San Francisco Estuary Institute

# STRATEGIC PLAN

## 2019-2024

*We have the potential, in Northern California, to create an international model of how an urban region of eight million people, at the edge of the sea, can adapt to the challenge of climate change and foster resilient ecosystems where people and nature thrive.*

All photographs by Shira Bezalel (SFEI)

# CONTENTS



SFEI San Francisco Estuary Institute

# Executive Summary

*The San Francisco Estuary Institute (SFEI) has a 25-year track record of serving local and state agencies by developing and translating science to measurably improve the health and resiliency of Bay-Delta ecosystems.*

*SFEI is a boundary organization at the interface between science and policy. We are recognized nationally for our ability to build consensus to support effective environmental decision-making and policy.*

*Bay-Delta ecosystems face enormous and growing pressures due to climate change, population growth, and aging infrastructure; significant investments will be required over the next two decades.*

*SFEI's new five-year strategic plan will shift from short-term planning and specific projects toward more ambitious, solution-based knowledge for long-term, regional decision making.*

> *"Great science can accomplish great things. We're proud to support SFEI in its efforts to characterize microplastic pollution in San Francisco Bay and the surrounding ocean, and believe their findings will have a lasting impact on microplastic pollution reduction, helping bring significant change to the local and national community."*

**GENNY BIGGS**
SPECIAL PROJECTS OFFICER
GORDON AND BETTY MOORE FOUNDATION

*We will be guided by the following goals:*

1

### ADVANCE VISIONARY SCIENCE

Produce visionary science that informs management decisions through collaborative science monitoring and partnerships.

2

### HARNESS INNOVATIVE TECHNOLOGY AND BIG DATA

Empower people in communities to visualize and solve environmental challenges with data and information technology tools.

3

### COMMUNICATE SCIENCE TO INFORM, INSPIRE, AND EMPOWER

Deliver the necessary science to revitalize nature in communities through collaborative forums and online tools.

4

### AUGMENT FUNDING RESOURCES

Develop a diverse portfolio of funding that leverages existing partnerships and expands philanthropic opportunities to help solve large-scale environmental challenges and provide financial stability to SFEI's ongoing mission.

Imagery courtesy of USGS

## The Vision

# We envision resilient ecosystems where people and wildlife thrive.

## The Mission

# We deliver visionary science that empowers people to revitalize nature in our communities.

**Visionary science** • Independent, state-of-the-art science focused on the big picture over the long term and at a large scale.

**Empowered people** • With robust science, effective tools, and collaboration, we empower people to make thoughtful and informed stewardship decisions.

**Revitalize nature** • Achieving clean water and healthy, resilient ecosystems by working with—rather than against—nature.

**Our communities** • Urban to rural, agricultural towns to natural areas.

# Who We Are


The San Francisco Estuary Institute is a center of independent environmental science. We were established in 1993 to provide public resource management agencies and policy makers at all levels of government with sound, objective scientific knowledge for decision making and communications regarding water quality and San Francisco Estuary management. The founders of SFEI intended it to grow into a source of reliable science for a broad array of environmental issues in Northern California. We have achieved that vision.

Today SFEI and SFEI's 60+ staff have become a center of excellence that engages citizens and government in innovative science and technology to define and resolve complex local and regional issues between people and nature. We provide technical assistance and scientific support related to water quality management, urban sustainability, and ecological resilience to those agencies as well as to NGOs, communities, and business leaders. Thus, the investment in SFEI has created long-lasting synergies and cost-effective partnerships. We are poised to address the pressing challenges of climate change in our region and elsewhere.

# Why We Matter

California has a long history of prioritizing the well-being of its natural resources. Citizens have voted repeatedly to allocate billions of taxpayer dollars to protect and restore diverse ecosystems, recognizing how these systems, in turn, support the economy and human health. California has further demonstrated an ongoing commitment to supporting science that underpins thoughtful stewardship of these critical natural systems. This is ever more urgent as climate change imperils the health of the state's land, water, and air, as well as the diversity of organisms that rely on them.

In partnership with neighborhoods, businesses, universities, and a tireless NGO community, California leads the way by investing in foundational and cutting-edge science, interagency engagement, and traditional knowledge to safeguard the environment and prepare for a healthy and sustainable future for people and nature.

Californians have a proven track record of investing time and money in the common good that natural resources provide. But they also need to know that the investment is wisely spent, and that the most pressing natural resource issues for quality of life have been prioritized and effectively addressed. In the face of climate change, this challenge is even more profound.

For more than a quarter century, the San Francisco Estuary Institute-Aquatic Science Center (SFEI)[1] has served as a trusted science advisor to local and state agencies charged with implementing natural resource mandates.

Our long history of providing objective, independent science, technical assistance, and scientific support to local decision makers in the Bay Area has earned SFEI a respected reputation to provide those services across the state. Our vision, reputation, tools, and expertise are sought after nationally as other regions grapple with similar natural resource challenges and decisions.

Our inclusive and transparent approach to identify, gather, and generate the most useful data is paramount to our success. SFEI is skilled at convening a cross-section of informed experts from diverse perspectives in order to deliver solution-based knowledge that will yield robust and durable policy outcomes. SFEI not only does the science, we know the questions to ask. Our hand-in-glove partnership with decision makers has honed our skill at applying the right process, tool, or data to the problem.

[1] The Institute is a union of the San Francisco Estuary Institute (SFEI), a nonprofit source of independent science founded through the U.S. Clean Water Act, and the Aquatic Science Center (ASC), a Joint Powers Authority linked directly to the California Water Quality Improvement Act through the State Water Resources Control Board. This union provides us with unique opportunities to work closely with regulatory and management agencies at all levels of government to provide independent, objective, unifying scientific and technological services for policies, programs, and projects that aim to protect the waters of the state, the U.S., and the life they should support.

# SCIENCE and TECHNOLOGY PROGRAMS at SFEI

The **Clean Water** program has guided the improvement of San Francisco Bay water quality, even as the population of the region has increased by 1.5 million over the past 25 years. Approaches and tools developed for the Bay are now being applied in other regions, including the Delta and the Russian River watershed.

The **Resilient Landscapes** program has provided broad, holistic visions for designing ecologically resilient communities and landscapes, and site-specific assessments. Our analyses and recommendations are supporting and implementing long-range visions in many Bay-Delta locales, with important applications to other regions of the state.

Our **Environmental Informatics** program has provided state-of-the-art, science-based data management and mapping tools to monitor, assess, and visualize complex environmental issues. These tools, and the peerless datasets they animate, support the assets and extend the influence of SFEI's Clean Water and Resilient Landscapes programs.

Today, a changing climate, a growing population, and an aging urban infrastructure has created a trifecta of challenges for all Californians. It also presents a unique opportunity for SFEI to apply more than 25 years of experience to these daunting issues. ***We have the potential, in Northern California, to create an international model of how an urban region of eight million people, at the edge of the sea, can overcome these challenges and foster resilient ecosystems where people and nature thrive.***

We can leverage our status as trusted advisors and conveners to inform, engage, and empower the next generation of environmental leaders. With new funding opportunities, and growing political will, we can provide the essential science to decision-makers in their efforts to merge nature-based solutions with the engineering, governance, and fiscal policies needed to integrate and renew our built and natural landscapes.

The 2011 San Francisco Estuary Institute Strategic Plan, which created a blueprint to align the vision and activities of the SFEI Board and staff, was successfully fulfilled. This updated Strategic Plan builds on those advancements and allows SFEI to more effectively tackle emerging issues. The challenges of these times call for more ambitious strategies for SFEI. It requires augmentation of our traditional funding model with the resources required to attain our goals on behalf of all who care about clean water, resilient ecosystems, and thriving, sustainable communities.

*At Google, we're always looking for new ways we can make a difference. Partnering with SFEI has enabled us to incorporate innovative science into our Urban Ecology Program as we envision climate resilience and greater access to nature in the cities where we work. We're excited to make a positive impact on the urban environment with SFEI's leadership."*

**KATE RANDOLPH**
SUSTAINABILITY TEAM LEAD
GOOGLE

# NOTABLE ACCOMPLISHMENTS

## CLEAN WATER

*Leading Collaborative Science to Improve Bay Water Quality*

In 1993, the San Francisco Bay Regional Water Board and dozens of cities, counties, industries, and dredgers joined together to create the Regional Monitoring Program (RMP) for Water Quality in San Francisco Bay, under the leadership of SFEI. The RMP is recognized as one of the best water-quality monitoring programs in the United States and the world, and has served as a model for similar programs in the Bay, the Delta, and beyond. Keys to the RMP's success are its partnerships, adaptability, and relevance to the most important management decisions. Over its 26 years, RMP data has led to state bans on certain flame retardants and microplastics as well as health advisories to protect the public from contaminants in fish tissue.

## RESILIENT LANDSCAPES

*Working with Nature to Foster Ecological Resilience*

SFEI has served as science advisors and partners to more than 50 government, NGO, and private-sector leaders on successful ecological resilience and habitat restoration projects spanning urban, agricultural, and wildland landscapes. Our pioneering historical ecology research has established an ecological foundation for large landscape restoration efforts in watersheds throughout California, prompting paradigm shifts in management. In the Bay, SFEI staff have provided science leadership to the California Coastal Conservancy's 2015 Baylands Goals—a blueprint to accelerate the restoration of tidal marsh in San Francisco Bay toward a goal of 100,000 acres. In the Sacramento-San Joaquin Delta, our landmark studies have supported a partnership between state agency and major water users by creating science-based options and a vision to restore up to 30,000 acres of Delta wetlands habitat. In collaboration with Google's ecology program, SFEI has created a handbook of resilience principles to support urban greening and design.

# ENVIRONMENTAL INFORMATICS

*Unlocking, Disseminating, and Applying Big Data*

The SFEI Environmental Informatics Program is the state-designated repository of water quality data for the San Francisco Bay-Delta region. Working in hundreds of sites across California, we utilize aerial drones, water-immersed sensors, and field crews to collect millions of data points that monitor our environment's health. We then feature these data sets in accessible management, mapping, and analysis tools for a wide range of policy leaders, agencies, and stakeholders. SFEI tools help to fulfill what would otherwise be elusive policy mandates. For example, our GreenPlan-IT tool helps planners locate and determine the most cost-effective, watershed-scale Green Infrastructure implementation scenarios to filter stormwater of contaminants before they reach the Bay. Likewise, our California Aquatic Resource Inventory is a wetland and riparian Geographic Information System (GIS) base map used to identify wetlands and prioritize opportunities for their restoration and enhancement. Our EcoAtlas toolset provides robust, timely, and accurate reporting on multiple statewide aquatic habitat restoration projects.

# A Call to Action

## The Pivotal Decade

This is a critical moment for the natural and built systems that California's communities will rely upon to maintain our quality of life for the rest of this century. Droughts, floods, rising sea levels, pollution, and population growth are major threats to our water quality, supply, and security; to our fish, wildlife, and biodiversity; and to human habitation, transportation, and economic prosperity.

**Consider this suite of challenges and opportunities for the San Francisco Bay Area and Delta:**

### ▸SEA LEVEL RISE

Over the next decade sea level rise is predicted to accelerate, culminating in a potential increase of more than 5 feet by 2100. That requires an immediate and almost revolutionary strategy for wetlands restoration and sediment management to buffer our shoreline communities against rising seas.

### ▸EXTREME WEATHER

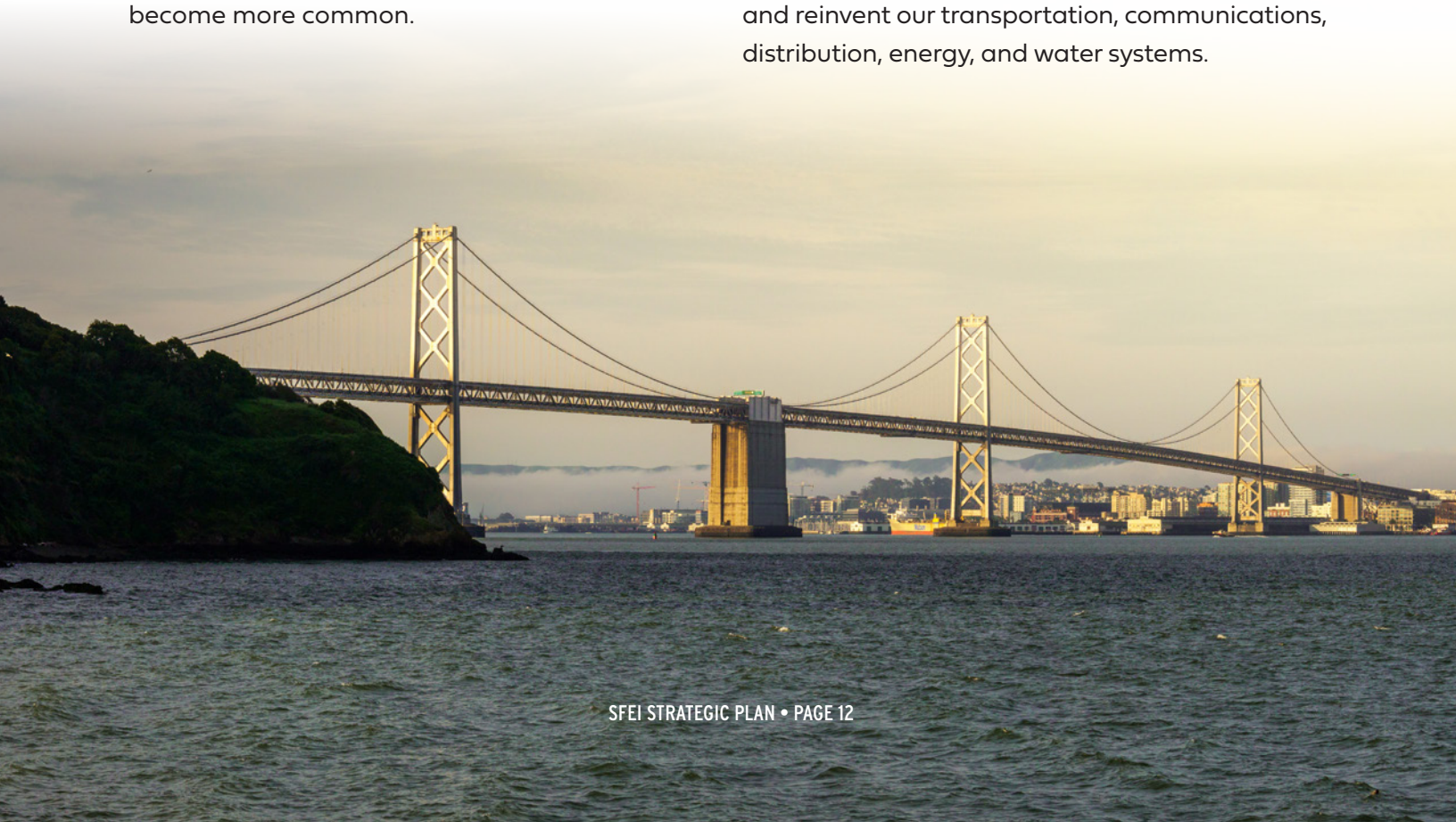
In the past decade, California has experienced the worst drought, floods, and wildfires in recorded history. Once rare extremes will become more common.

### ▸POPULATION AND WATER SUPPLY

By 2040, in just two decades, the San Francisco Bay Area must accommodate an estimated 25% growth in population and a likely 20–30% loss of Sierra snowpack that provides most of our water supply.

### ▸AGING INFRASTRUCTURE

Much of the Bay Area's urban infrastructure is reaching the end of its 75- to 100-year life cycle. Extreme weather and sea level rise will put our $50 billion in shoreline infrastructure at risk from flood events. We will need to dramatically renew and reinvent our transportation, communications, distribution, energy, and water systems.



## ▸WATER POLLUTION

The Bay's high nutrient loading may pose a greater risk of periodic toxic algal blooms and low dissolved oxygen in shallow areas. In addition to continued vigilance over pollutants of high concern in the Bay, such as mercury and PCBs, regional water agencies are now tracking new contaminants of emerging concern, including microplastics and pharmaceuticals. Critical scientific research will be required to identify cost-effective solutions to these serious problems. It will be increasingly important for projects to deliver multiple benefits, including resilient transportation infrastructure, more wetlands habitat, and expanded recreational opportunities. Solutions must strive to balance concerns regarding toxic pollutants, nutrients, and declining water supply.

## ▸REGIONAL PLANNING AND PERMITTING STRATEGIES

Given the pace and scope of climate change, Northern California must devise new regional governance, finance, and permitting solutions. Our solutions must advance comprehensive approaches to watershed management and fire prevention while also accelerating green infrastructure and urban greening.

## ▸EQUITY AND INCLUSION

Government, business, community, and philanthropic leaders recognize that the challenge of climate change hits disadvantaged communities the hardest. Providing access to critical environmental data will help ensure the inclusion of these communities in adaptation policies that affect their future.

In California, our leaders have a unique opportunity to address climate change and to transform our aging infrastructure for the 21st century. Over the next 10–20 years, vast investments by the region and state will be required to adapt to climate change by replacing shoreline protections, transportation, and water infrastructure, and by supporting wetlands and other natural systems. Policy makers will require support in four key areas: science, engineering, governance, and economics. To help California's leaders address these mounting challenges, SFEI is positioned to provide the essential science and scientific tools to help ensure that these decisions work with nature, and that the public's climate adaptation investments lead to optimal resilience.

# REASONS FOR HOPE

Resilience is inherent in natural landscapes. For most of the past 10,000 years in the San Francisco Bay and Delta region, geology, biology, and native culture came together to shape environmental settings favorable to life and abundance.

Over the last two centuries, however, urbanization disrupted the natural resilience of the Bay and its ecosystems. Only in the past 50 years have visionary public/private partnerships funded pilot projects to restore wetlands and initiate nature-based resilience and adaptation strategies, with promising early results.

Fortunately, the present offers a once-in-a-century opportunity for SFEI to provide the science to support Bay-Delta landscape resilience by working with, rather than against, natural systems.

**Funding for Resilience –** Remaking our infrastructure is extremely costly and relies on public funding. But the Bay Area is responsive to the challenge. The overwhelming passage of a 2016 nine-county regional ballot measure[2] for a parcel tax will raise approximately $25 million annually—$500 million over 20 years—to fund shoreline projects that will protect and restore San Francisco Bay. There is also state funding available from various bond measures as noted previously.

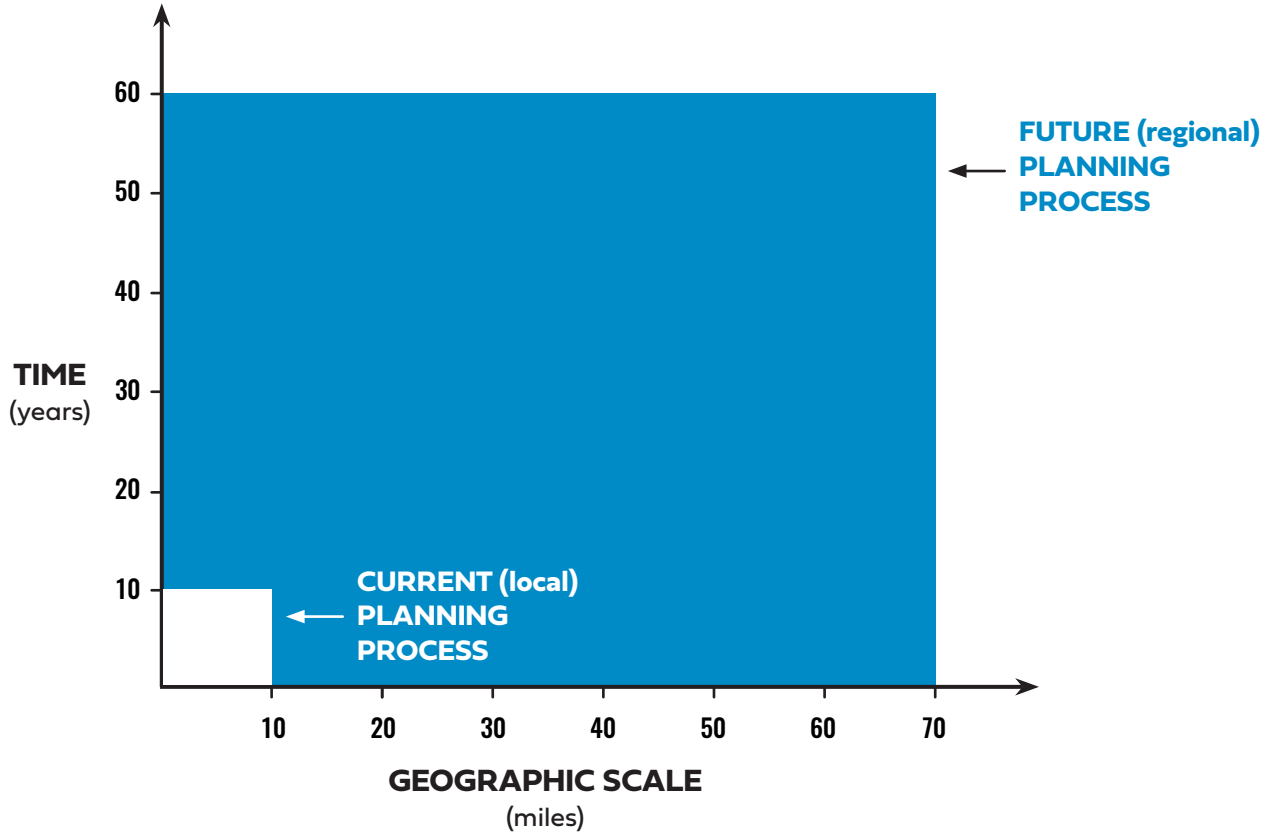
**Agency and Government Engagement –** Numerous collaborative agency planning efforts around adaptation and resilience are expressions of a strong political will in the Bay Area. SFEI is a trusted science leader in many of these efforts to empower local communities to plan from the perspective of "nature's jurisdictions" instead of the current lines on a map.

**Community Engagement –** Various targeted initiatives including the "Resilient by Design Bay Area Challenge," for which SFEI serves as science advisor, and our collaborative efforts with the tech community to create a resilient Silicon Valley, are evidence of the strong support from both local communities and businesses.

[2] The 2016 San Francisco Bay Restoration Authority's Parcel Tax Measure AA, "San Francisco Bay Clean Water, Pollution Prevention and Habitat Restoration."

A major reason for hope is the Institute's bold new vision for science funding. After careful consideration, the Institute is establishing a Development Program to supplement its contract-based core services. Project work is central to SFEI service to its partners, but it has constrained the ability to meet today's challenges. Projects are often funded for short or mid-term thinking when long-term thinking is needed. Budgets rarely address root drivers or broadly communicate results. The new Development Program will diversify funding sources so that SFEI scientists and technologists can tackle the longer-term, regionally based science questions that will make a difference for future generations.

## CLIMATE ADAPTION PLANNING




**Effective climate adaptation planning requires multi-agency collaborations that cover a large geographic scale and a long time frame.** Those will be the focus of the SFEI Strategic Plan. Currently, most climate adaptation land-use policies and decisions occur at the local government level. These smaller communities often lack the fiscal or political capacity to address regional land use issues many decades into the future.

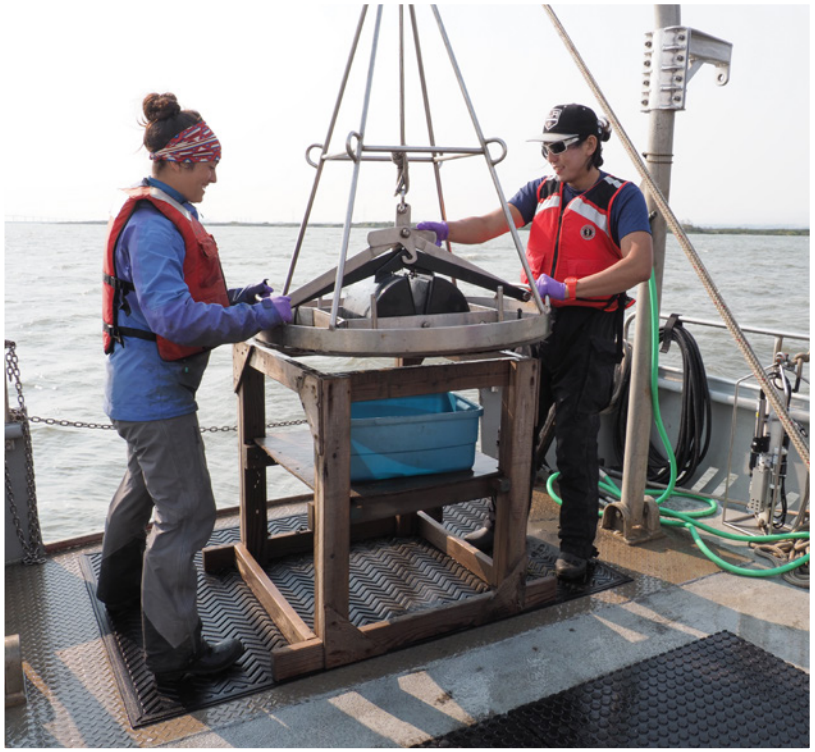
# Goals 2019–2024

## Seizing the Moment

Over the next five years, SFEI will work to protect water quality and build resilient ecosystems in the San Francisco Bay and Delta region, including the open Bay, Bay-Delta wetlands, and their adjacent watersheds. We will provide objective science to support environmental decision-making and implementation that empowers people to revitalize nature in their communities. We will also build organizational capacity to support equity-based approaches and solutions.

The lessons and knowledge we gain in the laboratory of the San Francisco Bay-Delta region over the next pivotal decade can provide a model for other regions in California, the nation, and internationally.

SFEI will build upon existing partnerships with Northern California's leading policy and decision makers to address some of the most significant challenges to our region. This includes water pollution from legacy contaminants such as mercury, selenium, and PCBs, from nutrients and bacteria, and from emerging contaminants including plastics, pharmaceuticals, and flame retardants. We will also work proactively with communities and local and regional agencies to protect human health and welfare, and natural ecosystems from the growing impacts of global warming, including sea level rise, extreme weather, and a changing climate.



We will extend and amplify the accomplishments of our Clean Water, Resilient Landscapes, and cross-cutting Environmental Informatics program. In addition, we will enhance our ability to realize a long-term, landscape-scale vision by augmenting our communications and fundraising capacities.

We will be guided by the following goals:

1

### ADVANCE VISIONARY SCIENCE

Produce visionary science that informs management decisions through collaborative science monitoring and partnerships.

2

### HARNESS INNOVATIVE TECHNOLOGY AND BIG DATA

Empower people in communities to visualize and solve environmental challenges with data and information technology tools.

3

### COMMUNICATE SCIENCE TO INFORM, INSPIRE, AND EMPOWER

Deliver the necessary science to revitalize nature in communities through collaborative forums and online tools.

4

### AUGMENT FUNDING RESOURCES

Develop a diverse portfolio of funding that leverages existing partnerships and expands philanthropic opportunities to help solve large-scale environmental challenges and provide financial stability to SFEI's ongoing mission.

# Strategies 2019–2024

## Clean Water PROGRAM STRATEGIES

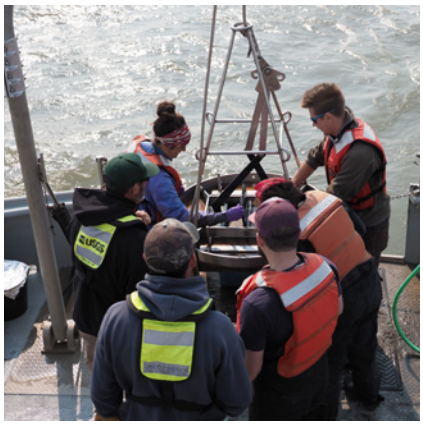
***Lead Regional Collaborations.*** We will continue to provide the essential science that managers need to protect and improve water quality in diverse and complex ecosystems. Regional monitoring programs for the Bay and the Delta will track priority contaminants such as mercury and PCBs in water, sediment, and sport fish, and extend this collaborative, regional monitoring to other regions where it is needed. We will measure inputs of priority contaminants to the Bay and continue to develop tools to track the effectiveness of efforts to remove them from wastewater and urban stormwater.

***Define the Challenge of Nutrients.*** Our research will develop approaches to assess the current and projected impacts of nutrients in the Bay and Delta. We will expand this successful program to near-shore settings where the impacts of nutrients may be greater.

***Ensure Early Detection of Contaminants of Emerging Concern.*** We will answer critical questions in regard to contaminants of emerging concern, including new pesticides, pharmaceuticals, industrial chemicals, and the new issue of microplastics. We will determine the extent of microplastic pollution in the Bay, how it gets there, associated risks, and whether concentrations have increased or decreased.

***Advance Visionary Regional Science.*** The Bay-Delta region is facing decisions on the expenditure of many billions of dollars to upgrade our wastewater and stormwater infrastructure and to restore wetlands. Thoughtful, visionary planning is needed to maximize the impact of these investments on protection of water quality. SFEI will convene leading policy makers and scientists to develop a long-term regional vision for ensuring clean and sustainable water to support the region's growing human population and aquatic life in the Estuary.






## PROGRAM HIGHLIGHT: The Regional Monitoring Program

# SFEI's GENESIS AND GOLD STANDARD FOR SUCCESS

In the late 20th century, our knowledge of San Francisco Bay's health was as cloudy as the water in it. Today, that picture is much clearer – and the Bay is cleaner – thanks to a monitoring program that is as forward-thinking as the Bay Area itself.

The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) emerged from U.S. EPA requirements for estuaries under the Clean Water Act. The RMP would help the region measure and collaboratively address the contaminants discharged directly into the Bay by local cities and industries, and those washing down from the 60,000-square-mile watershed that starts in the Sierra Nevada and drains 40% of the state.

The San Francisco Estuary Institute was formed in 1993 for the express purpose of administering the RMP. Since then, the highly respected independent scientists at SFEI have collected an unprecedented amount of data and shaped an actionable body of knowledge on the pollutants in Bay water, sediment, and biota.

Funded by municipalities and industries as a cost-effective way to meet conditions of their discharge permits, the RMP has united regulators, dischargers, and public interest groups, turning water quality stakeholders who are at odds elsewhere into collaborators with the common goal of assessing and improving the Bay's health.

Over the past 25 years, the population of the Bay Area has increased by 25%–1.5 million people. But thanks to the vigilance of SFEI scientists, and the active engagement of water quality managers and policymakers, Bay water quality has not deteriorated; in fact, it has gradually improved.

The key ingredients to the RMP's success are: sustained financial support over many years; sound, independent science supported by rigorous peer review; active participation, collaboration, and partnership by stakeholders; visionary planning; effective communication of the information generated, and adaptation in response to changes in the ecosystem.

In addition to continuing to ensure healthy Bay waters, the RMP model serves as a beacon and blueprint for all subsequent programs at SFEI seeking to transform the region and beyond.

**FOR MORE INFORMATION • https://www.sfei.org/programs/sf-bay-regional-monitoring-program**

> *"Throughout its 26-year history, SFEI has been a linchpin for local, state and federal agencies as well as community stakeholders to optimize solutions for our region's water-related issues. The San Francisco Bay Regional Water Quality Control Board is now utilizing SFEI to develop a region-wide approach to climate adaptation and nutrient reduction. By producing a set of locally-targeted planning tools available to the 100 local jurisdictions around the Bay, this effort will encourage the cross collaboration required to address the effects of climate change."*

**TERRY YOUNG PH.D.**
CHAIR, SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

# Resilient Landscapes PROGRAM STRATEGIES

***Deliver Cutting-Edge Science.*** SFEI will continue to apply cutting-edge science to improve the relationship between people and nature across the land-use spectrum from cities to rural areas and open space. We will provide scientific data aligning land use with natural systems to local leaders. This data will be used to advise and support decisions on adapting to climate change and population growth. The nature-based solutions we seek to apply have been shown to improve safety from floods and fire, and provide sustainable water supplies, thriving wildlife, and widespread access to parks and open space.

Our approach takes advantage of natural processes by restoring wetlands, floodplains, and riparian areas, designing urban greening with native plants, and creating landscape visions that allow natural systems to provide services for people and support native wildlife in perpetuity. Our science will help reduce flood risk, increase carbon sequestration, improve water quality, lessen water demand, diminish urban heat islands, and help shoreline communities adapt to sea-level rise.

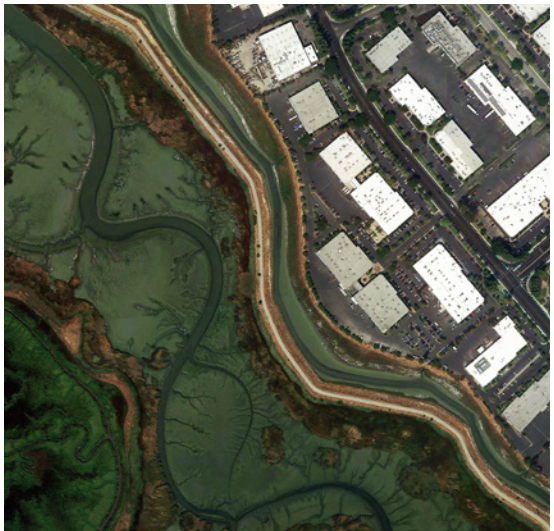
***Move from Piecemeal Ecological Planning to Creating Resilient Landscapes.*** After years of demonstrated success in a variety of projects undertaken by the Resilient Landscapes program, there has been growing demand for our approach and growing requests for its application to landscape-scale planning. By applying science and technology to envision landscape change, we will link scientists, resource managers, and the public to create multi-benefit solutions. Our geographic areas include the San Francisco Bay shoreline, Bay Area watersheds, Sacramento-San Joaquin Delta, and other California regions with major population centers including Southern California and the Central Valley. Where possible we will share our solutions nationally. The outcomes we seek are that:

- The water quality data needed by policy makers, resource managers, and the public is anticipated and helps to produce better ecological outcomes.
- The public, regulators, and water agencies use our science to allocate funds wisely and create more effective policies to ensure the health of our waters.

tiny type size - 480 words, should be cut down to 275 or so

***Disseminate knowledge and best practices from our projects.*** Drawing on SFEI's highly respected applied science expertise, extensive network of regional partnerships, and pioneering research in historical ecology and landscape resilience, we will advance independent science. We will push the envelope and "think big" in ways that local change agents need, but often cannot support alone. We expect our approach and framework to be applicable and scalable both nationally and internationally as demand for landscape-scale science and planning continues to grow. Our vision is:

- Cities, counties, and their surrounding landscapes are better equipped for sea-level rise, increased temperatures, drought, flooding, and other climate-related threats.
- Urban and rural areas are integrated with a mosaic of habitats, land use types, and ecosystems that span the whole landscape, providing connectivity for wildlife and contributing to regional ecological function.
- Green space in cities contributes to ecosystem services that improve human health and quality of life for all residents.
- Urban and agricultural landscapes support native biodiversity and regionally appropriate ecosystems.



## PROGRAM HIGHLIGHT: **DELTA LANDSCAPES**

# HOLISTIC SCIENCE FOR RESTORATION AT THE HEART OF CALIFORNIA'S WATER SUPPLY

The Sacramento San-Joaquin Delta is arguably the most important ecosystem in California. It's the water supply hub for 25 million people and millions of acres of the most fertile farmland on the planet. It is also a highly modified ecosystem that has lost 98% of wetlands, has many endangered species in decline, and is vulnerable to earthquakes and flooding.

The Delta Stewardship Council coordinates more than 200 agencies to achieve the coequal goals of a more reliable water supply for California and restoring the Delta ecosystem. Understanding the imperative for stellar science to guide their efforts, State agencies have funded SFEI to build on its work for the Delta Landscapes project.

The Delta Landscapes project investigated how the Delta functioned in the past, how it has changed, and what a future restored Delta could be. A Delta Renewed details how to re-establish the dynamic natural processes that could sustain native wildlife into the future. The report describes how, on a landscape scale, multi-benefit restoration strategies can create a more viable Delta ecosystem that can adapt and continue to provide valued functions as the climate changes – all in the context of an agricultural economy, water supply operations, and developed areas.

SFEI's work on Delta resilience and ecosystem health continues to evolve and is now being incorporated into the Delta Plan Ecosystem Amendment, the Delta Conservation Framework, the Voluntary Settlement Agreements, and a Landscape Scenario Planning Tool to guide unbiased restoration and funding decisions.

**FOR MORE INFORMATION** • http://sfei.li/dl

> *"The Delta Stewardship Council highly values the partnership with San Francisco Estuary Institute. Our work together supports development of best-available science to inform management of the Bay-Delta ecosystem and assists with communicating and promoting science-based adaptive management. SFEI's Delta Landscapes series has been a game-changer in helping to further expand a fundamental understanding of the system. We hope that this body of work will continue to be leveraged by others in their efforts to support restoration and conservation efforts across the Delta."*
>
> **SUSAN TATAYON**
> CHAIR, DELTA STEWARDSHIP COUNCIL

# Environmental Informatics PROGRAM STRATEGIES

***Apply New Technologies.*** The Environmental Informatics Program will apply innovative technologies to our environmental science challenges. The Program will engage local and remote users in cutting-edge mapping and analytical tools to integrate scientific data and information into assessment, planning, and management models. We will use emerging technologies — such as unmanned aerial vehicles and big data analytics — to address some of the most pressing natural resource issues.

***Promote data utility and integrity.*** As we integrate Silicon Valley's innovations into the environmental sector, SFEI must also ensure these new developments do not undermine best practices for data management. We will embrace change while also upholding the highest standards for quality assurance, advising public agencies on ways to innovate without compromising data integrity. All of this is to protect the underlying foundation of our science and lend the strongest confidence to imminent decisions.

***Support SFEI's Interdisciplinary Science.*** The cutting-edge work of both the Clean Water and Resilient Landscapes programs relies heavily upon high-quality data and top-performing technology. The Environmental Informatics program will continue to provide a solid foundation of technological support, reliable server capacity, robust data sources, and thoughtful tool designs for scientists both in the field and the office.  We lend our expertise to integrate multiple projects and focus areas across SFEI, facilitating collaborative practices while also fostering innovation in environmental science and nature-based solutions.

## SFEI Advancement

**COMMUNICATIONS** • ***Deliver Science to Community Leaders.*** Enhanced Communications strategies will be developed to inform, inspire, and empower community leaders, stakeholders, and donors to envision new solutions to complex environmental problems. Communications tools will focus on supporting inclusive and collaborative environmental stewardship by local leaders to improve the quality of their communities.

**DEVELOPMENT** • ***Expand SFEI's Resources.*** The launch of a Development Program is creating a culture of philanthropy at SFEI. This will result in a more diverse funding portfolio and business model better able to advance opportunities to solve large-scale environmental challenges and provide financial flexibility to support our ongoing mission. Expanded resources will allow SFEI to more broadly share its science throughout the community and enhance the impact of its current accomplishments.

## PROGRAM HIGHLIGHT: **EcoAtlas**

# THE BASE MAP FOR WATERSHED PLANNING & PROTECTION

Data visualizations, particularly maps, are core to SFEI's work. The EcoAtlas suite of tools is the linchpin of our efforts to make science usable and available to all: to transform data into information and knowledge.

In 1994, members of the Bay Area academic, science, and government communities, along with interested members of the public, sought to establish goals for habitat restoration along the Bay shoreline. At the time, however, there existed no common base map, no authoritative vision of the past of the region, and no existing software, system, trained personnel, or organization infrastructure among partners. In response, SFEI created EcoAtlas to support regional watershed planning and management.

The Bay Area EcoAtlas is a Geographic Information System (GIS) of the past and present local ecology of the creeks, rivers, baylands, and adjacent habitats of the San Francisco Bay Area. Over the years, SFEI has collaborated with numerous federal, state, local agencies and non-governmental organizations to expand the EcoAtlas toolset to support the development of wetlands programs, associated regulations, and monitoring efforts that benefit California's aquatic resources.

EcoAtlas, in essence, represents a distillation of the best science-based, rigorous thinking and planning conducted by the California wetlands science community. Backed by peer-reviewed journals, EcoAtlas is more than a mere map or single online tool. Rather, it is a toolset with many functions that work in harmony to produce scientifically valid results that can relate to the specialist and the general public alike. With constant renewal and redevelopment, EcoAtlas has been serving the San Francisco Bay Region and broader California constituencies for more than two decades.

**FOR MORE INFORMATION** • https://www.ecoatlas.org

> *EPA has worked side-by-side with the San Francisco Estuary Institute (SFEI) on many project throughout California. Through these endeavors, EPA values and appreciates the independent leadership innovation, and collaborative science of organizations such as SFEI."*

**TOMAS TORRES**
DIRECTOR, U.S. ENVIRONMENTAL PROTECTION AGENCY, WATER DIVISION

# Five-Year Outcomes
## 2019–2024

## GOAL 1: ADVANCE VISIONARY SCIENCE

***Outcome:*** Coordinated regional science, developed by SFEI, supports visionary planning and promotes sustainable, optimal, and nature-based resilience solutions to address population growth, sea level rise, water quality and a changing climate in the San Francisco Bay and Delta regions. These solutions—spanning the spectrum of land uses and from open waters to the shoreline and connected watersheds—are integrated into community-directed planning and ultimately into the blueprints of regional planning agencies.

- Operational Landscape Units (OLUs) adopted as an organizing spatial framework by major stakeholders in 3–5 planning sessions, while active monitoring implemented in established pilot projects informs future implementation of nature-based adaptation strategies.
- Delta agencies begin to incorporate resilience planning into landscape restoration visions developed through SFEI's science.
- Partnerships with municipalities on 2–3 pilot projects demonstrate integrated, multi-benefit, urban ecology, and resilience projects.
- A new forum is established for leading policy makers and scientists to develop a long-term regional vision for upgrading wastewater and stormwater infrastructure to ensure clean and sustainable water to support the region's growing human population and aquatic life in the Estuary.
- Collaborative regional water quality monitoring is strengthened and expanded to additional geographic areas and water quality challenges.
- New methodologies and uses of technology are adopted to identify and mitigate contaminants of emerging concern that pose the greatest risk to wildlife and people.
- New, user-driven participatory processes initiated in 1–2 underserved communities advance nature-based adaptation planning that integrates social equity and community engagement into decision making.
- Two to four new landscape visions and multi-benefit science strategies with an associated implementation project are completed.

## GOAL 2: HARNESS INNOVATIVE TECHNOLOGY AND BIG DATA

***Outcome:*** Critical scientific data gaps are filled to inform nature-based resilience and infrastructure planning and guide public investment mandated by voter approved funding bond measures and other state laws and regulations.

- Large volumes of data from a variety of sources are customized for state, regional, and local stakeholders and planners into value-added information and assessments in advance of key planning decision points.
- New design guidance tools for urban design and resilience are produced and made accessible to local planners, community leaders, and the public.
- The state continues to benefit from SFEI tools in environmental management programs.
- Analysis of ecosystem services and resilience to climate impacts is added to Delta ecological restoration data.

## GOAL 3: COMMUNICATE SCIENCE TO INFORM, INSPIRE, AND EMPOWER

***Outcome:*** User-driven science that SFEI and partners have developed is widely disseminated, encourages a broad user base, promotes equity, and is available for integration into various levels of planning processes.

- The Regional Communications Cooperative evolves to facilitate robust coordinated communications benefitting from SFEI's knowledge and resources.
- SFEI science-based, facilitated collaborations have led to agreements among major land owners and policy makers on investments and commitments to large-scale habitat restoration of landscape-scale Delta projects.
- Environmental justice organizations leverage SFEI's tools and information to ensure that discussions with planners, developers, agencies, and other local influencers are productive and equitable.
- SFEI contributions to the "State of the Estuary Report" provide a science-based framework to support landscape scale solutions to enhance the ecological health and resiliency of the San Francisco Bay and Delta.
- SFEI executes 3–5 successful partnerships with underserved Bay Area communities that build local capacity to develop and implement resilience plans and policies for those communities.

- Public involvement in, and support of, community resilience planning is increased via completion of 2–3 major community education/engagement projects.
- The development of new approaches to coastal resiliency and adaptation is enhanced and leveraged by consistent and ongoing communication, collaboration, and exchange of knowledge between thought leaders in the Bay Area and other U.S. coastal regions.
- Increased collaboration with regional leaders results in state policy and financial support for a Bay-Delta regional climate adaptation plan.

## GOAL 4: AUGMENT FUNDING RESOURCES

***Outcome:*** SFEI has the human and technological capacity needed to successfully undertake a long-term regional vision.

- SFEI's funding model shifts from a contract-only revenue basis to a contract/philanthropy hybrid in order to build relationships with individuals and private foundations.
- SFEI's Clean Water, Resilient Landscapes, and Environmental Informatics programs are integrated to best leverage fundraising and project execution functions.
- The suite of tools comprising SFEI's EcoAtlas is supported for continued maintenance and new tool development by a hybrid funding model including in-lieu fee agreements, participant fees, and continued project-based funding.


Ghirardelli

web site
phone

SFEI San Francisco Estuary Institute