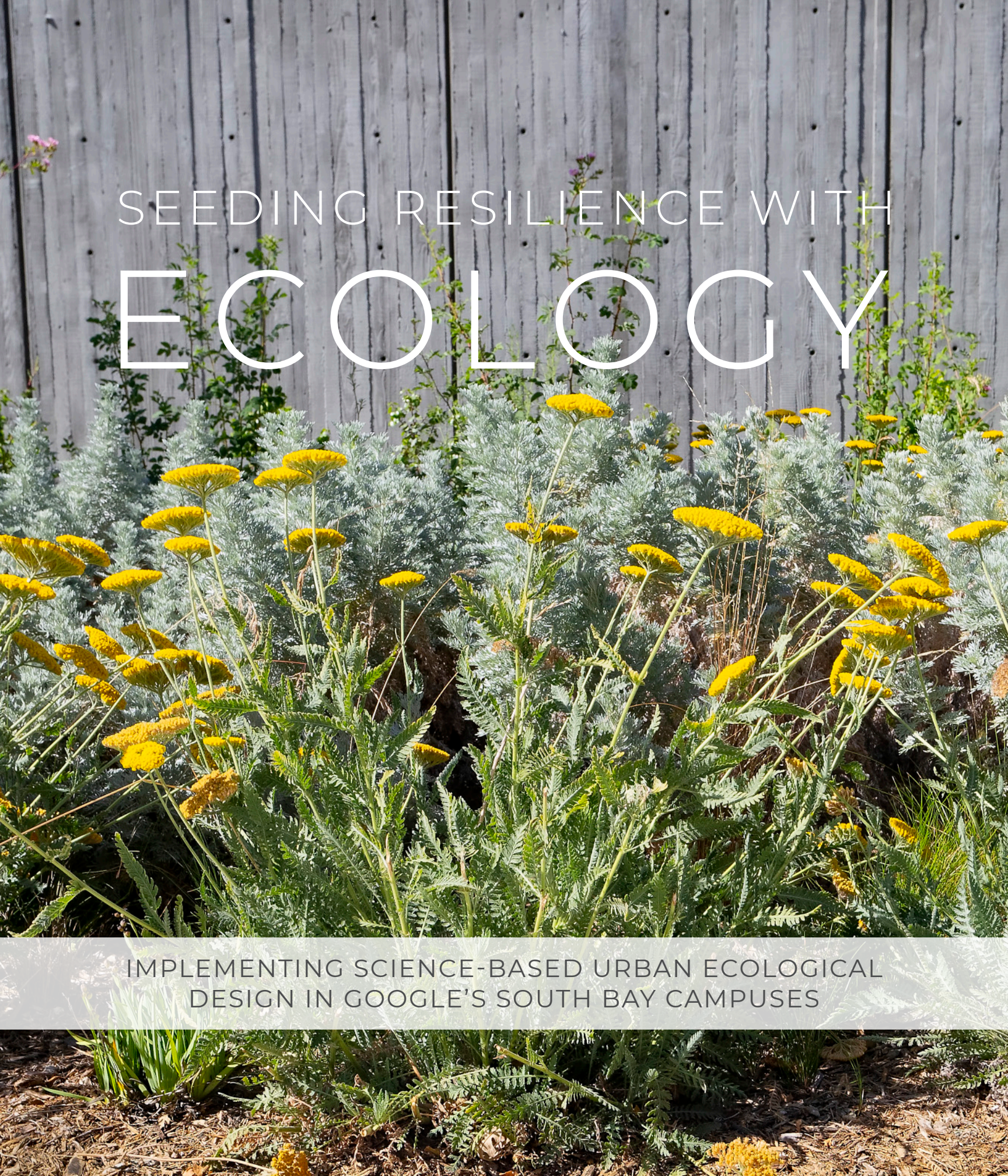


# SEEDING RESILIENCE WITH ECOLOGY

## IMPLEMENTING SCIENCE-BASED URBAN ECOLOGICAL DESIGN IN GOOGLE'S SOUTH BAY CAMPUSES

Google would particularly like to thank the Santa Clara Valley Audubon Society, California Native Plant Society, Citizens Committee to Complete the Refuge, Sierra Club, Committee for Green Foothills, Canopy, Grassroots Ecology and Living Classrooms. The vision and expertise of these organizations inspired the formation of the Ecology Program and have been integral to the program's ongoing efforts.

PHOTO COURTESY OF SANTA CLARA VALLEY AUDUBON SOCIETY

> *In 2012 an invitation to meet with Google was the beginning of a two-way learning and action curve: Google hired ecological staff, environmental groups gained opportunity to contribute, campus landscaping transitioned to native plants, actions of time and place were taken to address climate change, and development design considered wildlife needs alongside human function.*
>
> Eileen McLaughlin
> Citizens Committee to Complete the Refuge

# engaging a collective vision

Envisioning landscape resilience in Silicon Valley—that is, a regional landscape that sustains ecological function in the face of stress and uncertainty—is no simple task. Developing a meaningful vision depends upon collaboration among environmental stakeholders and the science community. Implementing that vision requires coordination across a wide cross section of regional, municipal, and local players.

Google's Ecology Program emerged from an ongoing dialogue between scientists, planners, and local organizations who share a common goal of regional ecological resilience. The innovative thinking, expert guidance, and thoughtful input of this group set the foundation for the science-based ecological ethos that is now embedded in the development of Google's South Bay campuses.

The urban ecology projects chronicled in this booklet are grounded in the scientific expertise of our trusted partners. Furthermore, these projects could not have been built without the support and flexibility of city, county, and regional leaders. It is only through these continuing partnerships that meaningful change in our urban landscapes can be achieved.

# framework for resilience

Google's headquarters are located in the heart of Silicon Valley—a region that supports a thriving hub of technological innovation, but where increasingly fragmented ecosystems are threatened by a future of rapid urbanization and environmental uncertainty.

Yet traces of the biodiversity that once thrived in this remarkable region can still be found in our urbanized environment: egrets nest in suburban office parks and valley oaks command the occasional backyard. These are important reminders that there is space for nature in our cities.

This begs the question: how can ecological resilience be intentionally and meaningfully integrated into our urban fabric? How can we validate that these ecological interventions provide significant and lasting benefits to both people and wildlife?

To help answer these big questions, Google sponsored the San Francisco Estuary Institute (SFEI) to create the Landscape Resilience Framework, and then saw it applied to our own community in SFEI's A Vision for a Resilient Silicon Valley. This publicly available resource synthesizes scientific literature into practical guidance for regional planning, from urban design to ecological restoration, providing direction to ensure that each landscape intervention contributes toward the overarching goal of resilience at the regional scale. Google's Native Habitat Landscape Monitoring Project monitors and documents discrete landscape projects to verify the benefits of ecological design.

> *The retention basin is an exciting example of how collaboration between Google, the city, and environmental organizations can lead to urban spaces that truly integrate ecological, flood protection and transportation needs.*
>
> Pat Showalter
> Mountain View City Council Member

PROJECT SPOTLIGHT:

## CHARLESTON RETENTION BASIN

Resilient urban landscapes must advance multiple priorities—such as habitat, water infrastructure, and pedestrian connectivity—necessitating collaboration and compromise among various stakeholders.

The Charleston Retention Basin is the result of a unique public-private partnership to improve circulation around and across an existing retention basin while simultaneously enhancing and expanding native habitat. In coordination with the City of Mountain View, LinkedIn, HCP Life Sciences, and local environmental organizations, Google developed a design to provide needed infrastructure while also creating a dynamic place-based experience by immersing pedestrians and cyclists in a thriving riparian ecosystem.

Ecological enhancements include nearly 6 acres of new native riparian communities, including willow and cottonwood forests and mixed oak woodlands. An intentional palette of native plants establishes structural complexity needed for local wildlife habitat and creates space for biodiversity in the urban matrix.

# catalyzing urban ecology

Each campus development, office retrofit and landscape improvement is an opportunity to integrate ecological processes into the densifying urban fabric of the South Bay. Over time, specific site interventions aggregate into larger, interconnected systems that sustain a more resilient urban landscape.

Scientifically sound urban ecology requires both regional vision and intimate knowledge of local ecosystems. It succeeds only when a deep understanding of historical landscapes is informed by a comprehensive assessment of future stressors. Under the expert guidance of Ecology Program partners, Google's campuses have become a unique testing ground for science-based urban ecology: development that prioritizes biodiversity and ecological functions alongside conventional human-focused considerations.

When done right, the benefits of urban ecology are layered and manifold. Ecologically resilient developments are better poised to adapt and recover from stressors spurred by climate change—such as sea level rise and urban heat islands. Urban ecology allows wildlife to move through and live within our dense developments. Furthermore, thoughtful integration of natural systems into our communities offers space for people to establish meaningful connections to their local natural environment.

> *Google embraced a heron and egret rookery! It is so rare to see a company truly integrate wildlife into campus life, and celebrate the cycle of life with the birds.*
>
> Shani Kleinhaus
> Santa Clara Valley Audubon Society

PHOTO COURTESY OF SANTA CLARA VALLEY AUDUBON SOCIETY

PROJECT SPOTLIGHT:

## EGRET ROOKERY

Each spring, hundreds of egrets return to a stretch of sycamores along Shorebird Way in the heart of Google's Mountain View Campus. Here, these birds nest and raise their young in a noisy cacophony lasting from March to August. In 2017, Great and Snowy Egrets and Black-crowned Night-Herons established 193 nests in this extraordinary space.

Since 2013, the Santa Clara Valley Audubon Society (SCVAS) has worked with Google to provide conservation guidance and educational programming for this ecological gem. These efforts include closing Shorebird Way to vehicular traffic during the breeding season, establishing a protocol for collecting and caring for injured and orphaned egrets, and installing interpretive signage. Additionally, the SCVAS organizes "Egret Office Hours," attracting hundreds of Googlers, community members, North Bayshore companies, nature enthusiasts, school groups and other visitors to learn about and enjoy the unique spectacle of the rookery.

# establishing native habitat

Intelligently designed native vegetation is a central pillar of urban ecology. Native plants provide invaluable habitat for wildlife—primarily birds and insects in the context of Google's campuses—and support vital, site-specific ecological processes.

Google's Habitat Design Guidelines, developed by ecology partners H.T. Harvey & Associates with extensive input from local groups, translate ecological science into design guidance that can be implemented at the project scale. To date, nearly 100 acres of campus landscapes have implemented the Habitat Design Guidelines, with many more on the horizon. The results are striking: areas once defined by lawn and hedges now host vibrant communities of California wildflowers alive with native bees and butterflies. These spaces are then studied and monitored to inform future design decisions.

Native habitat provides the structural complexity and food sources to which local wildlife are adapted. Humans, too, benefit from ecologically sound landscapes—these planting strategies are better poised to clean our air and water, moderate temperatures, and provide biophilic experiences.

PROJECT SPOTLIGHT:

## THE GREEN LOOP

Google's first major urban ecology project was the Green Loop, a multimodal path through the Mountain View campus that enhances both urban and ecological connectivity. By incorporating science-based guidance at the outset of design, the project team was able to implement key ecological strategies to support biodiversity without compromising on car-free connectivity goals.

"Google basically put its internal design team and outside ecologists in a room and said, 'We want you to work hand in hand every step of the way," says Dan Stephens, vice president of H.T. Harvey & Associates and a lead consultant for Google's urban ecology projects.

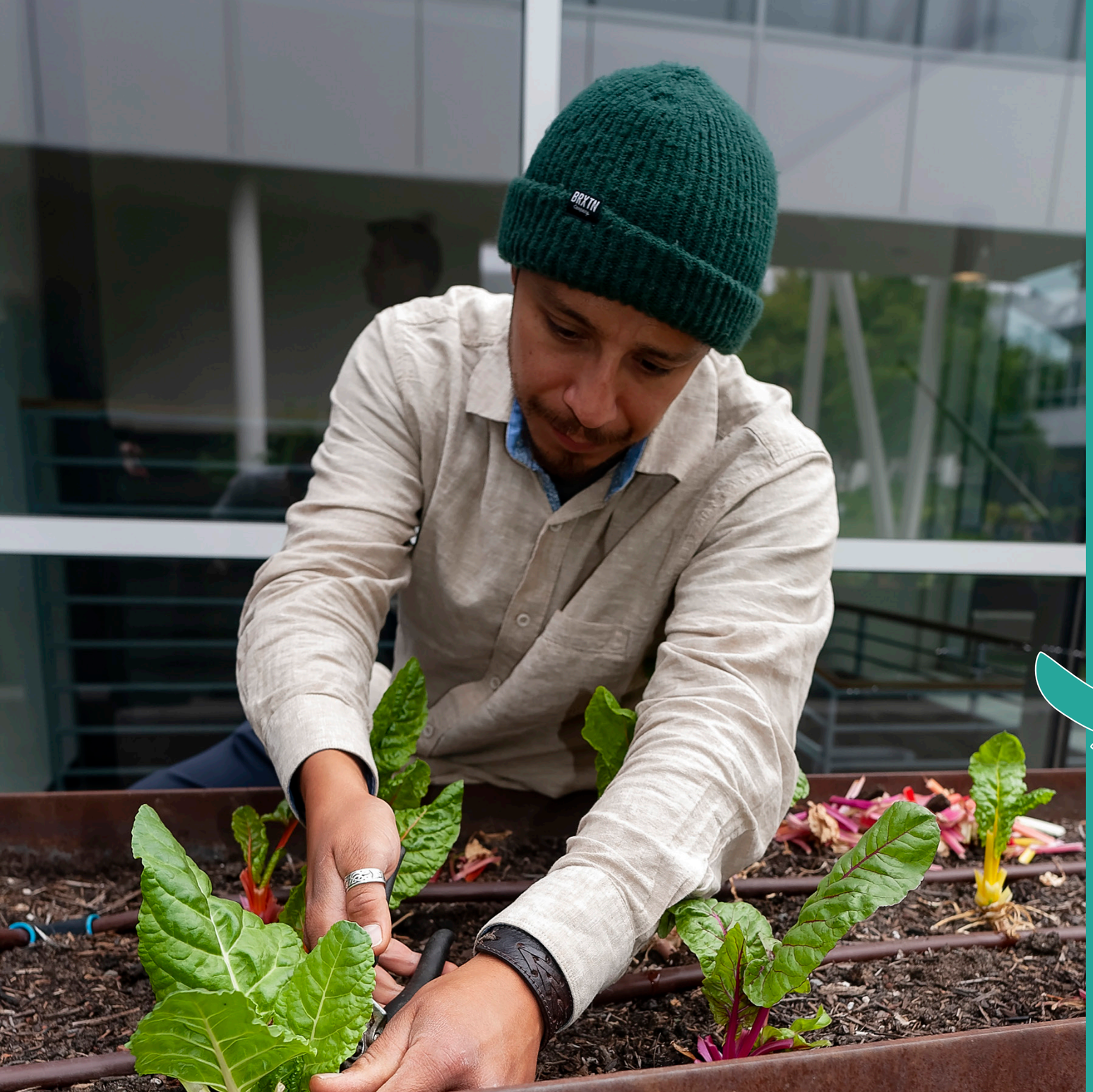
The Green Loop corridor hosts 1.4 acres of native vegetation—including California poppies, big berry manzanita, and yarrow—that provide valuable habitat for birds and other wildlife. The Green Loop incorporates native oaks that provide significant ecological benefits as they are drought tolerant, store large amounts of carbon, and feed a variety of animals.

# planting for pollinators

Pollinators provide an invaluable service to local ecosystems: these bees, moths, and butterflies are essential actors in sustaining healthy plant communities. Not only do many native plants rely on pollinators to reproduce, but the food crops that sustain our human populations also depend on a robust pollinator community. With this in mind, the Ecology Program sponsored H.T. Harvey to develop specific guidelines for pollinator habitat design to ensure these important creatures have spaces to thrive in the South Bay.

Even small patches of high quality pollinator habitat can make a difference in supporting native pollinator populations. With pollinators increasingly stressed to find quality habitat in the region, implementing pollinator-focused planting strategies is an efficient way to make measurable ecological impact and support the local food system.

Google worked directly with the California Native Plant Society to create a demonstration pollinator garden using native plants with high habitat value. Nestled alongside office buildings in Mountain View, this garden is specifically designed to support pollinators during each stage of the life cycle.



CONNECTING THE DOTS:

## URBAN AGRICULTURE

Pollinators are crucial to food production at any scale, from the vast farmlands of the Central Valley to small garden plots in our backyards. One immediate beneficiary of increased pollinator habitat on campus is Food at Google's own Farm to Table program, which supports an array of productive food garden plots and hands-on food production experiences for users. Overlapping resilience strategies—in this case, urban agriculture and ecological habitat—is important in ensuring resiliency across urban systems at large. Quality pollinator habitat, managed bee boxes, and local gardens support each other across property and programmatic boundaries. People, plants, wildlife, and urban systems all benefit when such interventions interweave. The Farm To Table program demonstrates a holistic approach to sustainable urban design and agriculture that meets our human needs for food consumption, wellness, community and ecological health.

Landscape processes are dynamic and ongoing; maintenance and monitoring sustain and validate ecological implementation. Google's Native Habitat Landscape Monitoring Project is a cutting-edge effort to measure the ecological benefits associated with installing native landscapes on its campuses.

# embracing messiness

Conventional office landscaping follows a formula found in every American suburb: manicured lawns, tidy shrubs, and artfully arranged flowerbeds. Native landscapes, however, mimic the natural processes of larger ecosystems and, therefore, tend to be a bit more unruly. California wildflowers inevitably dry out during summer, defying expectations of year-round greenness. Leaf litter and fallen branches are typically cleared from urban landscapes, but if left in place they provide habitat for native insects while improving soil quality and reducing irrigation needs.

These dynamic landscapes require a change in the way we conceive of and maintain urban landscaping. As we transition to prioritizing habitat value and biodiversity over traditional aesthetics, maintenance staff must adapt conventional landscape practices while employees must recalibrate their expectations of office landscapes. Education is a key component to both implementing urban ecology and ensuring interventions last over time.

*What sets Google apart is that they don't just substitute native plants for exotic plants in a standard landscape design; they actually plan for resilient ecosystems based on the historical ecology of the area.*

Alice Kaufman
Committee for Green Foothills

PROJECT SPOTLIGHT:

## TURF REPLACEMENT

While major projects such as the Charleston Retention Basin provide significant contributions to urban ecology, smaller moves are just as essential. Replacing turf with native landscaping is a simple way to reduce irrigation demands and provide habitat. In 2014, 1.5 acres of turf on Google's main campus were replaced with native prairie plantings and a demonstration garden, setting the stage for imagining a more broadly integrated ecological approach for the urban landscape.

# re-oaking the valley

Urban ecological design transforms the built environment from day one: these spaces immediately look, smell, and sound different than typical urban landscapes. Yet the species with the potential for the longest lasting ecological impact—such as our stately native oaks—require a longer time horizon to fully express themselves.

Native oaks once defined the landscapes of Silicon Valley, long before urban developers in the twentieth century blanketed the region with universally standard street trees. Oaks thrived in the long, dry California summers and hosted a diverse array of wildlife adapted to the unique characteristics of these trees. In Re-Oaking Silicon Valley, SFEI outlined the potential of native oaks to increase biodiversity if reintroduced at scale across the region.

Google's newest campus landscapes have become an important incubator for establishing the next generation of native oaks. Elements of oak woodland ecosystems are incrementally incorporated into campus design, seeding a long-term vision in which the contemporary urban environment recalls that of its historic heritage. Over time, these trees will not only create valuable habitat, sequester carbon, and decrease demands on irrigation, but also re-establish a unique sense of place within our valley landscapes.

Google's Charleston East development project will mark important progress in establishing a more resilient urban canopy by using native street trees. This design was made possible by the City of Mountain View, setting an exciting precedent of collaboration with the city to advance ecological goals.

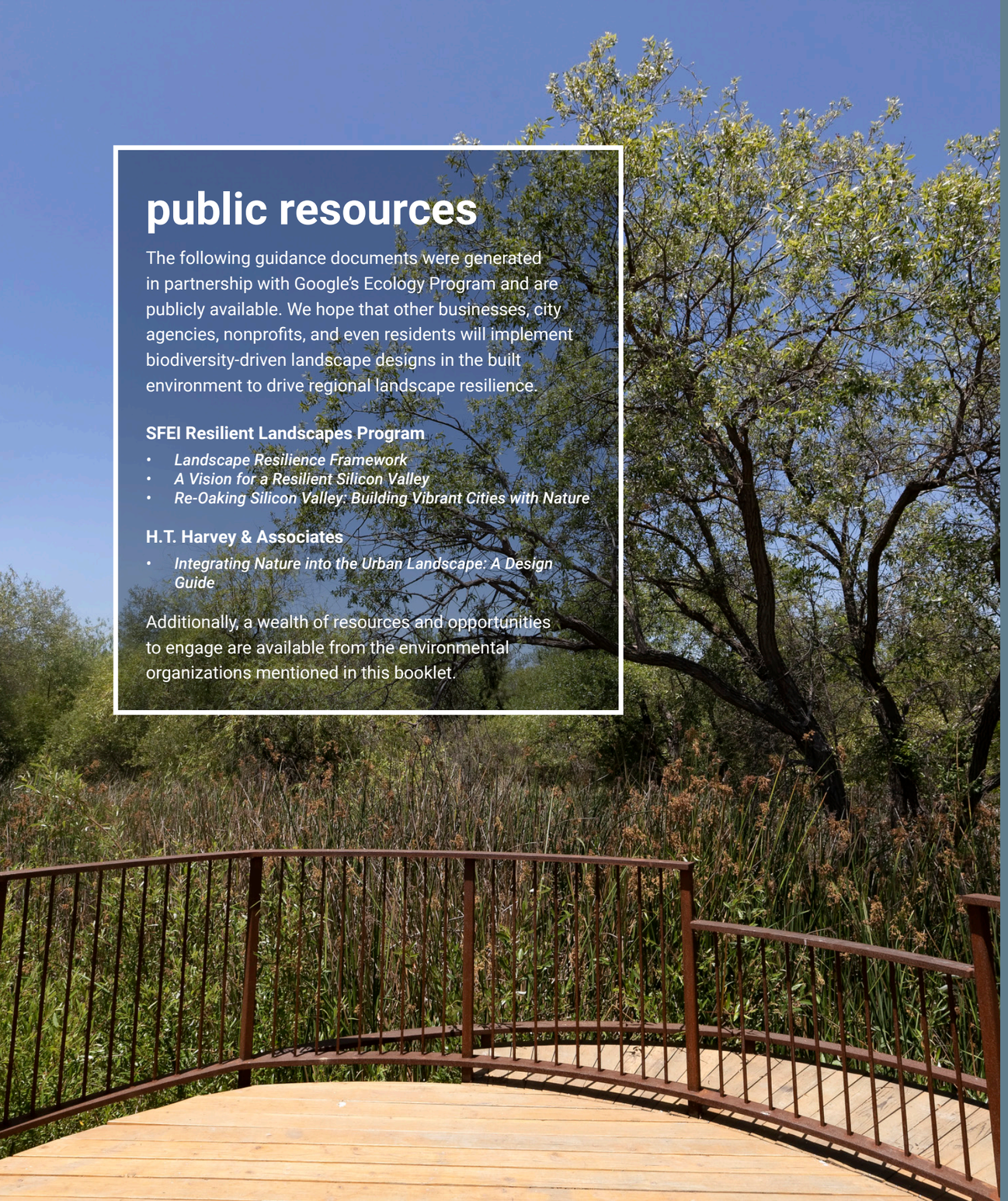
> *This collaborative effort [of the Ecology Program] serves as a demonstration of how a private company can mobilize through partnerships the integration of science-based guidance for ecology and climate adaptation into development plans.*
>
> **Catherine Martineau**
> **Executive Director, Canopy**

# looking to the future

Together, with scientists, environmental groups, municipal leaders, and our broader community, the Ecology Program envisions a future where nature and ecological science are thoughtfully integrated into urban design across the Silicon Valley.

Furthermore, urban ecology is a key pillar of Google's effort to emphasize climate resilience across the company. Water stewardship, urban heat islands, sea level rise—these issues present profound risk in a changing climate, but can be tempered in part through ecological enhancements in our built environment.

Exciting urban ecology projects are on the horizon—from rich marsh landscapes on the Bay's edge to enhanced habitat along our urban channels—that all seek to revitalize natural processes in today's fragmented urban settings. Ongoing collaboration, engagement, and innovation are essential to create the resilient landscape of tomorrow.



# public resources

The following guidance documents were generated in partnership with Google's Ecology Program and are publicly available. We hope that other businesses, city agencies, nonprofits, and even residents will implement biodiversity-driven landscape designs in the built environment to drive regional landscape resilience.

**SFEI Resilient Landscapes Program**

- *Landscape Resilience Framework*
- *A Vision for a Resilient Silicon Valley*
- *Re-Oaking Silicon Valley: Building Vibrant Cities with Nature*

**H.T. Harvey & Associates**

- *Integrating Nature into the Urban Landscape: A Design Guide*

Additionally, a wealth of resources and opportunities to engage are available from the environmental organizations mentioned in this booklet.

All photographs are by Rick Miskiv (www.mskv.co)–unless otherwise noted–and taken on Google's Mountain View and Sunnyvale campuses. This book was produced by Google's Ecology Program in 2018.