San Francisco Estuary Blueprint 2022
LAND ACKNOWLEDGMENT AND RACIAL EQUITY STATEMENT

Land Acknowledgment
The work of the San Francisco Estuary Partnership and our environmental partners is critical to the health and future sustainability of our Estuary. However, the Estuary's shoreline, baylands, and uplands have been vital to the health and sustainability of Indigenous people for thousands of years, far predating current efforts to respond to development, fill, population growth, and rising seas.

We honor and acknowledge all Tribal ancestral lands regardless of state or federal recognition. Tribes, Tribal communities, and their families have been stewards of the lands on which we reside since time immemorial. These Tribes, who are the rightful stewards of the land, include the Buena Vista Rancheria of Me-Wuk Indians of California, Shingle Springs Band of Miwok Indians, Potter Valley Tribe, United Auburn Indian Community, Southern Pomo, Wappo, Patwin, Wintun, Nisenan, Madu, Yokuts, Coast Miwok, Bay Miwok, Plains Miwok, Him-p^n Ohlone, Jaliqun, Sada Clan, Confederated Villages of Lisjan, Karkin and Chochenyo Ohlone speaking people, Muwekma Ohlone of the San Francisco Bay Area, Tamien Nation, Association of Ramaytush Ohlone, and the Anhamutus band of Miwuk Indians. We would also like to acknowledge those Tribes and villages that are not on this list and their inherent right to speak for these lands. Our work to protect and restore the Estuary and its watershed should acknowledge and be informed by the history of injustices, by the fact that we are working on the land of Native people who have been displaced through violent means, and by the fact that our work is often adjacent to or even on top of sacred cultural sites. Recognizing the intersections between ecosystem restoration, human recreation, and vital sacred sites can facilitate opportunities throughout our Estuary to restore, create, and protect for multiple purposes. We do this work in good faith, knowing it is centrally important that we work toward reconciliation and reparations wherever possible.

Prior to colonization, over 10,000 people lived in the coastal area between Point Sur and the San Francisco Bay, belonging to about 58 distinct Tribal communities, and roughly half of the entire Indigenous population of California lived in the Sacramento and San Joaquin Valleys. Today, due to displacement, Tribal groups rarely own or have access to their ancestral territory and sacred sites.

We are working to mend relationships with all Tribal communities so we can be better stewards and allies to the original peoples and disenfranchised communities across the Estuary. We commit to improve our cultural competency and strive to build meaningful relationships with the Tribes, Tribal organizations, and Indigenous peoples of the San Francisco Estuary. We invite Indigenous people from anywhere in the Estuary to reach out to us to collaborate and identify opportunities for partnership.

Racial Equity Statement
The San Francisco Estuary Partnership understands that without meaningful effort to eliminate racial inequity in our work, our mission to protect, restore, and enhance the Estuary can result in perpetuating or exacerbating disproportionate impacts to frontline communities, socially vulnerable and underserved populations, Tribal groups and Indigenous people, and people of color. We seek to listen, understand, and work with these communities towards a healthier, more resilient Estuary that benefits all equally.

We have a long way to go, but we are committed to becoming better allies to frontline communities and Black, Indigenous, and people of color throughout the Estuary and beyond.

For more information on the Estuary Blueprint, including current progress, visit sfestuary.org/estuary-blueprint or scan the code.
TABLE OF CONTENTS

ESTUARY BLUEPRINT CONTRIBUTORS ............................................ i
LETTER FROM THE IMPLEMENTATION COMMITTEE CHAIR AND VICE CHAIR ..... ix
INTRODUCTION .............................................................................. 1
   About The Partnership ........................................................... 2
   About the San Francisco Estuary ............................................. 2
   Estuary Blueprint Purpose ...................................................... 4
   Estuary Blueprint History ....................................................... 4
   2022 Estuary Blueprint Update Process ................................. 5
   2022 Estuary Blueprint Spotlight: Equity .............................. 7
FINDINGS ..................................................................................... 9
   How Healthy is the Estuary? ................................................... 10
   Can We Improve the Health of the Estuary? ......................... 10
   What Will it Take to Achieve a Healthy Estuary? ................... 11
   2022 Estuary Blueprint Spotlight: Resilience ...................... 12
IMPLEMENTATION ....................................................................... 13
   Where do we want to be in 2050? ........................................ 13
   Goals .................................................................................... 13
   Objectives ............................................................................ 14
   Anatomy of an Action .......................................................... 15
   Table 1. Nexus of Goals and Actions Table ......................... 16
   Table 2. Task Leads and Collaborating Partners for Estuary Blueprint Actions .... 70
   2022 Estuary Blueprint Spotlight: Facilitating Adaptation ........ 88
TRACKING PROGRESS ................................................................. 90
   Introduction .......................................................................... 90
   Tracking Environmental Outcomes ....................................... 91
   Tracking Programmatic Outputs ........................................... 92
   Table 3. State of the Estuary 2015 Indicator and Estuary Blueprint 2022 Goals ... 93
NEXT STEPS .................................................................................. 95
APPENDIX ................................................................................... 98
   Table 4. Estuary Blueprint Sensitive Species .......................... 99
   Table 5. 2022 Estuary Blueprint Benefits to Sensitive Species Table ........ 103
   2022 Estuary Blueprint Spotlight: Wildlife .......................... 110
The 2022 Estuary Blueprint contributors include Blueprint Steering Committee members, Estuary Partnership staff, Estuary Partnership Implementation Committee members, and many individuals from myriad organizations who contributed to the Blueprint through Working Group meetings and individual consultations.

<table>
<thead>
<tr>
<th>Blueprint Steering Committee Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Andrew, Department of Water Resources</td>
</tr>
<tr>
<td>Amanda Bohl, Delta Stewardship Council (IC Vice Chair)</td>
</tr>
<tr>
<td>Pat Eklund, Association of Bay Area Governments</td>
</tr>
<tr>
<td>Arthur Feinstein, Citizens Committee to Complete the Refuge</td>
</tr>
<tr>
<td>Lisa McCann, San Francisco Bay Regional Water Quality Control Board</td>
</tr>
<tr>
<td>Thomas Mumley, San Francisco Bay Regional Water Quality Control Board (IC Chair)</td>
</tr>
<tr>
<td>Barbara Salzman, Marin Audubon Society</td>
</tr>
<tr>
<td>Sandra Scoggin, San Francisco Bay Joint Venture</td>
</tr>
<tr>
<td>Luisa Valiela, U.S. Environmental Protection Agency</td>
</tr>
</tbody>
</table>
Estuary Partnership Implementation Committee

Association of Bay Area Governments
Audubon California
Bay Area Clean Water Agencies Association
Bay Area Council
Bay Area Flood Protection Agencies Association
Bay Area Municipal Stormwater Collaborative
Bay Planning Coalition
California State Coastal Conservancy
California State Department of Fish and Wildlife
California State Department of Water Resources
California State Natural Resources Agency
Central Valley Regional Water Quality Control Board
Citizens Committee to Complete the Refuge
Delta Conservancy
Delta Stewardship Council
East Bay Regional Park District
Friends of the San Francisco Estuary
Local governments
Marin Audubon Society
Metropolitan Transportation Commission
Natural Resources Conservation Service
Natural Resources Defense Council
National Oceanic and Atmospheric Administration - Fisheries
NOAA Office for Coastal Management/Sentinel Site Cooperative
Pacific Gas and Electric
Resource conservation districts
San Francisco Bay Conservation & Development Commission
San Francisco Bay Joint Venture
San Francisco Bay National Estuarine Research Reserve
San Francisco Bay Regional Water Quality Control Board
San Francisco Estuary Institute
San Francisco Public Utilities Commission
Save San Francisco Bay
Sonoma County Water Agency
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Contributors

A

Alameda County Mosquito Abatement District
Alameda County Water District
All Positives Possible
Amah Mutsun Land Trust
American Carbon Registry
Association of Bay Area Governments
Association of Ramaytush Ohlone

B

Bay Area Air Quality Management District
Bay Area Clean Water Agencies
Bay Area Clean Water Agencies’ Bay Area Pollution Prevention Group
Bay Area Climate Adaptation Network
Bay Area Ecosystems Climate Change Consortium
Bay Area Flood Protection Agencies Association
Bay Area Municipal Stormwater Collaborative
Bay Area One Water Network
Bay Area Pollution Prevention Group
Bay Area Regional Collaborative
Bay Area Regional Health Inequities Initiative
Bay Area Regional Reliability Partnership
Bay Area Ridge Trail Council
Bay Area Water Agencies Coalition
Bay Area Watershed Network
Buena Vista Rancheria

C

California Department of Fish and Wildlife
California Department of Pesticide Regulation
California Department of Toxic Substances Control
California Department of Transportation
California Department of Water Resources
California Division of Boating and Waterways
California EcoRestore
California Indian Environmental Alliance
California Invasive Plant Council
California Ocean Protection Council
California Ocean Science Trust
California Office of Environmental Health Hazard Assessment
California Product Stewardship Council
California State Coastal Conservancy
California State Lands Commission
California State Parks Department of Boating and Waterways
California State University, East Bay
California State Water Resources Control Board
California Waterfowl
CalTrout
Centers for Disease Control and Prevention
Central and Northern California Ocean Observing System
Central California Vegetation Managers’ Workgroup
Central Contra Costa Sanitary District
Central Valley Regional Water Quality Control Board
Citizens Committee to Complete the Refuge
City of Berkeley
City of Hayward
| City of Oakland                  |        |        |
| City of Palo Alto               |        |        |
| City of Richmond                |        |        |
| City of San Francisco           |        |        |
| City of San Jose                |        |        |
| City of San Pablo               |        |        |
| Climate Plan                    |        |        |
| Committee of Western Regional Panel on Aquatic Nuisance Species |        |        |
| Conservation Lands Network      |        |        |
| Contra Costa Water District     |        |        |
| Delta Conservancy               |        |        |
| Delta Plan Interagency          |        |        |
| Implementation Committee        |        |        |
| Delta Protection Commission     |        |        |
| Delta Stewardship Council       |        |        |
| Downtown Streets Team           |        |        |
| Ducks Unlimited                 |        |        |
| East Bay Regional Park District |        |        |
| Environmental Science Associates|        |        |
| EnviroSpectives                 |        |        |
| Estuary NEWS                    |        |        |
| Federal Aquatic Nuisance Species Task Force |        |        |
| First Generation Environmental Health and Economic Development |        |        |
| Friends of the San Francisco Estuary |        |        |
| Golden Gate Audubon Society     |        |        |
| Greater Farallones National Marine Sanctuary |        |        |
| Greenaction for Health and Environmental Justice |        |        |
| Interagency Ecological Program  |        |        |
| Invasive Spartina Project, California State Coastal Conservancy |        |        |
| Los Angeles Metropolitan Water District |        |        |
| Lower Columbia Estuary Partnership |        |        |
| Marin Audubon Society           |        |        |
| Marin Department of Public Works Engineering Sea Level Rise Program |        |        |
| Marin Resource Conservation District |        |        |
| Merkel & Associates             |        |        |
| Metropolitan Transportation Commission |        |        |
| Moss Landing Marine Lab         |        |        |
| Mycelium Youth Network          |        |        |
| National Oceanic and Atmospheric Administration – Fisheries |        |        |
| Natural Resources Conservation Service |        |        |
| NorCal Resilience Network       |        |        |
| North Bay Water Reuse Authority |        |        |
| North Bay Watershed Association |        |        |
| Office of the Delta Watermaster, State Water Resources Control Board and Delta Stewardship Council |        |        |
| Pacific Institute               |        |        |
| PlantRight Partnership          |        |        |
| Point Blue Conservation Science |        |        |
| Potter Valley Tribe             |        |        |
| Puget Sound Partnership         |        |        |
| Reinventing the Nation’s Urban Water Infrastructure (ReNUWIT) |        |        |
| ReScape California              |        |        |
| Restore the Delta               |        |        |
| Richardson’s Bay Regional Agency |        |        |
| Romberg Tiburon Center          |        |        |
| Sacramento Municipal Utility District |        |        |
| Sacramento-San Joaquin Delta Conservancy |        |        |
| San Francisco Bay Area Integrated Regional Water Management Coordinating Committee |        |        |
| San Francisco Bay Area Water Trail Project |        |        |
| San Francisco Bay Bird Observatory |        |        |
| San Francisco Bay Conservation & Development Commission |        |        |
| San Francisco Bay Joint Venture |        |        |
| San Francisco Bay National Estuarine Research Reserve |        |        |
| San Francisco Bay National Wildlife Refuge Complex |        |        |
| San Francisco Bay Regional Coastal Hazards Adaptation Resiliency Group |        |        |
| San Francisco Bay Regional Water Quality Control Board |        |        |
| San Francisco Bay Restoration Regulatory Integration Team |        |        |
| San Francisco Bay Sentinel Site Cooperative |        |        |
| San Francisco Bay Trail Project |        |        |
| San Francisco Baykeeper         |        |        |
| San Francisco Estuary Institute |        |        |
| San Francisco Estuary Partnership |        |        |
| San Francisco State University Estuary & Ocean Science Center |        |        |
| San Francisquito Creek Joint Powers Authority |        |        |
| San Mateo Countywide Water Pollution Prevention Program |        |        |
| San Mateo Resource Conservation District |        |        |
| Santa Clara County Parks and Recreation Department |        |        |
| Santa Clara Valley Water District |        |        |
| Save the Bay                    |        |        |
| Sierra Club                     |        |        |
| Smithsonian Environmental Research Center |        |        |
| Sonoma Land Trust               |        |        |
| South Bay Salt Pond Restoration Project, California State Coastal Conservancy |        |        |
| Southern California Coastal Water Research Project |        |        |
| SPUR                           |        |        |
| Stanford University             |        |        |
| Strategic Growth Council        |        |        |
| Suisun Resource Conservation District |        |        |
| Suscol Intertribal Council      |        |        |
| Sustainable Silicon Valley      |        |        |
| The Bay Foundation              |        |        |
| The Bay Institute               |        |        |
| The Nature Conservancy          |        |        |
| The Watershed Project           |        |        |
| Tillamook Estuaries Partnership |        |        |
| Together Bay Area               |        |        |
| Tuolumne River Trust            |        |        |
U
University of California-Berkeley
University of California-Davis
University of California-Santa Cruz
Urban Tilth
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

V
Valley Water
Virginia Institute of Marine Science

W
WaterReuse California
West Oakland Environmental Indicators Project

Y
Yolo Basin Foundation

Z
Zone 7 Water Agency

San Francisco Estuary Partnership Staff
Josh Bradt
Natasha Dunn
Diana Fu
Susan Glendening
Athena Honore
Liz Juvera
Darcie Luce
Karen McDowell
James Muller
Heidi Nutters
Leslie Perry
Sarina Seaton
Caitlin Sweeney (Director)
Alexandra Thomsen
Carmen Zamora (California Sea Grant fellow)
Adrien Baudrimont (former staff)
Kelly Santos (former California Sea Grant fellow)
The Executive Council of the San Francisco Estuary Partnership has approved the 2022 Estuary Blueprint.

Jared Blumenfeld
Secretary
California Environmental Protection Agency

Therese W. McMillan
Executive Director
Association of Bay Area Governments Acting pursuant to the Contract for Services dated May 30, 2017

Wade Crowfoot
Secretary
California Natural Resources Agency

Paul Souza
Regional Director, Pacific Southwest Region
U.S. Fish and Wildlife Service

Martha Guzman
Regional Administrator, Region 9
U.S. Environmental Protection Agency

LETTER FROM THE IMPLEMENTATION COMMITTEE CHAIR AND VICE CHAIR

We are pleased to present the 2022 Estuary Blueprint, also known as the Comprehensive Conservation and Management Plan (CCMP). This update reflects hundreds of hours of discussions, research, and coordination by over 180 federal, state, and local agencies and organizations committed to improving the health of the San Francisco Bay and the Sacramento-San Joaquin Delta.

As never before, the Estuary Blueprint emphasizes the connection between the lower and upper Estuary. It recognizes that nature does not see the Bay and Delta as distinct, but rather as a holistic, integrated system forming one beautiful estuary. With this in mind, the Bay and the Delta cannot adapt to climate change independently of one another. Agencies and organizations—state, federal, Tribal, local, and non-governmental—must urgently mobilize our partnerships and collaborate to produce tangible results.

This update takes further steps to protect habitats and living resources, build resilience to sea level rise, improve water quality and quantity, and champion the Estuary. It also underscores the need for equity in our work, as well as the need to address resilience at the nexus of the social and ecological sciences. Just as the Bay and Delta work together to form the Estuary, the social and ecological sciences work together to provide us a more holistic understanding of the systems of which we are part.

While the Estuary Blueprint is action-oriented with tasks and milestones for restoring the Estuary's chemical, physical, and biological processes to health, we—the partners identified in these pages and others—must call upon ourselves to implement the Estuary Blueprint's vision. We must co-create an estuary that adapts to the challenges of climate change urgently and equitably.

Thomas Mumley,
Implementation Committee Chair
San Francisco Bay Regional Water Quality Control Board

Amanda Bohl,
Implementation Committee Vice Chair
Delta Stewardship Council
INTRODUCTION

In the past few years, the San Francisco Estuary region has confronted epic wildfires, historic rainfall intensity and flooding, and chronic drought. The whiplash of these events has confirmed that climate change has already begun to impact human and wildlife communities from Sacramento to San Francisco, and beyond.

Furthermore, a global COVID-19 pandemic has disrupted regional planning and project implementation everywhere, presenting new challenges to traditional processes and creating an unfamiliar working landscape for resource managers.

Finally, the pervasive, horrific violence against Black, Brown, and Asian and Asian-American people has amplified long-term calls for racial justice, galvanizing new commitments to address historic and present inequity through every thread of our social fabric.

These events have set the context for the multi-stakeholder process that updates the San Francisco Estuary Blueprint. The 2022 Estuary Blueprint is the product of hundreds of hours of collaboration by over 300 individuals committed to achieving a healthier, more resilient Estuary by 2050. The 25 Actions in the Blueprint advance stakeholder goals for our region by addressing both legacy and emerging issues, forging new relationships and practices, and preparing for an uncertain future. Stakeholders will also collaborate to advance the Blueprint goals more equitably with frontline communities, underserved populations, and Tribes, Tribal organizations, and Indigenous people. Grounded in the best available science, buoyed by over 30 years of collaboration, and rejuvenated by new stakeholders at the planning table, the contributors to the Blueprint worked towards this update with great adaptability, innovation, and urgency to guide the San Francisco Estuary region for the next five years.

What is to be the future of the Estuary that sits at the heart of 12 Bay Area and Central Valley counties and serves all of California as the hub of a critical water supply system? How can the communities that surround the Estuary best protect this economic engine and ecological treasure, as climate change exerts more and more pressure? Can we sustain all the beneficial uses of its waters—for drinking, irrigation, shipping, fishing, recreation—while reducing stresses on its habitats and wildlife and restoring them to health? If climate change and population growth continue as projected, what will the Estuary look like in 50 years? How do we plan for both expected changes and those we cannot yet foresee? What actions can we take now to help ensure a thriving Estuary in 2050, almost three decades into the future? These are the pressing questions that the San Francisco Estuary Partnership, working with hundreds of partners over the last 35 years, has sought to answer, and it is these questions that shape the core of the updated 2022 Estuary Blueprint.
Without the perseverance and dedication of the Estuary Blueprint’s contributors, this plan and its progress—past and present—would not exist. Navigating the unpredictability of climate change toward a healthier, more resilient Estuary requires adaptability, innovation, and collaboration, and the Estuary Blueprint is the roadmap that gets us there.

About The Partnership
The San Francisco Estuary Partnership was established in 1988 by the State of California and the U.S. Environmental Protection Agency under the Clean Water Act’s National Estuary Program when the San Francisco Estuary was designated as an estuary of national significance. The Partnership is a collaboration of local, state, and federal agencies, non-governmental organizations, academia, and business leaders working to protect and restore the San Francisco Bay-Delta Estuary. Section 320 of the Clean Water Act calls for each National Estuary Program to develop and implement a Comprehensive Conservation and Management Plan (CCMP) to establish priorities and guide decisions to address a range of environmental issues for the Estuary. The San Francisco Estuary Partnership’s CCMP—first produced in 1993—is now known as the Estuary Blueprint. With the Estuary Blueprint as a guide, the San Francisco Estuary Partnership leverages federal, state, and local resources to support projects and programs to protect, enhance, and restore the Estuary system, working with a large suite of diverse partners. The Partnership’s host entity is the Association of Bay Area Governments, which is staffed by the Metropolitan Transportation Commission.

About the San Francisco Estuary
Our Estuary, the largest in western North America, encompasses San Francisco Bay and the Delta of the Sacramento and San Joaquin rivers in California. Unlike most estuaries that spread out into a wide delta of braided channels where rivers meet the sea, the San Francisco Estuary’s Delta is more than 60 miles inland, trapped behind coastal ridges after rising seas flooded the Bay 10,000 years ago. Managers often divide this complex water body into the Bay and the Delta, or the upper and lower Estuary. However, it is all one system connected by freshwater outflow to the Pacific and by the ebb and flow of ocean tides far upstream into the Delta. The Estuary’s watershed extends from the ridgeline of the Sierra Nevada mountains to the Golden Gate, including almost 60,000 square miles and nearly 40 percent of California.

The Estuary’s waters and wetlands are a biological resource of tremendous importance—providing critical winter feeding habitat for over a million migratory birds each year, a productive nursery for many species of juvenile fish and shellfish, and a year-round home for a vast diversity of plants and animals. Half of California’s surface water supply falls as rain or snow within this region.

Geographically, San Francisco Bay includes four smaller bays. The farthest upstream is Suisun Bay, which includes a vast area of marshes. Suisun Bay lies just below the confluence of the Sacramento and San Joaquin Rivers. Suisun and its neighbor San Pablo Bay, sometimes called the North Bay, are surrounded mostly by rural areas, and are strongly influenced by freshwater outflows from the rivers. The Central Bay, ringed by three bridges, is the deepest and saltiest of the four bays. Cities and industries occupy most of its shores. The shallower South Bay extends south into quiet backwaters surrounded by restored marshes, salt ponds, and suburban office parks and lagoon communities.

Upstream of the Bay, the Sacramento-San Joaquin River Delta is a 1,000 square-mile triangle of diked and drained wetlands. Only small remnants of once-extensive tule marshes still fringe the channels that wind between the flat, levee-rimmed farmlands of the Delta’s myriad islands, many of which are now deeply subsided and below sea level. Before it was diked and drained, the Delta gathered the fresh waters of the Sacramento, San Joaquin, Mokelumne, and Cosumnes rivers and moved them all downstream through a complex array of tidally influenced channels into San Francisco Bay. Today, the Delta, with its rich farmland, is the engineered junction of one of the world’s largest plumbing systems, where much of the system’s fresh water is diverted to supply California’s population centers and Central Valley agriculture.
Estuary Blueprint Purpose

The San Francisco Estuary Partnership’s Estuary Blueprint is a collaborative agreement about what should be done to protect and restore the Estuary—a road map for restoring the Estuary’s chemical, physical, biological, and social-ecological processes to health. The Estuary Blueprint does not hold regulatory authority but identifies consensus-based, collaboratively identified regional priorities, and tracks progress on achieving the Blueprint’s actions via publicly available websites and documents. The plan asks participating entities to commit to the actions, but each entity retains its own discretion to make decisions related to the San Francisco Estuary and is not bound by the findings or recommendations in the Estuary Blueprint.

Estuary Blueprint History

The first Estuary Blueprint (then known as the Comprehensive Conservation and Management Plan) was produced in 1993 after several years of status assessments and policy discussions in which over 100 different stakeholder groups took part. It was the first plan to recognize that the Bay and the Delta should be managed as one Estuary and remains the only plan of such scope to date. After 14 years of implementation, the CCMP was updated in 2007 to include new and revised actions while maintaining many actions from the original.

In 2016, the CCMP was revised to reflect the changing context of Estuary management, with a new focus on the need to plan for and adapt to climate change. The 2016 CCMP created a closer alignment with the State of the Estuary Report, which tracks the health of the Estuary and is updated every four to six years. It also represented a major overhaul of earlier versions, reducing over 200 actions to 32 actions with a clear five-year time frame for implementation of each action’s tasks. The document was retitled the Estuary Blueprint to reflect this shift.

The 2022 Estuary Blueprint maintains the overall structure of the 2016 plan of actions to be carried out over five years, connected to longer-term goals and objectives with a target of 2050 for a healthy, resilient Estuary.

2022 Estuary Blueprint Update Process

The update of the Estuary Blueprint took place over two years and is the result of countless hours of effort from a broad range of organizations, agencies, and individuals across the Estuary. The 2022 update was guided by the following principles:

I. Remain aspirational yet feasible: The actions are aspirational but consist of a set of tasks to be achieved within the five-year time frame of the plan.

II. Expand and deepen multi-sectoral engagement: As a collaborative, consensus-based document, the Estuary Blueprint should reflect the agreement of as broad a set of stakeholders as possible. Deeper engagement by a broader set of stakeholders will result in a more robust plan.

III. Integrate further across geographies and plans: Building on the integration of plans in the 2016 Estuary Blueprint, this update seeks to emphasize the connections and commonalities between the upper and lower Estuary and incorporate relevant priorities in new or recently updated regional plans.

IV. Focus on equity: The 2022 Estuary Blueprint seeks to address this critical missing component of past plans by integrating issues of equity into every action and by explicitly creating a new action and associated tasks dedicated to improving equitable outcomes.

V. Improve clarity and responsibility: This update builds on the successful implementation of the 2016 Estuary Blueprint by strengthening the connections between actions, tasks, and associated milestones.
Several governing bodies directed the efforts of the Estuary Blueprint update.

- **San Francisco Estuary Partnership Executive Council**: The Executive Council is responsible for review and approval of the updated Blueprint and consists of: California Natural Resources Agency Secretary; California Environmental Protection Agency Secretary; U.S. Environmental Protection Agency Region 9 Administrator; U.S. Fish and Wildlife Service Pacific Southwest Region Director; and Association of Bay Area Governments Executive Director.

- **San Francisco Estuary Partnership Implementation Committee (IC)**: The 39-member IC is composed of partners who are engaged in implementing the Estuary Blueprint. The IC meets quarterly and provides overall guidance, interim input, and review and approval of the updated Blueprint.

- **Estuary Blueprint Update Steering Committee**: Comprised of volunteers from the IC, the nine-person steering committee met monthly to guide and direct the overall update as representatives of the IC and served as content experts.

- **Action Working Groups**: Working groups were led by Estuary Partnership staff who organized participants around actions or clusters of actions and guided updates to the actions and tasks. Working group members included past Task Leads (called “Owners” in the 2016 Blueprint) and Collaborating Partners, IC and Steering Committee members, program partners, and other experts and interested individuals. These working groups provided guidance for revision of and updates to the actions’ tasks.

- **San Francisco Estuary Partnership Staff Team**: This team managed the overall Blueprint update process, including developing agendas and facilitating steering committee meetings and working group meetings; providing guidance for and participating directly in working groups; and compiling all content.

- **San Francisco Estuary Partnership Partners and General Public**: Interested parties not on the steering committee and working groups provided input on interim products throughout the development process. Staff engaged partners and the general public through various forums including presentations, online meetings and listening sessions, the San Francisco Estuary Partnership website, social media, an online survey, and a public comment period.

---

The 2022 Estuary Blueprint recognizes the connection between healthy, thriving communities and a healthy, resilient Estuary. It goes further than previous versions to elevate equity to a priority concern for the present and future.

The Estuary Blueprint update anticipates the disproportionate impacts of climate change on vulnerable, underserved, and marginalized communities, especially those that are non-White, non-native English speakers, elderly, poor, chronically ill, uninsured, and/or renters. Program leaders and partners acknowledge the subjugation, near decimation, and unjust theft of land from Indigenous peoples, the redlining and pollution of Black and other non-White communities, and the prolonged underinvestment and lack of accountability by government agencies and environmental groups. The 2022 Estuary Blueprint reflects upon and seeks to understand its place, and act towards ameliorating decades of mistrust, discrimination, and wrongdoing.

The Equity action in the 2022 Estuary Blueprint aims to promote environmental equity in the San Francisco Estuary region in concurrent, complementary ways. Equity is both integrated in actions throughout the Estuary Blueprint, and explicitly featured as its own action. This deliberate decision recognizes that if equity is not prioritized in our work, it will fall to the wayside and perpetuate an inequitable status quo. It also recognizes the need for broader stakeholder representation at the planning table in earlier phases of development. It seeks to prioritize the needs of those that have been marginalized from previous adaptation and other regional environmental planning processes and those that have historically lacked the ability to participate due to systemic and institutional barriers.
Under Action 2, Task 2-1 will create a network of community-based organizations to increase collaboration between communities and government agencies. By setting a goal to fund projects that build the capacity of marginalized communities, Task 2-2 will support and elevate community voices that are invaluable to regional planning processes. Additionally, Tasks 2-3, 2-4, and 2-5 will support work to recognize that those long involved with the efforts to improve the Estuary’s ecosystems need to reflect on their role critically and iteratively in contributing to inequitable systems, as well as creating practical resources that can facilitate more equitable decision-making and project implementation processes.

The Equity action, select tasks related to equity, and the equity considerations featured in each action’s overview reflect a priority of the San Francisco Estuary Partnership and the 2022 Estuary Blueprint: everyone — not a select few — should be able to benefit from a healthier, more resilient environment.

The Estuary Partnership released a full State of the Estuary Report in 2015 and an interim State of the Estuary Report in 2019. The State of the Estuary Report is the most comprehensive health report completed for the Estuary and is updated regularly. It uses the best available science and most recent data to assess the status of various parts of the ecosystem. The State of the Estuary Report offers an assessment of progress toward solving the Estuary’s most urgent problems using key indicators of estuarine health developed over the past 30 years.

The full 2015 State of the Estuary Report evaluated 33 indicators of estuarine health and found mixed results for different areas of the Estuary: 12 indicated poor condition and 21 fair-to-good condition.

The 2019 State of the Estuary Report offered an interim assessment of five key indicators and explored three potential new indicators as part of a greater focus on the nexus between human well-being and estuarine health and the pressing challenge of climate change. The following findings come from the 2019 interim State of the Estuary Report and the 2015 complete State of the Estuary Report, and form the basis for the goals, objectives, and actions of the 2016 and 2022 Estuary Blueprints.
How Healthy is the Estuary?

- The upper Estuary (Suisun Bay and the Delta) is in fair to poor condition and getting worse, while the lower Estuary (San Francisco Bay) is in better health but jeopardized by climate change.
- Freshwater inflows and beneficial floods now exert such a small fraction of their former influence that they no longer build and maintain the physical structure of habitats in the Estuary, drive historical seasonal changes, or support critical ecological functions.
- Changes to the hydrology of the Estuary's watersheds and the diking of tidal areas have eliminated estuarine wetlands and deprived the remaining wetlands of the sediment they need to build up their elevation in relation to sea level rise.
- This impairment of critical physical processes is intertwined with habitat loss, degradation, and fragmentation.
- These losses of physical processes and habitats have reverberated throughout biological systems, contributing to unproductive food webs, smaller and declining native fish and wildlife populations, and the dominance of invasive species.
- Certain indicators of both human and ecological health, such as the amount of open green space, demonstrate an inequitable distribution across communities in the Estuary.
- Human activities have severely altered the physical processes that create and maintain estuarine habitats and the benefits they provide to people; however, Estuary habitat restoration efforts have increased shoreline protection from sea level rise and storms, provided the public with access to nature and open space, supported endangered species, increased opportunities for carbon sequestration, and increased the aesthetic beauty of a highly populated area.

Can We Improve the Health of the Estuary?

The State of the Estuary Reports suggest that we can restore some aspects of ecosystem health when we choose to make the investment.

- Water quality has improved over the last few decades due to better management and regulation, though some legacy contaminants remain a problem.
- Focused collaboration, along with significant funding, has resulted in large gains in tidal marsh restoration over the last two decades. Improvements in marsh-dependent wildlife populations are now detectable.
- Investments in water conservation and recycling in urban areas are reducing demand for potable water, even while population is increasing.
- Despite these gains, impacts from climate change jeopardize the health of all parts of the Estuary.

What Will it Take to Achieve a Healthy Estuary?

A healthy Estuary needs more freshwater flows through the system, more flooding in the right places, more space for natural habitats and wildlife and connections between habitat patches, more sediment moving through watersheds, and less hardscape, among many other needs. A healthy Estuary also needs more real time monitoring of estuarine conditions, as well as funding to learn from and adapt to what works and doesn’t work in restoration and intervention.

- Restoring the health of the upper Estuary will require significant investment. Restoration of critical physical processes can create resilience to climate change, habitats to support native wildlife, and benefits like shoreline protection and carbon sequestration. The health of the upper Estuary is also dependent on the management of nonnative species and the prevention of new invasive species.
- The health of the entire Estuary would benefit from more efficient use of the system’s fresh water for human use, as well as changes in upstream water management.
- The Estuary’s wetlands remain at risk unless we take a watershed-based, regional approach to managing sediment and fresh water as essential resources and allow for tidal wetlands to migrate landward.
- Wildlife conservation efforts should aim to ensure successful reproduction and habitat connectivity over time as climate change alters landscapes, as well as more focus on frequent population monitoring with a plan to intervene if an extreme event jeopardizes rare species.
- The interconnectedness of the Estuary and its surrounding communities needs to be recognized, and its legacies of environmental injustices acknowledged and addressed. It is critical to engage frontline and underserved communities, Tribes, Tribal organizations, and Indigenous communities as partners in protecting, restoring, and enhancing the Estuary.
- Moving forward, management actions must occur in the context of change. Sustaining a healthy Estuary while addressing the impacts of climate change, including prolonged drought and rising seas, will require collaboration, adaptation, flexibility, and resilience among all engaged communities and agencies from now on.

This 2022 Estuary Blueprint provides 25 immediate priorities for achieving a healthier Estuary.

The full background on the conclusions summarized above, as well as detailed findings, metrics, and technical appendices on Estuary health, can be found at sfestuary.org.
The 2022 Estuary Blueprint recognizes that climate change is no longer a future abstraction, but a present reality already impacting the region. In addition to preparing the region for more extreme weather events like prolonged drought and intense bursts of precipitation, scientists and planners are also confronted with the issue of looming sea level rise: a significant concern for both human and habitat investments around Estuary shores such as housing, regional infrastructure, and thousands of acres of restored wetlands.

To meet these extraordinary challenges, resilience has been incorporated as a throughline in the 2022 Estuary Blueprint. Steps to address and prepare for climate change begin with Blueprint Goal 2: Bolster the resilience of Estuary ecosystems, shorelines, and communities to climate change. Within this broad and overarching priority, numerous actions and objectives address more specific characteristics of resilience such as habitat and species diversity, buffer and transition zones, and connectivity and complexity in the design of natural and human infrastructure, among others. Each of the 25 actions in the Blueprint also examines climate resilience in their respective action backgrounds, using the Climate Change Considerations section to explain how each action will address or be impacted by climate change.

The 2022 Estuary Blueprint’s approach has also been updated to take a holistic approach to increasing resilience: one that is premised on the belief that the resilience of geophysical environments and human communities are not only interconnected, but interdependent. Action 2 (Equity) was created to acknowledge that increased resilience in the region will not be possible without the buy-in of communities, especially those considered to be vulnerable, underserved, and frontline to the impacts of climate change.

Through the 2022 Estuary Blueprint, the San Francisco Estuary Partnership will continue to help partners and stakeholders visualize and build ecosystems and communities that are more resilient to climate change.
Objectives

A. Protect, restore, and enhance ecological conditions and processes that support self-sustaining natural communities
B. Eliminate or reduce threats to natural communities
C. Conduct scientific research and monitoring to measure the status of natural communities, develop and refine management actions, and track progress towards management targets
D. Increase resilience of tidal habitats and tributaries to climate change
E. Increase resilience of communities at risk from climate change impacts while protecting and improving natural resources
F. Promote integrated, coordinated, multi-benefit approaches to increasing resilience
G. Increase drought resistance and water efficiency and reduce reliance on imported water
H. Improve freshwater flow patterns, quantity, and timing to better support natural resources
I. Reduce contaminants entering the system and improve water quality
J. Build public support for the protection and restoration of the Estuary
K. Strengthen regional leadership in support of Estuary health
L. Promote efficient and coordinated regional governance
M. Incorporate the best available social science and cultural knowledge when protecting and improving the Estuary
N. Engage frontline, underserved, and Indigenous communities as partners in protecting, restoring, and enhancing the Estuary

Anatomy of an Action

1. ACTION TITLE
The language of the action itself, describing the type of action (such as protect, improve, develop), the object of the action (such as habitats, monitoring programs, communities), and any key qualifiers or targets (such as watershed-scale, nature-based, multi-benefit).

A. Action Description provides an expanded version of the action, including additional narrative or details.
B. TASK X-1 All actions include multiple tasks; some tasks occur in a logical progression, while others address a variety of geographic areas or gaps in achieving a comprehensive action.
C. MILESTONE All tasks have one clear, measurable milestone, or “to do” item, to be completed over the next five years to support the larger action.
D. COST ESTIMATE This symbol represents an estimate of the funding needed to fulfill the milestone associated with this task.
E. COST RANGE KEY Defines the cost range per task.

2. GOALS ICONOGRAPHY
The icons represent the nexus of the action with one or more of the Blueprint Goals.

3. BACKGROUND
The background section provides key contextual information for the action under the following subheadings:

A. Overview further explains the action and why it is a priority for a resilient and thriving Estuary;
B. Updates and Emerging Issues conveys significant changes to the focus of the action between the 2016 Estuary Blueprint and the current Blueprint, and in some cases anticipates future shifts;
C. Climate Change Considerations explains how the action addresses or may become more urgent and challenging with further climate change;
D. Equity Considerations evaluates how the action addresses or impacts frontline, socially vulnerable and/or marginalized communities, including any ways the action addresses or should address these impacts in future versions of the Estuary Blueprint; and
E. Connections to Other Actions emphasizes the core connections between specific actions.

TASK LEADS*
Entities listed as Task Leads have agreed to play a key role in advancing tasks as implementers, funders, trackers, conveners, or stewards.

COLLABORATING PARTNERS*
Collaborating Partners is a list of key entities, in addition to the Task Leads, engaged in accomplishing the task. This list describes the most central partners but may not include all possible partners associated with a collaborative task. Collaborating partners represent organizations that might implement, champion, inform, advise, or provide scientific or technical expertise in support of the action, tasks, and milestones.

* Task Leads and Collaborating Partners are listed by task in the Partners Table on p. 70
<table>
<thead>
<tr>
<th>ACTION</th>
<th>ACTION SHORTHAND DESCRIPTION</th>
<th>BLUEPRINT GOAL 1 Sustain and improve the Estuary’s habitats and living resources</th>
<th>BLUEPRINT GOAL 2 Bolster the resilience of Estuary ecosystems, shorelines, and communities to climate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Climate Resilience</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>Equity</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Adaptation Planning</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Adaptation Implementation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Watershed Connections</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Sediment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Carbon Management</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Wetland Monitoring</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Intertidal/Subtidal Habitats</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Tidal Marsh</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Transition Zones</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>Managed Wetlands</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>Seasonal Wetlands</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Creeks</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Invasive Species</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Freshwater Flows</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Water Conservation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>18</td>
<td>Recycled Water</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>19</td>
<td>Stormwater Management</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>20</td>
<td>Nutrients</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>21</td>
<td>Emerging Contaminants</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Health Risks of Contaminants</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Trash</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Public Access</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Champion the Estuary</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTION</th>
<th>ACTION SHORTHAND DESCRIPTION</th>
<th>BLUEPRINT GOAL 3 Improve water quality and increase the quantity of fresh water available to the Estuary</th>
<th>BLUEPRINT GOAL 4 Champion the Estuary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Climate Resilience</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>Equity</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Adaptation Planning</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Adaptation Implementation</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Watershed Connections</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Sediment</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Carbon Management</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Wetland Monitoring</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Intertidal/Subtidal Habitats</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Tidal Marsh</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Transition Zones</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>Managed Wetlands</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>Seasonal Wetlands</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Creeks</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Invasive Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Freshwater Flows</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Water Conservation</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>18</td>
<td>Recycled Water</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>19</td>
<td>Stormwater Management</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>20</td>
<td>Nutrients</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>21</td>
<td>Emerging Contaminants</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>22</td>
<td>Health Risks of Contaminants</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>23</td>
<td>Trash</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>24</td>
<td>Public Access</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>25</td>
<td>Champion the Estuary</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
In many ways, the following actions form the heart of the 2022-2027 Estuary Blueprint. These 25 actions prioritize work on the areas identified as most urgently needing progress in the next five years.

**Action 1:** Climate Resilience .......................... 20
**Action 2:** Equity ........................................... 22
**Action 3:** Adaptation Planning .......................... 24
**Action 4:** Adaptation Implementation .................. 26
**Action 5:** Watershed Connections ......................... 28
**Action 6:** Sediment .......................................... 30
**Action 7:** Carbon Management .......................... 32
**Action 8:** Wetland Monitoring ............................ 34
**Action 9:** Intertidal/Subtidal Habitats .................... 36
**Action 10:** Tidal Marsh ...................................... 38
**Action 11:** Transition Zones ............................... 40
**Action 12:** Managed Wetlands ............................ 42
**Action 13:** Seasonal Wetlands ............................ 44
**Action 14:** Creeks ............................................. 46
**Action 15:** Invasive Species ............................... 48
**Action 16:** Freshwater Flows ............................. 50
**Action 17:** Water Conservation ........................... 52
**Action 18:** Recycled Water .............................. 54
**Action 19:** Stormwater Management .................... 56
**Action 20:** Nutrients ........................................ 58
**Action 21:** Emerging Contaminants ..................... 60
**Action 22:** Health Risks of Contaminants ................ 62
**Action 23:** Trash ............................................ 64
**Action 24:** Public Access .................................... 66
**Action 25:** Champion the Estuary ......................... 68
**Plan for increased climate resilience that incorporates natural resource protection.** Facilitate regional planning efforts to understand and address climate change impacts and advance climate adaptation that emphasizes the protection of natural resources.

**TASK 1-1**
Implement the Bay Adapt Joint Platform to advance climate adaptation in the lower Estuary that supports protection of the Estuary’s resources and its communities.

*MILESTONE*  
“Vision Statement” for the Bay shoreline that sets a long-term picture of successful adaptation; regional and sub-regional objectives; regional and sub-regional strategies and actions; and guidelines and methodologies for evaluating local plans and projects for funding and other incentives.

*Cost Estimate Key*  
$ - Up to $100,000  
$$ - Up to $1 million  
$$$$ - Up to $10 million  
$$$$$ - Over $10 million

**TASK 1-2**
Complete and implement Delta Adapts to advance climate adaptation in the upper Estuary that supports protection of the Estuary’s resources and its communities.

*MILESTONE*  
Delta Adapts Adaptation Strategy.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Up to $1 million

**TASK 1-3**
Establish a Regional Climate Resilience Equity Consortium run by community-based organizations to provide participation and input on an as-needed basis for climate resilience planning, policy, and implementation projects.

*MILESTONE*  
Workplan including tasks, a cost estimate, and funding analysis for a Regional Climate Resilience Equity Consortium.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Over $1 million

**TASK 1-4**
Determine need for new, or modification of existing, regulatory authority to protect shoreline habitats and open space while pursuing measures to protect communities and infrastructure from climate impacts through establishment of a collaborative working group.

*MILESTONE*  
Shoreline regulatory authority Impact and Needs Assessment.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Up to $1 million

**TASK 1-5**
Establish an independent Climate Science Consortium that supports needed science and provides high-quality science translation to advance adaptation and resource protection.

*MILESTONE*  
Climate Science Consortium.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Over $1 million

**TASK 1-6**
Expand the use of the Adaptation Atlas to support analysis and selection of adaptation strategies within Operational Landscape Units (OLUs) to support natural resource protection and advancement of nature-based strategies.

*MILESTONE*  
Adaptation strategies for one to two OLUs per year through collaborative process.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Over $1 million

**TASK 1-7**
Fund and support completion of robust, coordinated city and county-level adaptation plans that prioritize natural features and ecosystem processes as resilience strategies.

*MILESTONE*  
Five local adaptation plans that include strategies for protecting natural areas.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Over $1 million

**TASK 1-8**
Determine potential influence of rising sea level on groundwater elevations (and contaminated sites) within counties using an interpolated groundwater model based on empirical measurements.

*MILESTONE*  
Groundwater data model for nine counties.

*Cost Estimate Key*  
$ - Up to $1 million  
$$ - Up to $1 million  
$$$$ - Over $1 million

**OVERVIEW**

The Estuary needs robust climate resilience planning to guide major collaborative action in the decades to come. This Action responds to the climate crisis and accelerates regional climate adaptation by setting regional objectives and guidelines, supporting critical climate change science, and advancing adaptation planning at the local level. Natural resources protection and restoration are key components of a regional response to climate change.

**UPDATES AND EMERGING ISSUES**

Since 2016, much progress has been made in climate resilience planning, including completion of local and regional vulnerability assessments (including Adapting to Rising Tides Regional Sea Level Rise Vulnerability and Adaptation Study and Delta Adapts Vulnerability Assessment) and advancement of adaptation strategies (such as Bay Adapt Joint Platform and Delta Adapts Adaptation Plan). The updated Action supports and advances ongoing efforts for regional climate resilience planning with a focus on natural resource protection, as well as addressing the potential mobilization of nearshore contaminated groundwater.

**CLIMATE CHANGE CONSIDERATIONS**

The unpredictability and scale of climate change impacts will be felt regionally, so any planning that enhances resilience will need to be collaborative and coordinated. This Action recognizes the urgency of the climate crisis while exploring long-term solutions that sustain precious ecosystem processes.

**EQUITY CONSIDERATIONS**

Climate resilience and adaptation projects will need to pay special attention to social equity, since planning and implementing large projects to prepare the physical environment for sea level rise will inevitably affect the economic and social dimensions of its inhabitants. Furthermore, many nearshore sites with residual contamination in soil are located in underserved communities and communities of color who face health risks with current and future exposure. It is critical that agencies work in partnership with community leadership to address priority concerns.

**CONNECTIONS TO OTHER ACTIONS**

Climate resilience shares intersections with many other Actions in the Blueprint, but is most closely connected with:

- A2: Equity
- A3: Adaptation Planning
- A4: Adaptation Implementation
- A5: Watershed Connections
- A9: Intertidal/Subtidal Habitats
- A10: Tidal Marsh
- A11: Transition Zones
- A19: Stormwater Management
Elevate frontline and Indigenous communities in planning for and benefiting from a healthy, resilient Estuary.

Support the role that Indigenous and frontline communities play in promoting Estuary health and resilience by advancing equity through regional strategies, including growing capacity for government agencies and for organizations with deep roots in frontline and underserved communities.

**TASK 2-1**
Develop a living network of Bay Area community-based organizations to foster collaboration and increase equity in planning and permitting decisions.

**MILESTONE**
A pilot Community-Based Organization Directory Map launched with a requisite training module.

**COST ESTIMATE** – $  

**TASK 2-2**
Grow the capacity of community members and community-based organizations to be active leaders in improving the health of the Estuary, including funding, grant-making, and grant-writing assistance to result in restoration project planning, design, and implementation.

**MILESTONE**
20 projects that grow the capacity of frontline and underserved communities to plan and implement projects.

**COST ESTIMATE** – $$

**TASK 2-3**
Develop strategies or Best Management Practices (BMPs) in partnership with frontline and underserved communities for incorporating community priorities into the design and implementation of habitat restoration and nature-based shoreline adaptation projects. Coordinate with the Community-Based Organization Directory module in partnership with frontline and underserved communities.

**MILESTONE**
A BMPs manual completed and disseminated to project managers and funders, including up to three associated workshops to train audiences in use of BMPs.

**COST ESTIMATE** – $$

**TASK 2-4**
Develop Best Management Practices (BMPs) in partnership with Tribes, Tribal representatives, and Indigenous people for incorporating cultural knowledge and resource needs into the design and implementation of habitat restoration and nature-based shoreline adaptation projects.

**MILESTONE**
BMPs manual completed and disseminated to project managers and funders, with up to three associated workshops to train audiences in use of BMPs.

**COST ESTIMATE** – $$$

**Value Proposition**

- **GOALS**
  - Living Resources
  - Resilience
  - Water
  - Stewardship

**Overview**

The people who live throughout the Estuary are a part of its history and future; they have an impact on it as much as this ecosystem has an impact on them. Without meaningful efforts to increase equity in our work, our mission to protect, restore, and enhance the Estuary can result in disproportionate impacts to frontline communities, Black people, Tribes and Indigenous people, and people of color. This Action commits the actors in the region to listen, support, and work collaboratively with these underserved populations for the purpose of creating a healthier Estuary for all.

**Updates and Emerging Issues**

This is a new Action that acknowledges the importance of environmental justice and equity in the Estuary Blueprint’s vision. Future efforts include conducting a racial equity analysis of the Blueprint to inform the next update or revision.

**Climate Change Considerations**

Climate change will disproportionately affect marginalized communities, so it is imperative that local and regional governments work in tandem with these communities to plan, design, and implement resilience projects.

**Equity Considerations**

To adequately address environmental injustice in our work, it is important to prioritize equity implicitly and explicitly in the Estuary Blueprint. This Action explicitly dedicates the region to more equitable policies, processes, and outcomes.

**Connections to Other Actions**

While many Actions include considerations to equity in their Tasks and Milestones, this Action is most closely connected with:

- A1: Climate Resilience
- A3: Adaptation Planning
- A4: Adaptation Implementation
- A14: Creeks
- A16: Freshwater Flows
- A20: Nutrients
- A22: Health Risks of Contaminants
- A24: Public Access
- A25: Champion the Estuary

**Photo**

- Heidi Nutters
- Karl Nielsen
**ACTION 3 - ADAPTATION PLANNING**

**OVERVIEW**

Overcome challenges to accelerate implementation of climate adaptation projects that prioritize natural and nature-based strategies.

Remove barriers that stand in the way of implementing projects that prepare and adapt the Estuary’s ecosystems and communities for climate change. Barriers to the implementation of projects that address climate change include lack of technical expertise and data, lack of funding, and regulatory policies and processes.

**TASK 3-1**

Implement community-based climate adaptation solutions that prioritize natural resources by supporting frontline communities and community-based organizations as full partners and leaders in adaptation planning and implementation.

**MILESTONE**

Community-based organizations and frontline communities funded to lead or participate in at least one to two adaptation planning or implementation projects per year.

**COST ESTIMATE – $$$**

**TASK 3-2**

Establish a technical assistance “help desk” network that coordinates programs and entities to provide data and technical assistance for climate change adaptation for cities, counties, and other stakeholders that facilitates natural resource protection.

**MILESTONE**

Regional climate change adaptation “help desk” network.

**COST ESTIMATE – $$$**

**TASK 3-3**

Revise or create regulatory policies, guidelines, or regulations to accelerate natural and nature-based adaptation projects consistent with the overall protection of the health of the Estuary (such as San Francisco Bay Conservation & Development Commission’s creation of new sediment management policies, revision of the Suisun Marsh Protection Plan, San Francisco Bay Regional Water Quality Control Board’s revised sediment reuse and climate change policies, the Delta Stewardship Council’s Delta Plan revised ecosystem guidelines, or creation of new programmatic permitting approaches).

**MILESTONE**

Three new or revised policies, guidelines, or regulations to facilitate natural or nature-based adaptation projects.

**COST ESTIMATE – $$$**

**TASK 3-4**

Strengthen and improve the ability of the San Francisco Bay Restoration Regulatory Integration Team (BRRIT) to accelerate projects and incentivize nature-based approaches.

**MILESTONE**

Solutions for one to three high priority issues identified by the BRRIT’s Policy Management Committee.

**COST ESTIMATE – $**

**TASK 3-5**

Further integrate resilience and natural resource protection into Plan Bay Area by restructuring Metropolitan Transportation Commission and Association of Bay Area Governments’ Priority Conservation Area Program to advance natural and nature-based strategies for climate resilience.

**MILESTONE**

Restructured Metropolitan Transportation Commission and Association of Bay Area Governments’ Priority Conservation Area Program.

**COST ESTIMATE – $**

**TASK 3-6**

Increase funding for adaptation planning and implementation that values long-term protection of habitats and communities.

**MILESTONE**

A sea level rise adaptation funding and investment framework for the San Francisco Bay Area.

**COST ESTIMATE – $**

**TASK 3-7**

Align Federal Emergency Management Agency hazard planning with climate adaptation planning to secure funding for protection of habitats and use of natural and nature-based strategies.

**MILESTONE**

15 grant applications submitted to Federal Emergency Management Agency Building Resilient Infrastructure and Communities (BRIC) and/or other Federal Emergency Management Agency grant programs for nature-based adaptation projects.

**COST ESTIMATE – $**

**Cost Estimate Key**

- $ - Up to $100,000
- $ - Up to $1 million
- $$$ - Up to $10 million
- $$$$ - Over $100 million

**Photo: Carmen Erasmus**

**Photo: Noah Berger**

**OVERVIEW**

Advancing natural and nature-based infrastructure is a key strategy for the timely implementation of climate resilience projects. However, there are many barriers that stand in the way of projects so desperately needed by the Estuary’s ecosystems and communities. The lack of technical expertise, data, and funding all hinder projects from being implemented in a timely manner. Additionally, regulatory and permitting processes for these innovative projects can be cumbersome, conflicting, or out-of-date given quickly changing conditions.

**UPDATES AND EMERGING ISSUES**

While much progress has been made since 2016 with regard to implementing climate adaptation projects, significant challenges remain that threaten our region’s ability to respond to the urgency of current and future climate change impacts. This revised Action seeks to identify and address current barriers that impede timely implementation of shoreline natural and nature-based climate adaptation strategies.

**CLIMATE CHANGE CONSIDERATIONS**

The unpredictability and scale of climate change impacts will be felt regionally, so any planning that enhances resilience will need to be collaborative and coordinated. This Action recognizes the urgency of the climate crisis while exploring long-term solutions that sustain precious ecosystem processes.

**EQUITY CONSIDERATIONS**

This Action focuses on overcoming barriers to accomplishing natural and nature-based infrastructure, which includes building the capacity of frontline communities to be active leaders and collaborators in project planning and implementation.

**CONNECTIONS TO OTHER ACTIONS**

Natural and nature-based infrastructure planning shares intersections with many other Actions in the Blueprint, but is most closely connected with:

- A1: Climate Resilience
- A2: Equity
- A4: Adaptation Implementation
- A5: Watershed Connections
- A9: Intertidal/Subtidal Habitats
- A10: Tidal Marsh
- A11: Transition Zones
Implement climate adaptation projects that prioritize natural and nature-based strategies.
Facilitate the implementation of climate adaptation projects that prioritize natural and nature-based strategies to proactively address emerging climate change issues, such as sea level rise and saltwater intrusion, and recognize interactions between projects.

**TASK 4-1**
Advance design of shoreline and bank adaptation projects or pilot projects using natural or nature-based approaches, including horizontal levees, living shorelines, transition zones, and other innovative design approaches.

**MILESTONE**
Ten project designs.

**COST ESTIMATE** - $$$$

**TASK 4-2**
Advance implementation of shoreline and bank adaptation projects using natural or nature-based approaches.

**MILESTONE**
Ten implemented projects.

**COST ESTIMATE** - $$$$ - Up to $1 million

**TASK 4-3**
Enhance existing subtidal and intertidal artificial structures or features into new structures that better provide space for and protect native species and habitats. Explore design modifications to develop green-grey approaches to modify existing and create new improvements to traditional grey infrastructure (riprap, seawalls, levees, etc.).

**MILESTONE**
15 pilot projects implemented that include green-grey habitat enhancement features.

**COST ESTIMATE** - $$$$ - Up to $10 million

**TASK 4-4**
Spatially track shoreline adaptation projects to help communicate the region's progress, facilitate planning, evaluate project design and funding needs, and identify opportunities for local community input and use of nature-based adaptation strategies.

**MILESTONE**
Shoreline Adaptation Project Mapping Program within EcoAtlas for the San Francisco Bay.

**COST ESTIMATE** - $ - Up to $100,000

**TASK 4-5**
Share best practices, data, information, and lessons learned to advance implementation of nature-based infrastructure by expanding collaborative models such as the Transforming Urban Waters Initiative to address multiple types of natural and nature-based adaptation approaches.

**MILESTONE**
One to two collaborative meetings per year to address barriers to implementation for individual nature-based adaptation projects.

**COST ESTIMATE** - $ - Up to $100,000

**Cost Estimate Key**
- $ - Up to $1 million
- $$$ - Up to $10 million
- $$$$ - Up to $100 million
- $$$$$ - Over $100 million

---

**Overview**
Natural and nature-based shoreline infrastructure consists of existing or restored landscapes such as tidal marshes and floodplains, as well as engineered systems that incorporate natural features or processes. Natural and nature-based infrastructure provides multiple benefits including flood protection, habitat, improved water quality, and recreational benefits, and can help communities adapt to sea level rise and restore ecosystems. Living shorelines, a type of nature-based infrastructure that often includes subtidal and intertidal habitats such as oyster reefs and eelgrass beds, can not only mitigate wave action, preventing storm surges, but also provide important ecosystem functions for wildlife and shoreline communities. Accelerating the implementation of natural and nature-based infrastructure projects is a key climate adaptation strategy.

**Updates and Emerging Issues**
This revised Action builds on Action 3 to facilitate and track implementation of climate adaptation projects.

**Climate Change Considerations**
The diversity of ecosystems and habitats in the San Francisco Estuary increases the resilience of the entire system. To support that diversity and resilience, climate planning must take a holistic and regional approach.

**Equity Considerations**
This Action recognizes the importance of community input and buy-in for the implementation of natural and nature-based infrastructure to address climate resilience and adaptation needs.

**Connections to Other Actions**
Natural and nature-based infrastructure implementation shares intersections with many other Actions in the Blueprint, but is most closely connected with:
- A2: Equity
- A3: Adaptation Planning
- A4: Adaptation Implementation
- A5: Watershed Connections
- A9: Intertidal/Subtidal Habitats
- A10: Tidal Marsh
- A11: Transition Zones
Restore watershed connections to the Estuary to improve habitat, flood protection, and water quality.
Plan and implement projects and programs that connect watersheds to the Estuary to enhance habitats, natural processes, and ecosystem services. Potential benefits may include tidal, intertidal, and open water habitat restoration; flood management; water quality improvement; fish passage and food supply; wave energy reduction; groundwater recharge; sediment delivery; wildfire management; and recreational opportunities.

**TASK 5-1**
Advance a watershed-based approach to landscapes to align reservoir, stormwater, flooding, groundwater, sediment, wildfire, restoration, nonpoint source pollution control, and climate change adaptation management activities as well as water supply planning, compensatory mitigation, and voluntary restoration, to provide multiple benefits.

**MILESTONE**
Demonstration watershed identified and principal land and resource managers convened to explore existing tools, datasets, and appropriate numerical models for the development of coordinated permitting and management activities in the watershed for multiple benefits.

**COST ESTIMATE** – $$$

**TASK 5-2**
Increase environmental planner and practitioner use of planning tools and guidance documents developed for multi-benefit projects that restore watershed connections by improving the understanding of and access to such tools and documents, including examples of their successful use in the region to implement multi-benefit projects.

**MILESTONE**
Three to six workshops held on multi-benefit habitat restoration and flood management that provide a comprehensive review of the most recent tools and guidance documents for planners and practitioners.

**COST ESTIMATE** – $$

**TASK 5-3**
Advance the use and implementation of sediment management principles and approaches at the Bay margins identified in the 2021 Sediment for Survival Report to improve sediment supply and conveyance in Operational Landscape Units (OLU) with the greatest potential for tributary sediment supply to meet demands, given appropriate intervention.

**MILESTONE**
Stakeholders for one Operational Landscape Unit (OLU) identified and convened to demonstrate OLU partnership structure and advance sediment transport planning.

**COST ESTIMATE** – $$

**TASK 5-4**
Develop a regional coarse sediment strategy to identify potential need for and sources of coarse sediment, reuse methods and locations, and logistical, financial, and regulatory challenges. Develop possible management techniques for transporting sediment trapped in flood control channels into Bay margin ecosystems through natural processes where possible and through active interventions where not possible.

**MILESTONE**
San Francisco Bay regional coarse sediment strategy and scientific report that identifies possible management techniques for transporting sediment in flood control channels to their marshes.

**COST ESTIMATE** – $$$

**Cost Estimate Key**

- $ - Up to $100,000
- $$ - Up to $1 million
- $$$ - Up to $10 million
- $$$$$ - Over $100 million

---

**GOALS**

- Living Resources
- Resilience
- Water

---

**Annex A19: Stormwater Management**

- **Overview**
  Historically, watershed connections such as creeks and floodplains have provided important transition zones and habitat for wildlife, rich sediment and organic matter for diverse tidal marshlands, improved groundwater percolation for better water quality, and robust absorbent properties for runoff capture and flood control. Over time, humans have modified these important watershed connections in ways that now disrupt the natural exchange of water and sediment that nourishes complex habitat mosaics for native wildlife.

- **Updates and Emerging Issues**
  Since 2016, this Action has been updated to align with the findings and recommendations from the 2021 Sediment for Survival Report. The report integrates an Operational Landscape Unit (OLU) framework into a watershed-based approach to manage the complexity of the Bay shoreline. This Action now focuses on advancing sediment transport to supply sediment to the shoreline and on leveraging and encouraging natural ecosystem processes to accomplish sediment connectivity where flood control channels have disrupted natural sediment delivery to the Bay margins. In the future, additional opportunities for sediment transport will need to be identified, such as reservoir reoperations for sediment supply.

- **Climate Change Considerations**
  Significant amounts of sediment will be needed to combat the threat of drowning wetlands due to sea level rise. Improving watershed connections, and thus sediment deposition, has the potential to reduce flood hazards to frontline communities, whose flood control infrastructure is frequently outdated or failing.

- **Equity Considerations**
  Restoring watershed connections, if implemented with an equity lens, can provide benefits to frontline communities that frequently have outdated or failing flood control infrastructure and reduced or inaccessible green spaces. Watershed-based planning efforts should include community and Tribal input to ensure equitable outcomes.

- **Connections to Other Actions**
  Watershed connections provide unique habitat and ecosystem services closely related to or dependent upon:
  - A1: Climate Resilience
  - A3: Adaptation Planning
  - A4: Adaptation Implementation
  - A6: Sediment
  - A7: Carbon Management
  - A11: Transition Zones
  - A14: Creeks
  - A19: Stormwater Management
Manage sediment and soil on a regional scale and advance beneficial use.

Manage fine and coarse sediments and upland soils on a watershed and regional scale to enhance Estuary habitats and shoreline; flood protection efforts through research to inform policy, evaluation of methodology, development of management tools and conveying structures, and identification of funding opportunities for regional sediment coordination for beneficial reuse.

**TASK 6-1**
Increase the amount of beneficial reuse of dredged sediment by maximizing implementation of the Long-Term Management Strategy (LTMS) beneficial reuse goal, through scientific evaluation of dredging and beneficial reuse impacts to inform permitting and regulatory policy.

**MILESTONE**
Report documenting net impacts/benefits of beneficially reusing sediment from hydraulic dredging and, if deemed appropriate under the San Francisco Bay Regional Water Quality Control Board’s California Environmental Quality Act (CEQA) analysis, incorporating beneficial reuse of hydraulically dredged material into the U.S. Army Corps of Engineers multi-year permit.

**COST ESTIMATE** – $$$

**TASK 6-4**
Improve coordination of dredged sediment supply with demand to reduce sediment disposal and increase beneficial reuse by convening a long-term working group that includes restoration community practitioners, dredgers, and regulators. This group will coordinate a regional approach and develop a programmatic roadmap for beneficial reuse opportunities and increase the use of Sedimatch by dredgers and restoration practitioners.

**MILESTONE**
One to two meetings of a long-term working group convened and one to three workshops held with small dredgers.

**COST ESTIMATE** – $$

**TASK 6-5**
Secure federal and non-federal (state and local) long-term funding sources for the incremental cost of beneficial reuse of dredged sediment beyond the U.S. Army Corps of Engineers’ least cost alternatives (Federal Standard), including costs to deliver and place sediment at beneficial reuse projects on the Estuary’s shoreline.

**MILESTONE**
Long-term funding program, cost-shared with federal and non-federal funds, established for the incremental cost of beneficial reuse of dredged sediment for projects across the Estuary.

**COST ESTIMATE** – $$$$

**TASK 6-2**
Pilot shallow water placement of sediment in restoration projects and conduct pre- and post-placement modeling and monitoring such that the regulatory agencies can evaluate the benefits and impacts.

**MILESTONE**
2026 Water Resources Development Act Resilient San Francisco Bay Strategic Placement Project and associated monitoring completed.

**COST ESTIMATE** – $$$$

**TASK 6-3**
Update contaminant screening criteria and risk assessment methodology for dredged sediment and upland soils.

**MILESTONE**

**COST ESTIMATE** – $$

**TASK 6-6**
Obtain funding for research efforts to address the 16 critical knowledge gaps identified in the 2021 Sediment for Survival Report.

**MILESTONE**
Technical reports addressing sediment demand for vertical accretion, lateral movement of sediment, sediment supply, and organic matter accumulation.

**COST ESTIMATE** – $$$$

**G O A L S**
Estuary Blueprint - Implementation - Actions

**OVERVIEW**
Sediment provides the fundamental building material for estuarine ecosystems, habitat restoration, and shoreline protection. While watersheds naturally transport sediment with stream and river flows, human activities such as channeling, damming, and developing shorelines have led to a dramatic decrease in the Estuary’s sediment supply. Moreover, most dredged sediment is not beneficially reused — this critical issue must be resolved for the region to meet its restoration goals and to adapt to sea level rise. This Action has been updated to prioritize the responsible and beneficial reuse of dredged materials for restoration.

**UPDATES AND EMERGING ISSUES**
The 2021 Sediment for Survival Report has articulated the urgent needs, possible sources, and practical methods of meeting the Estuary’s demand for more sediment.

**CLIMATE CHANGE CONSIDERATIONS**
Sediment is a requirement for tidal marshes, particularly in the Bay, to successfully adapt to rising sea levels; it is also critically short supply. Without overcoming regulatory, financial, and jurisdictional hurdles, resource managers will not be able to deliver enough sediment to restoration projects to allow wetlands to accrete quickly enough to outpace sea level rise. The ability of the region’s environments and communities to adapt to the impacts of climate change will be greatly diminished if the sediment supply issue is not resolved soon.

**EQUITY CONSIDERATIONS**
Communities that inhabit Estuary margins are considered frontline communities to climate change, due to their vulnerability to the impacts of sea level rise, while also often consisting of communities of color and lower income residents. Restoring tidal marshes is a critical adaptation strategy to protect frontline communities and will require significant increase in sediment supply.

**CONNECTIONS TO OTHER ACTIONS**
As one of the key components to the resilience of estuarine habitats, sediment is inextricably linked to the restoration of tidal habitats and all their geophysical and ecological benefits. Consequently, this Action connects to many Actions within the Blueprint, with special relevance to:

A1: Climate Resilience
A3: Adaptation Planning
A4: Adaptation Implementation
A5: Watershed Connections
A7: Carbon Management
A9: Intertidal/Subtidal Habitats
A10: Tidal Marsh
A14: Creeks
A16: Freshwater Flows
Decrease carbon emissions and subsidence in the Delta and increase carbon sequestration on natural and agricultural lands.

Conduct wetland restoration, enhancement, and creation projects, and promote conversion of suitable agricultural lands in the Delta to rice cultivation to slow or reverse subsidence, reduce greenhouse gases in the atmosphere, and advance scientific understanding of carbon management. Projects should focus on converting the more subsided locations to managed wetlands and rice farming and converting less subsided locations to tidal wetlands.

**TASK 7-1**

Work with agencies and willing private landowners to obtain funding to plan and implement activities in the deeply subsided regions of the Delta that halt subsidence and related greenhouse gas emissions.

MILESTONE
Projects on 20,000 acres of deeply subsided lands in the Delta that halt subsidence and related greenhouse gas emissions.

COST ESTIMATE – $$$$$

**TASK 7-2**

Continue to conduct applied research to better understand the processes of carbon sequestration and greenhouse gas emissions generated from wetlands and open water systems in the Bay-Delta. Work within reference systems and utilize scenario testing to inform management and restoration approaches that can be applied at larger scales. Quantify the greenhouse gas fluxes from different types of wetlands and different management regimes.

MILESTONE
One to three technical reports on the carbon implications of land management and wetland restoration activities in the Delta and/or Bay.

COST ESTIMATE – $5

**TASK 7-4**

Advance research on submerged aquatic vegetation (SAV) and its potential for carbon management in the Estuary, and develop recommendations on how to better protect, plan for, and manage existing SAV habitats and restoration efforts to maximize the potential of native SAV to provide sustained carbon storage.

MILESTONE
Reported results and initial recommendations from at least one project gathering site-based carbon sediment core data in or adjacent to eelgrass habitat.

COST ESTIMATE – $1

**TASK 7-5**

Collect more data on San Francisco Bay carbon cycles, fluxes, and fates across a variety of ecosystems and land use types, including restored wetlands, to address gaps in our understanding of carbon sequestration in Bay systems.

MILESTONE
One to three study sites established with atmospheric and hydrologic carbon exchange measurements combined with soil sediment data collection that encompass the diversity of Bay Area wetlands regarding age, disturbance, and salinity.

COST ESTIMATE – $$$

**TASK 7-6**

Promote use of carbon credit funding for wetland restoration in the Estuary.

MILESTONE
Pilot tidal wetland restoration projects in ecosystems that have not yet applied the American Carbon Registry Standards to qualify for the voluntary carbon market, such as tidal wetlands.

COST ESTIMATE – $-$

**TASK 7-3**

Increase economic impact of carbon markets in the Estuary to advance wetland restoration and management goals.

MILESTONE
Report detailing the potential impacts and benefits of various co-management activities on lands included in the carbon market, various strategies to scale participation in the market through regionally coordinated applications for multiple sites, and the institutional and regulatory barriers that limit entry of wetland restoration and agriculture projects into the carbon market.

COST ESTIMATE – $-$

**TASK 7-7**

Increase economic impact of carbon markets in the Estuary to advance wetland restoration and management goals.

MILESTONE
Report detailing the potential impacts and benefits of various co-management activities on lands included in the carbon market, various strategies to scale participation in the market through regionally coordinated applications for multiple sites, and the institutional and regulatory barriers that limit entry of wetland restoration and agriculture projects into the carbon market.

COST ESTIMATE – $-$
Implement a Wetlands Regional Monitoring Program (WRMP) for the Bay Area and the Delta to help local, regional, state, and federal agencies evaluate the effectiveness of efforts to sustain healthy aquatic habitats and resources.

**TASK 8-1**

Develop the WRMP Monitoring Network through the establishment of benchmark, reference, and restoration project sites.

**MILESTONE**

Five monitoring sites with biogeographic representation within San Francisco Bay.

**COST ESTIMATE** - $$

**TASK 8-2**

Determine how efforts to restore tidal marshes affect the distribution, abundance, and health of plants and animals and coordinate with related monitoring efforts, including the State of the Birds reporting.

**MILESTONE**

One to two Standard Operating Procedures for biological and ecological indicators.

**COST ESTIMATE** - $

**TASK 8-3**

Identify sustainable funding for the WRMP to support science, data management, and administration, and develop a strategy that is tied to the sources of funding.

**MILESTONE**

New funding sources secured for the WRMP.

**COST ESTIMATE** - $$

**TASK 8-4**

Ensure that WRMP outreach and engagement includes diverse audiences. Increase engagement with community representatives, social science and community-based science, and Traditional Ecological Knowledge on the Steering Committee, Technical Advisory Committee, and in development of social indicators to monitor connections between people and wetlands. Examples may include cultural use, recreation, education and training opportunities, and flood protection.

**MILESTONE**

Standard Operating Procedures to monitor connections between people and wetlands.

**COST ESTIMATE** - $$

**TASK 8-5**

Strengthen partnerships and monitoring coordination between the lower and upper San Francisco Estuary.

**MILESTONE**

Workgroup to increase coordination between the Delta Interagency Ecological Program and the WRMP Technical Advisory Committee.

**COST ESTIMATE** - $

**Overview**

The Wetlands Regional Monitoring Program (WRMP) will improve understanding of the condition of tidal wetlands at a regional scale and support the design, implementation, and adaptive management of restoration projects. Monitoring and analysis will address landscape-scale drivers impacting restored and mature wetlands to help inform climate change adaptation and priority responses at a regional level. The WRMP development process was initially started with the 2016 Estuary Blueprint revision and has fostered regional support for the program. The program engages a broad range of stakeholders, including regulators, land managers, scientists, and community-based organizations.

**Updates and Emerging Issues**

Revised and new Tasks reflect next steps to move the program from development to implementation and increase its relevance to broader stakeholder groups.

**Climate Change Considerations**

Climate change will not directly impact implementation of the WRMP; however, the vulnerability of tidal wetlands to climate stressors (see Action 10) makes the role of the WRMP in evaluating changes and recommending management actions more essential.

**Equity Considerations**

Task 8.4 specifically focuses on incorporating an equity lens into the WRMP, including engaging new stakeholders and expertise on WRMP committees, in outreach, and in development of ecosystem services indicators.

**Connections to Other Actions**

The WRMP improves management of habitats addressed in the following Actions:

- A9: Intertidal/Subtidal Habitats
- A10: Tidal Marsh
- A11: Transition Zones
- A12: Managed Wetlands
- A13: Seasonal Wetlands

The WRMP may also contribute information to guide efforts in:

- A5: Watershed Connections
- A6: Sediment
- A15: Invasive Species
Protect, restore, and enhance intertidal and subtidal habitats.

Protect, restore, and enhance non-wetland intertidal, unvegetated tidal flat, and subtidal habitats to improve ecological complexity and completeness, and to deliver ecosystem services and water quality benefits to the Estuary.

**TASK 9-1**
Determine habitat suitability for native eelgrass in context with potential future climate changes in San Francisco Bay. Learn, respond, and adapt strategies to account for natural variability and climate change stressors.

**MILESTONE**
Habitat Suitability Model for Eelgrass in San Francisco Bay.

**COST ESTIMATE** – $500,000

**TASK 9-2**
Increase populations of Submerged Aquatic Vegetation (SAV), with a focus on native eelgrass (Zostera marina), by expanding the extent of existing beds and establishing new beds in the Bay.

**MILESTONE**
Submerged Aquatic Vegetation (SAV) coverage in the Bay increased by 75 acres.

**COST ESTIMATE** – $5,000,000

**TASK 9-3**
Increase populations of native oysters (Ostrea lurida) by expanding the extent of existing beds or establishing new beds.

**MILESTONE**
20 projects that increase shellfish beds.

**COST ESTIMATE** – $20,000,000

**TASK 9-4**
Work with regulatory agencies, including through the San Francisco Bay Restoration Regulatory Integration Team (BRRIT), to raise awareness among regulatory agencies on the status of eelgrass, oyster, and other types of intertidal, subtidal, and other nature-based shoreline protection methods designed in a multi-objective approach.

**MILESTONE**
Programmatic framework for permitting living shoreline projects.

**COST ESTIMATE** – $250,000

**TASK 9-5**
Restore non-wetland intertidal and subtidal habitats other than eelgrass and oyster beds, such as rocky intertidal areas, coarse sediment beaches, macroalgal beds, and living shorelines. Identify appropriate and feasible sites, secure funds, and implement projects to create or improve these types of habitats as well as other projects that integrate multiple habitats.

**MILESTONE**
20 projects that focus on rocky intertidal, coarse sediment beach, macroalgal bed, living shoreline, and other integrated habitats.

**COST ESTIMATE** – $5,000,000

**TASK 9-6**
Remove artificial structures that are known to contribute to shoreline debris and water quality degradation and that provide minimal habitat benefit (i.e., derelict creosote pilings, failing seawalls, failing riprap).

**MILESTONE**
10 projects that include the removal of artificial structures.

**COST ESTIMATE** – $1,000,000

**TASK 9-7**
Protect and enhance unvegetated tidal flat habitats to be healthy and free of debris, functionally and physically linked to tidal wetland and/or open Estuary sites, and able to sustain diverse species of Bay invertebrates and local and migratory shorebirds.

**MILESTONE**
90 restoration site designs that include tidal flat enhancement and protection.

**COST ESTIMATE** – $1,000,000

**Cost Estimate Key**

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500,000</td>
<td>Up to $1 million</td>
</tr>
<tr>
<td>$250,000</td>
<td>Up to $10 million</td>
</tr>
<tr>
<td>$100,000</td>
<td>Up to $100,000</td>
</tr>
<tr>
<td>$1,000,000</td>
<td>Over $100 million</td>
</tr>
</tbody>
</table>

**Photo:** Ted Robertson Dutra

**Photo:** Jude Stalker
**Action 10: Tidal Marsh**

**TASK 10-1**

**Protect, restore, and enhance tidal marsh habitat.**

Restore and enhance complete tidal marsh ecosystems, considering sea level rise and other climate change stressors in restoration design and implementation, and protect historical San Francisco baylands for current and possible future ecosystem benefits.

**MILESTONE**

23,000 acres of tidal marsh restored in the Bay and 5,500 acres of tidal marsh restored in the Delta.

**COST ESTIMATE** – $$$$$

**TASK 10-2**

Enhance tidal marsh, including constructing and enhancing transition zones and high tide refugia features such as marsh islands, to increase ecological function and resilience to climate change.

**MILESTONE**

3,000 acres of tidal marsh enhanced in San Francisco Bay.

**COST ESTIMATE** – $$$$

**TASK 10-3**

Protect San Francisco Bay historical baylands (including both tidal marsh and non-tidal wetlands and waters within the historical Bay margins) to preserve and enhance tidal habitats and adjacent habitats to allow for migration with sea level rise.

**MILESTONE**

20,000 acres of baylands protected through various mechanisms including acquisition, transfer of fee title, or easement.

**COST ESTIMATE** – $$$$$

---

**Cost Estimate Key**

- $ - Up to $100,000
- $$ - Up to $1 million
- $$$ - Up to $10 million
- $$$$ - Over $100 million

---

**Overview**

Tidal marshes offer diverse ecosystem services to the San Francisco Estuary and its communities through their abilities to provide habitat for wildlife, stabilize shorelines, prevent erosion, absorb stormwater, and store carbon. Today, there are approximately 51,300 acres of tidal marsh in the Bay — about a quarter of the acreage that existed at the beginning of the 19th century. This Action seeks to increase tidal marsh area to 106,000 acres in the Bay and 50,000 acres in the Delta by 2050 as set forth by the **Delta Plan**.

**Updates and Emerging Issues**

Since 2016, this Action has been updated to focus on tidal marshes, with tidal flats now included in Action 9: Restoration and enhancement milestones have been revised for the next five years and align with San Francisco Bay Joint Venture Implementation Plan and California EcoRestore acreage goals. The protection task has been expanded to focus on all undeveloped land within the historic San Francisco baylands that offer current habitat value and/or future enhancement or restoration opportunities.

**Climate Change Considerations**

Sea level rise and other climate change stressors present additional hurdles to the restoration of tidal marshes. The updated protective and enhancement milestones work in tandem with Actions 8: Wetland Monitoring and 11: Transition Zones, to increase the pace and scale of restoration, develop recommendations for climate-resilient restoration, and support the migration of tidal marshes upland as sea levels rise.

**Equity Considerations**

Ecosystem restoration and enhancement projects need to consider and incorporate the priorities of surrounding communities. Additionally, such projects should take into special consideration that many tidal marsh habitats carry great cultural significance and provide important resources to Tribes and Indigenous populations.

**Connections to Other Actions**

Restoration and enhancement of tidal marsh habitat and other similar habitats hold great potential for increasing climate resilience. This Action is closely connected with Actions that expedite the implementation of natural and nature-based infrastructure to address climate change:

- **A1: Climate Resilience**
- **A3: Adaptation Planning**
- **A4: Adaptation Implementation**
- **A5: Watershed Connections**
- **A6: Sediment**
- **A7: Carbon Management**
- **A8: Intertidal/Subtidal Habitats**
- **A11: Transition Zone**
- **A12: Managed Wetlands**
- **A15: Invasive Species**
Protect, restore, and enhance estuarine-upland transition zones and adjacent upland ecosystems.

Protect estuarine-upland transition zones, and their ecosystem services, to help the Estuary adapt to rising sea levels. Include protection of adjacent upland ecosystems and diked historic baylands where feasible and appropriate. Integrate transition zones and adjacent upland ecosystems into restoration and enhancement projects in the Estuary to provide both migration space and high water refugia.

**TASK 11-1**
Enhance, restore, or create estuarine-upland transition zones in existing or restored tidal marshes.

**MILESTONE**
50 transition zone enhancement, restoration, or creation projects incorporated into existing or restored marshes and adjacent uplands.

**COST ESTIMATE** – $$$$$

**TASK 11-2**
Protect transition zones, adjacent upland areas, and diked historic baylands for wetland migration space, based on identified needs and opportunities, through acquisition of fee title, partnerships to develop conservation easements, or other management agreements.

**MILESTONE**
30 sites protected or planned for protection as areas for future wetland migration space.

**COST ESTIMATE** – $$$$$

**TASK 11-3**
Determine an approach for maintaining an updated estuarine-upland transition zone mapping inventory over time. Integrate the approach into long-term monitoring by the Wetlands Regional Monitoring Program (WRMP). Identify opportunities to coordinate with the Delta Adapts and Delta Plan Ecosystem Amendment analyses.

**MILESTONE**
Standard Operating Procedures for completing periodic mapping of Bay transition zones.

**COST ESTIMATE** – $ 

**TASK 11-4**
Support information-sharing and knowledge transfer activities to address the challenges of restoring native plant communities in the transition zone. Topics may include sourcing native plants; designing, preparing, and maintaining sites; monitoring; and addressing plant pathogens.

**MILESTONE**
Three to five workgroup meetings to address transition zone restoration challenges.

**COST ESTIMATE** – $
**Action 12: Managed Wetlands**

Maximize habitat benefits of managed ponds and other non-tidal wetlands and waters.

Maximize habitat benefits of managed ponds and wetlands (including storage and treatment wetlands and ponds, current and former salt production ponds, and managed floodplains) for a wide range of species. Support studies and actions to enhance and expand habitat value of managed ponds and wetlands and minimize negative impacts to aquatic species and water quality.

**TASK 12-1**
Fund, implement, and monitor managed pond enhancements to increase nesting waterbird success and grow populations.

**MILESTONE**
Three projects to implement and test techniques, and monitoring reports on outcomes.

**COST ESTIMATE** – $$$

**TASK 12-2**
Investigate the effectiveness of specific habitat enhancement measures (such as changes in configuration, management, or operation of managed ponds or wetlands) to provide increased successful bird nesting, foraging, roosting, and high tide refugia with surveys for three to five years following implementation of measures.

**MILESTONE**
Five reports summarizing results of habitat enhancement measures.

**COST ESTIMATE** – $$

**TASK 12-3**
Study the ability of managed ponds and other non-tidal habitats to sustain diverse species of vertebrates, invertebrates, and endemic and endangered plants over time. Analyze species use, diversity, and value as compared to tidal wetlands.

**MILESTONE**
Report released and results shared comparing species use and diversity in various managed pond and wetland habitats.

**COST ESTIMATE** – $$

**TASK 12-4**
Develop a methodology for assessing the risk-adjusted long-term costs and benefits of managed ponds, managed wetlands, and non-tidal wetlands and waters. Methodology should take into account habitat benefits for multiple species and changes in operations and maintenance requirements to adapt to sea level rise and climate change and prevent water quality impacts. In the upper Estuary, the methodology should also account for the cost/benefit of how the water is “sourced” and how the actions impact partners.

**MILESTONE**
Methodology tested and evaluated for future use across the region.

**COST ESTIMATE** – $$

**TASK 12-5**
Develop and implement predation control measures on managed ponds. These measures include camouflaging habitats and installing exclusion fencing.

**MILESTONE**
Measures tested and implemented at five sites.

**COST ESTIMATE** – $$$

---

**Overview**

For more than a century, humans have managed marsh and pond habitats to attract waterfowl for hunting. More recently, diked former wetlands and salt ponds are being retained and enhanced as managed ponds that address subsidence issues, species protection goals, and restoration priorities. Managed ponds (shallow or deep open water areas) provide valuable habitat for critical vegetation, small mammals, and a wide variety of waterbirds. Managed wetlands (such as diked marshes) can provide habitat for critical vegetation, marsh-dependent birds, and small mammals where full tidal restoration is not feasible.

**Updates and Emerging Issues**

Since 2016, this Action has been expanded to include managed wetland and inundated floodplain habitats, and its focus has shifted to balancing the benefits of such habitats between waterbirds and fish. Tasks and milestones pertaining to integrated predator control have been moved to Action 15: Invasive Species.

**Climate Change Considerations**

The effects of climate change and sea level rise challenge the long-term viability of managed ponds. Projected higher water levels, more frequent and intense storms, and regional salinity shifts may make it difficult or even impossible in the future for managers to maintain target habitat conditions inside the ponds, which may become subtidal habitat. Tasks under this Action will help evaluate the costs and benefits of maintaining these areas under climate change scenarios to inform future management.

**Equity Considerations**

Managed wetlands, as with other types of wetlands, are frequently located in areas of great cultural significance to Tribes and may support culturally important plants. Both Tribes and surrounding frontline communities must be involved in planning activities for managed wetlands.

**Connections to Other Actions**

Managed ponds can expand valuable habitat for diverse species of flora and fauna when other habitat types are not available, like the habitats addressed in:

- **A8**: Wetland Monitoring
- **A9**: Intertidal/Subtidal Habitats
- **A10**: Tidal Marsh
- **A11**: Transition Zones
- **A14**: Creeks

---

**Cost Estimate Key**

- $ - Up to $100,000
- $$ - Up to $1 million
- $$$$ - Up to $10 million
- $$$$$ - Over $100 million
Protect, restore, and enhance seasonal wetlands.

Protect, restore, and enhance non-tidal seasonal wetlands outside of historical tidal areas, including vernal pool complexes, using conservation easements and related protection tools, restoration, and improved grazing management practices.

**Action 13**

**SEASONAL WETLANDS**

**TASK 13-1**
Protect non-tidal seasonal wetlands including vernal pool complexes using conservation easements or other protection tools.

**MILESTONE**
At least 1,500 acres of seasonal wetlands protected in the Bay region.

**COST ESTIMATE** – $$$

**TASK 13-2**
Restore non-tidal seasonal wetlands, including vernal pool complexes.

**MILESTONE**
At least 800 acres of seasonal wetlands restored in the Bay region and 3,200 acres in the Delta region.

**COST ESTIMATE** – $$$$-

**TASK 13-3**
Advance best practices for grazing management to protect natural seasonal wetlands and enhance habitat value of stock ponds.

**MILESTONE**
Four workshops around the region for landowners.

**COST ESTIMATE** – $

---

Seasonal wetlands can be found upland and are called “seasonal” because they periodically flood or fill with rain, runoff, or groundwater during winter rains. Their salinities lie on a spectrum of salty to fresh, since many seasonal wetlands may be former tidal marshes that have been closed off from tidal action by dikes and levees. Seasonal wetlands also provide habitat for large numbers of waterfowl and shorebirds during migratory periods and support rare and endangered plants and invertebrates.

**Updates and Emerging Issues**
Since 2016, this Action’s Tasks have been expanded to cover seasonal wetlands more generally: not just vernal pool complexes. Also, this Action’s protection and restoration Tasks are now aligned with the goals of The Conservation Lands Network 2.0 Report and San Francisco Bay Joint Venture. Looking ahead to the next Estuary Blueprint revision, this Action is expected to explore more opportunities to partner with landowners around grazing management and forest management best practices.

**Climate Change Considerations**
Climate change will bring more extreme and unpredictable weather to the region. Extended dry periods and prolonged or extreme flooding may result in the increased precariousness of seasonal wetlands.

**Equity Considerations**
Like other habitat-oriented Actions, projects to restore seasonal wetlands should engage Tribes and frontline communities in planning and implementation. Tasks under the Climate Resilience and Equity Actions address this need.

**Connections to Other Actions**
This Action is connected to other Actions focused on restoring, protecting, and conserving habitat, including:

- A8: Wetland Monitoring
- A9: Intertidal/Subtidal Habitats
- A10: Tidal Marsh
- A11: Transition Zones
- A14: Creeks
Conserve and enhance riparian and instream habitats throughout the Estuary’s watersheds.

Conserve stream reaches and restore riparian habitats by defining impairments and threats, filling data gaps, developing science-based tools, securing necessary funding, and designing, advancing, and collaborating on projects.

**TASK 14-1**

Establish advisory group to assess the capacities of regional restoration tracking platforms, such as EcoAtlas and EcoRestore, to include riparian and aquatic instream habitat restoration project metrics such as benthic macroinvertebrate indicators, canopy cover, native riparian plant species, fish barrier removal, gravel augmentation, restored access for fish rearing on floodplains and other off-channel habitats, carbon sequestration, required pre/post project monitoring data, and costs by funding source.

**MILESTONE**

New metrics identified to add to regional data sets.

**COST ESTIMATE – $**

**TASK 14-2**

Compile and provide technical and policy guidance to the watershed restoration community and decision-makers to accelerate the pace and scale of riparian and instream habitat restoration and protection. This guidance potentially includes stream and watershed data, characterization of key habitat areas for salmonids and other native fish assemblages, development setback policies, erosion control and regenerative and firewise landscaping measures, land acquisition/conservation easements, unplanned chloramine and firefighting chemical discharges, and best practices for community engagement in restoration stewardship, maintenance, and monitoring support.

**MILESTONE**

Appropriate guidance documents identified, and engagement strategy developed for sharing with planners and practitioners.

**COST ESTIMATE – $**

**TASK 14-3**

Seek additional funding for riparian conservation and restoration activities including floodplain acquisition, establishment of a network of streamflow gages, fish population surveys with a focus on anadromous salmonid streams, and long-term public engagement such as watershed planning and project stewardship.

**MILESTONE**

Biennial lists of prospective riparian restoration projects, acquisition and conservation actions, data gaps, and other watershed management requests to help policymakers secure and allocate regional, state, and federal funding.

**COST ESTIMATE – $**

**TASK 14-4**

Implement riparian corridor and instream habitat restoration/enhancement and conservation/acquisition/preservation projects emphasizing multi-objective and multi-benefit efforts.

**MILESTONE**

5,000 acres of creek corridor and adjacent upland habitat conserved, and 2,000 acres of riparian corridor and instream habitat restored or enhanced.

**COST ESTIMATE –$$$$$**

**TASK 14-5**

Pilot the use of cooperative working arrangements among homeless advocacy organizations, local governments, and watershed organizations to create a stream steward program composed of people experiencing homelessness at a creekside encampment (to be selected). The program would provide stipends, stewardship training and resources, potable water and sanitation services, and connection to available social services. This approach would provide resources for both protecting the waterway and support services to find long-term housing for unsheltered participants.

**MILESTONE**

Initiate pilot program.

**COST ESTIMATE – $$$**
Minimize the impact of invasive species.

Reduce the impact of invasive species through prevention, early detection, rapid response, eradication, and control. Conduct work with national, state, and regional coordinating bodies and the key agencies implementing specific programs.

TASK 15-1
Maintain, expand, and improve invasive species prevention programs (including for ballast water, marine biofouling, trailer boats, and organisms in trade). Actions may include developing new or expanding existing policies and programs, conducting outreach (e.g., to the boating community, Weed Management Area partnerships, etc.) and working with existing entities to identify priority activities.

MILESTONE
Five to seven new or expanded policies or programs, list of priority activities in various programs, and two outreach campaigns implemented through pertinent networks.

COST ESTIMATE – $ 

TASK 15-2
Increase early detection, monitoring, and rapid response programs by identifying additional funding sources and creating a Rapid Response Fund. Monitoring includes: 1) assessing and mapping Estuary-wide distribution of key invasive species, and 2) increasing citizen scientist monitoring through Calflora, Naturalist, and other similar websites.

MILESTONE
Rapid response fund established, and three to four funding sources identified for monitoring and/or mapping.

COST ESTIMATE – $$$

TASK 15-3
Develop Early Detection and Rapid Response (EDRR) Frameworks at the local or national scale by setting up a framework to detect and respond to invasive species and a series of sustained and coordinated actions with associated responsible agencies and partners.

MILESTONE
At least one new EDRR Framework.

COST ESTIMATE – $ 

TASK 15-4
Develop new early detection tools using eDNA (i.e., eDNA meta barcoding) for specific environments and suites of species (i.e., marine species).

MILESTONE
One to three techniques for early detection, such as pilot eDNA meta barcoding or other eDNA techniques.

COST ESTIMATE – $ 

TASK 15-5
Implement eradication and control programs with priority given to species that can be eradicated and/or species that have extensive impacts on habitats important to the health of the estuarine ecosystem. Research and test pilot control measures for key invasive species.

MILESTONE
For two to five key invasive species, total acreage of species reduced and/or number of acres being managed to reduce species increased.

COST ESTIMATE – $$$ 

TASK 15-6
Ensure regulatory agencies and project proponents include requirements to prevent the introduction and spread of invasive species, including using native-only plant lists, using sources with a clean supply of native plant species that are free of pathogens, and confirming that Best Management Practices (BMPs) are shared for invasive species where they exist (for example: Invasive Spartina Project BMPs 2016, California State Lands Commission’s BMPs for marine leases).

MILESTONE
Number of permits or leases with improved native and invasive species requirements increased.

COST ESTIMATE – $ 

TASK 15-7
Finalize Best Management Practices (BMPs) for reducing the spread of aquatic invasive species through biofouling of mobile marine infrastructure in collaboration with regulatory agencies for incorporation into permits.

MILESTONE
Final BMPs released for reducing the spread of aquatic invasive species through biofouling of mobile marine infrastructure.

COST ESTIMATE – $ 

Cost Estimate Key
$ - Up to $100,000
$ - Up to $1 million
$ - Up to $10 million
$ - Up to $100 million
$ - Over $100 million
**Action 16: Freshwater Flows**

**GOALS**

- Living Resources
- Resilience
- Water
- Stewardship

**Improve the timing, amount, and duration of freshwater flows critical to Estuary health.**

Inform elected officials, Tribes, and the public, including frontline communities, about the critical importance of freshwater flows through the Sacramento/San Joaquin Delta to San Francisco Bay and ultimately out the Golden Gate. Work with partners to adjust the timing, amount, and duration of freshwater flows as part of a more natural flow regime through the Delta and San Francisco Bay to better support all public trust uses.

**TASK 16-1**

Update and implement the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta WQCP) with timely and scientifically sound information and keep the public and non-governmental organizations (NGOs), Tribes, and local, state, and federal officials informed.

**MILESTONE**

Completed update and implementation of the Bay-Delta WQCP.

**COST ESTIMATE – $**

**TASK 16-2**

Initiate research to assess critical ecological connections between the inland (Bay-Delta-Central Valley watershed) and coastal portions of the Estuary, including but not limited to:

1. The relationship between the freshwater plume from San Francisco Bay to nearshore waters and the abundance, distribution, and other population viability attributes of coastal fish and wildlife.
2. The relationship between flows and salmon abundance; the health of the Southern Resident population of orca (Orcinus Orca) and other oceangoing species; and the abundance of various runs of Chinook salmon (Oncorhynchus tshawytscha) originating in the upper Estuary’s watersheds (Sacramento River and Central Valley Evolutionarily Significant Units).

**MILESTONE**

One to two technical papers describing the initial findings, as well as a white paper synthesizing overall findings for a lay audience.

**COST ESTIMATE – $**

**TASK 16-3**

Integrate Tribal priorities regarding improvements to freshwater flows, such as pursuing legal personhood for traditional waterways and incorporating Traditional Ecological Knowledge into water management and decision-making for the Tribes of the San Francisco Estuary. Support Tribes in developing capacity to co-manage or lead freshwater flows resources management.

**MILESTONE**

At least one convening of Tribes and Tribal organizations to review state data and plans, including opportunities for Tribe-to-Tribe conversations, in preparation for meeting with state agencies at the Tribal Water Summit or similar event.

**COST ESTIMATE – $**

**TASK 16-4**

Undertake a study to assess the social, cultural, and economic values, including non-monetary values, of freshwater flows to residents of the Estuary and beyond, including Tribes.

**MILESTONE**

Report synthesizing values of freshwater flows.

**COST ESTIMATE – $**

**TASK 16-5**

Synthesize recent studies on the effect of flow regimes on survival of juvenile salmonids and Delta water temperatures to support future updates to instream flow management decisions that are protective of native fishes for the Sacramento and San Joaquin rivers and Delta.

**MILESTONE**

One or more technical reports distributed to decision-makers, managers, Tribes, and the public.

**COST ESTIMATE – $**

**TASK 16-6**

Explore potential collaboration on freshwater flows priority needs and populations of endangered species with other West Coast National Estuary Programs (Puget Sound Partnership, Tillamook Estuaries Partnership, Lower Columbia Estuary Partnership, San Francisco Estuary Partnership, The Bay Foundation), Tribal Marine Stewards Network, and sovereign Tribal nations to collaborate on shared freshwater flows priority actions.

**MILESTONE**

One meeting between West Coast National Estuary Programs and Tribal representatives.

**COST ESTIMATE – $**

**Cost Estimate Key**

- $ - Up to $100,000
- $5 - Up to $1 million
- $10 - Up to $10 million
- $100 - $100 million
- $1 - Over $100 million

**Overview**

The flow of fresh water from the watershed to the Estuary to the Pacific Ocean is a critical hydrologic process that influences almost all ecological processes and organisms in the Estuary. Altered freshwater flow regimes are one of the many powerful stressors affecting the health of the Estuary today, and studies show that current flows, particularly from the Sacramento and San Joaquin rivers and their tributaries, are insufficient to protect public trust resources, such as valuable aquatic ecosystems and multiple fish species.

**Updates and Emerging Issues**

Since 2016, this Action’s focus remains largely similar to the last iteration of the Blueprint with the addition of expanding engaged stakeholders to include the priorities of Tribes and communities. Additionally, this task has identified natural and social science knowledge gaps to be filled and disseminated.

**Climate Change Considerations**

As climate change accelerates over the next decades, weather patterns are expected to become more extreme, leading to longer periods of drought, larger storms, and higher temperatures. Sierra snowpack may melt faster and earlier, leading to higher instream temperatures, with potentially devastating impacts on reservoir operations and salmonid mortality, as has occurred recently. Initiating research and providing management guidance through this Action will help address these vulnerabilities.

**Equity Considerations**

Tribes have long been excluded from restoration and management decisions that affect the flow of fresh water so vital to their peoples’ histories, cultures, and livelihoods. Integrating Tribal priorities and Traditional Ecological Knowledge (TEK) into management decisions will build the foundation for future collaborative management practices and Tribal leadership in freshwater flows resources management.

**Connections to Other Actions**

As a critical hydrologic process, freshwater flows play important roles in the following Actions:

- A3: Watershed Connections
- A6: Sediment
- A11: Transition Zones
- A14: Creeks
- A17: Water Conservation
- A18: Recycled Water
**ACTION 17**

**WATER CONSERVATION**

Reduce water use around the Estuary.
Explore opportunities to reduce water exports from the Estuary through demand management such as reduced water use for landscaping, and residential water conservation.

**TASK 17-1**

Advance the installation of ‘smart’ water meters and monitors, including Advanced Metering Infrastructure or AMI, as industry best practice throughout the Estuary and provide support for obtaining funding for agencies working towards this goal.

**MILESTONE**

All major Bay Area water agencies substantially advanced in early phase conversion to ‘smart’ water meters, such as piloting testing or proof of concept.

**COST ESTIMATE – $$$$$**

**TASK 17-2**

Expand Bay Area Regional Energy Network (BayREN)’s Water Upgrades Save Program or similar water efficiency programs to expedite customer participation and utility investment in indoor and outdoor water efficiency projects for single family residential, multifamily residential, commercial, and institutional customers to reduce water waste from inefficient fixtures and leaks.

**MILESTONE**

All municipal water utilities enrolled in the Water Upgrades Save Program or similar programs.

**COST ESTIMATE – $$$$$**

**TASK 17-3**

Improve Model Water Efficient Landscape Ordinance (MWELO) compliance by providing MWELO and regenerative landscape trainings, and an MWELO Toolkit to municipal staff throughout the Estuary and other regions that obtain water from the Estuary or its watersheds.

**MILESTONE**

20 regenerative landscape and MWELO trainings throughout the Estuary and its watersheds.

**COST ESTIMATE – $$**

**TASK 17-4**

Develop a model ordinance for water efficient retrofit on resale or retrofit on listing, based on such examples as existing City of Davis, Santa Cruz County, and/or City and County of San Francisco ordinances, taking into account contingencies that do not delay close of escrow.

**MILESTONE**

Model retrofit ordinance for use by Estuary cities and counties.

**COST ESTIMATE – $**

**TASK 17-5**

Convene Bay Area water and wastewater agencies to discuss regional water conservation targets, opportunities, and limitations, resulting in a synthesis report.

**MILESTONE**

One workshop held with Estuary stakeholders, resulting in a synthesis report.

**COST ESTIMATE – $**

**Overview**

Water conservation remains the most cost-effective and environmentally friendly way to reduce demand on overextended groundwater aquifers and riverine systems. Although California has passed legislation to require efficient water use both indoors and outdoors, opportunities still exist to improve implementation of these laws and address remaining gaps across the residential, agricultural, commercial, and industrial sectors.

**Updates and Emerging Issues**

This Action combines the two 2016 Actions on outdoor landscaping and agricultural water use efficiency and expands its focus to a suite of water conservation strategies targeting indoor residential use, outdoor water use across all sectors, and repairs. Additionally, this Action will anticipate emerging issues by laying out a task to convene water utility agencies and planners to consider the future of water conservation in the Bay Area.

**Climate Change Considerations**

This Action addresses water supply issues that will be exacerbated by climate change. Over the long term, other methods of extending water supply during long droughts, in addition to water use efficiency, may need to be developed or expanded. Additionally, exceptionally efficient use may create challenges for wastewater systems.

**Equity Considerations**

Multifamily residential units, especially rental units, pose one of the remaining challenges to increasing residential water use efficiency. Renters may pay into a shared water bill without seeing it, and therefore may unknowingly subsidize the cost of water wasted due to inefficient fixtures and leaks. Strategies to increase customer participation in water conservation programs can result in more affordable water bills for renters.

**Connections to Other Actions**

This Action connects to other Actions that focus on water supply, including:

- A16: Freshwater Flows
- A18: Recycled Water
- A19: Stormwater Management
**Action 18: Recycled Water**

Expand the use of recycled water. Work with water agencies, municipalities, and stakeholders to reduce barriers to the broader use of recycled water. Support the use of the right water at the right time and in the right place.

**TASK 18-1**

Share recycled water informational materials, resources, and program models among municipalities, wastewater agencies, and drinking water agencies.  
**MILESTONE**
Platform for sharing resources.  
**COST ESTIMATE** – $ 

**TASK 18-2**

Collaborate with the Bay Area Clean Water Agencies’ Recycled Water Committee stakeholders and others to identify opportunities to expand incorporation of recycled water in local and regional water resources planning processes.  
**MILESTONE**
Bay Area Clean Water Agencies Recycled Water Study finalized.  
**COST ESTIMATE** – $500,000 

**TASK 18-3**

Collaborate with the Bay Area Clean Water Agencies’ Recycled Water Committee and others to convene stakeholders to identify opportunities for the broader use of recycled water, understand funding and planning gaps, and address regulatory and permitting constraints.  
**MILESTONE**
Forum to discuss overcoming challenges to regional recycled water projects.  
**COST ESTIMATE** – $1,000,000 

**TASK 18-4**

Evaluate reverse osmosis concentrate (ROC) management options to protect San Francisco Bay health and water quality while providing multiple stakeholder-driven benefits.  
**MILESTONE**
Two to three semi-annual inter-agency discussions convened on the pathways to permitting ROC management.  
**COST ESTIMATE** – $1,000,000 

**Cost Estimate Key**

<table>
<thead>
<tr>
<th>Cost Estimate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>Up to $100,000</td>
</tr>
<tr>
<td>$500,000</td>
<td>Up to $500,000</td>
</tr>
<tr>
<td>$1,000,000</td>
<td>Up to $1 million</td>
</tr>
<tr>
<td>$5,000,000</td>
<td>Up to $5 million</td>
</tr>
<tr>
<td>$25,000,000</td>
<td>Up to $25 million</td>
</tr>
<tr>
<td>$100,000,000</td>
<td>Over $100 million</td>
</tr>
</tbody>
</table>

**Overview**

Recycled water refers to water that is treated to potable or non-potable standards for a beneficial use. In the Bay Area, local wastewater agencies work individually and through partnerships like the Bay Area Clean Water Agencies (BACWA) to implement strategic uses of recycled water, minimize its costs and maximize its benefits, and communicate a unified message about its complexities to the public. Without strong cross-jurisdictional governance and management structures, approaches to managing recycled water can be inconsistent and inefficient.

**Updates and Emerging Issues**

Since 2016, this Action has been revised to include more measurable and achievable milestones. Additionally, advanced treatment of recycled water via reverse osmosis produces a concentrate, the management of which needs to be considered in planning efforts. Lastly, a deeper understanding of the connection between recycled water and estuarine health needs to be established in order to secure more public and elected buy-in.

**Climate Change Considerations**

This Action addresses water supply issues that will be exacerbated by climate change. As climate change prolongs droughts and the public practices increased water efficiency, recycled water faces the unique challenge of unpredictable supply and competition that affects industries such as landscaping and refineries.

**Equity Considerations**

Much of the Bay Area’s wastewater treatment infrastructure lies along the shoreline, as well as in or near frontline communities. Regional resilience planning efforts will need to consider pollution risks for these communities as the shoreline infrastructure adapts to rising seas.

**Connections to Other Actions**

The challenge posed by reverse osmosis concentrate management connects this Action to:

- A20: Nutrients
- A21: Emerging Contaminants
- A22: Health Risks of Contaminants

This Action is also connected to other water supply Actions, such as:

- A16: Freshwater Flows
- A17: Water Conservation
- A19: Stormwater Management
Manage stormwater with low impact development and green stormwater infrastructure.
Implement Low Impact Development (LID) and Green Stormwater Infrastructure (GSI) to reduce polluted stormwater to the Estuary. Develop planning and tracking tools, technical materials, policy recommendations, and financing strategy guidance to aid agencies with implementation.

**TASK 19-1**
Expand funding opportunities for Green Stormwater Infrastructure (GSI) planning and implementation, including those identified in the Roadmap of Funding Solutions for Sustainable Streets. Expand effort to engage utility agencies that also maintain infrastructure in the public realm to increase collaboration and cooperation.

**MILESTONE**
10 stormwater management/transportation planning meetings with Metropolitan Transportation Commission, San Francisco Bay Regional Water Quality Control Board, and others.

**COST ESTIMATE – $**

**TASK 19-2**
Improve the San Francisco Bay Low Impact Development (LID) Tracker Tool and the process to efficiently receive pertinent GSI project information reported to the San Francisco Bay Regional Water Quality Control Board to increase the number of projects in the Tracker Tool and allow reporting on the cumulative pollutant reduction effectiveness of GSI projects on the water quality of San Francisco Bay.

**MILESTONE**
A permanent agency home and budget for the LID Tracker Tool with budget for coordination with municipalities and countywide clean water programs, project data compilation and entry, and ongoing software maintenance.

**COST ESTIMATE – $$**

**TASK 19-3**
Pilot an alternative or in-lieu LID compliance Compliance program for San Francisco Bay Regional Water Quality Control Board that demonstrates to municipalities a programmatic approach to alternative compliance that can provide funding for both capital implementation and long-term operations of multi-benefit Green Stormwater Infrastructure, and result in projects that provide a net environmental benefit or equivalent or increased water quality benefits.

**MILESTONE**
San Francisco Bay Regional Water Quality Control Board-approved alternative compliance pilot program with two public projects identified for receiving resources from regulated project proponents.

**COST ESTIMATE – $$$**

**TASK 19-4**
Develop a stormwater asset management module within the Metropolitan Transportation Commission’s StreetSaver Program to help Bay Area municipal jurisdictions improve inventory, inspection, and maintenance of storm drain and green infrastructure assets along streets.

**MILESTONE**
Revised StreetSaver Program that includes a stormwater asset management module consistent with requirements in stormwater permits.

**COST ESTIMATE – $$**

---

**GOALS**

- Living Resources
- Resilience
- Water
- Stewardship

**Overview**
In cities around the region, impervious surfaces such as streets and sidewalks typically represent 15-25 percent of land cover. Impervious surfaces prevent stormwater from being filtered through the soil, resulting in stormwater runoff that carries pollutants like oil, grease, pesticides, and heavy metals down drains and straight into the Estuary. As climate change brings more extreme weather events to the Estuary, green stormwater infrastructure (GSI) and low impact development (LID) installations can reduce runoff volumes and distribute runoff into inlets across a longer period of time, helping to reduce the impacts of urbanization on local hydrology and water quality.

**Updates and Emerging Issues**
Since 2018, this Action’s focus has shifted from planning to implementation, with projects being tracked regionally via an LID Tracker Tool, built by the San Francisco Estuary Institute to be compatible with other GIS-based software programs. Additionally, this Action now explores creative ways to fund stormwater infrastructure projects, such as an in-lieu alternative compliance that can provide funding for both capital implementation and long-term operations of multi-benefit Green Stormwater Infrastructure, and result in projects that provide a net environmental benefit or equivalent or increased water quality benefits.

**Climate Change Considerations**
Climate change will bring more extreme weather events to the Estuary, causing periods of drought and periods of intense precipitation. GSI/LID installations can distribute runoff into inlets over a longer period of time, helping reduce flooding caused by overwhelmed stormwater systems.

**Equity Considerations**
GSI/LID techniques often improve community aesthetics and create more pedestrian friendly spaces, which are needed in many underserved communities. However, these projects can also raise property values and lead to green gentrification, further exacerbating displacement in communities already vulnerable to hot real estate markets.

**Connections to Other Actions**
The use of GSI/LID to prevent water pollution and flooding hazards closely connects this action with:

- **A1: Climate Resilience**
- **A2: Equity**
- **A3: Adaptation Planning**
- **A4: Adaptation Implementation**
- **A18: Recycled Water**
- **A20: Nutrients**
- **A21: Emerging Contaminants**
- **A22: Health Risks of Contaminants**

---

**Cost Estimate Key**

- **$ - Up to $100,000**
- **$ - Up to $1 million**
- **$ - Up to $10 million**
- **$ - Up to $100 million**
- **$ - Over $100 million**
Advance nutrient management in the Estuary.

Support water quality investigations, consistent monitoring and modeling, and analysis of management alternatives for nutrients, along with disseminating public-facing outreach materials on resulting data and management decisions.

**TASK 20-1**

Ensure the continuation of a long-term monitoring and modeling program of nutrient-related indicators in San Francisco Bay through the San Francisco Bay Regional Water Quality Control Board's Nutrient Management Strategy and program partnerships, and in the Delta through the U.S. Geological Survey and interagency Ecological Program.

**MILESTONE**

Funding for long-term monitoring and modeling program renewed at sustainable levels, and additional funding sources investigated.

**COST ESTIMATE** – $$

**TASK 20-2**

Implement and iterate the Science Plan and Nutrient Assessment Framework of the San Francisco Bay Nutrient Management Strategy to establish the status and trends of nutrient indicators and quantitatively inform San Francisco Bay’s response to nutrient loading.

**MILESTONE**

Completed round of modeling and synthesis studies and final version of the Assessment Framework developed by 2024 to inform future permits and other management actions.

**COST ESTIMATE** – $$$

**TASK 20-3**

Undertake studies in the Estuary related to developing and evaluating alternatives for nutrient management actions, including initial considerations of costs and environmental effects.

**MILESTONE**

Evaluation of opportunities completed to manage nutrient loading via nature-based solutions and recycled water.

**COST ESTIMATE** – -$

**TASK 20-4**

Disseminate information to decision-makers and the public regarding the status and trends of nutrient-related indicators and research findings, as well as the opportunities, constraints, and costs associated with various nutrient load management strategies.

**MILESTONE**

Outreach materials related to the status and trends of crucial nutrient indicators shared via an annually updated web-based portal and public-facing syntheses of research findings shared annually.

**COST ESTIMATE** – $$

**TASK 20-5**

Develop a framework for monitoring, modeling, and disseminating information on the extent, severity, and impacts of Harmful Algal Blooms (HABs) in the Delta.

**MILESTONE**

HABs framework for the Delta.

**COST ESTIMATE** – $-

**Cost Estimate Key**

$ - Up to $100,000

$-$ - Up to $1 million

$$-$ - Up to $10 million

$$$$-$ - Over $100 million

**Overview**

Excess levels of nutrients, such as nitrogen and phosphorus, can cause problems like algae blooms and oxygen levels that are too low to support diverse native fish communities. Historically, the San Francisco Bay has not experienced the adverse effects of nutrient loading even though it is nutrient-enriched compared to other estuaries. However, widespread nutrients affect Suisun and San Pablo Bays, which highlights the need for a holistic understanding of nutrient dynamics throughout the entire Estuary. Thus, robust long-term monitoring and continuing investigations must inform nutrient management.

**Updates and Emerging Issues**

Since 2016, the San Francisco Bay Nutrient Management Strategy has been established as a joint fact-finding initiative. Looking forward to 2027, permits will be revised to incentivize nutrient reduction strategies before nutrients reach wastewater treatment plants. Future priorities must include increasing the funding pool across a wider range of sources, ensuring diverse engagement from communities as nutrient reduction strategies emerge, and continuing to study nutrient dynamics across the entire Estuary to identify the most appropriate set of management needs.

**Climate Change Considerations**

Scientists believe warming oceans are causing a cascade of changes with a nexus to nutrients. These changes include increased upwelling of nutrient-rich waters, phytoplankton production, ocean acidification, harmful algae blooms, and hypoxia. In shallower portions of the Bay, fish will become less resilient to low dissolved oxygen levels as temperatures increase. Looking to the 2027 update, a Task researching the potential for wastewater-borne nutrients to exacerbate climate change impacts may be needed. Current Tasks focus on preliminary research on the effects of nutrient loading on the Estuary.

**Equity Considerations**

Successful nutrient management will enable ongoing access to surface waters that support subsistence fishing and cultural uses, promote multi-benefit water quality projects to increase access to green infrastructure and open space, and increase job opportunities in the wastewater sector. To ensure this vision, regional decision-makers must engage diverse communities in more accessible and appropriate ways as shoreline resilience and nutrient management efforts emerge. Wastewater treatment upgrades and climate adaptation measures will affect historically low-income communities close to treatment facilities, and managers have increasingly recognized the need to engage communities traditionally excluded from decision-making processes.

**Connections to Other Actions**

Factors related to nutrient management in the Estuary connect this action to:

- A1: Climate Resilience
- A2: Equity
- A3: Adaptation Planning
- A4: Adaptation Implementation
- A15: Invasive Species
- A16: Freshwater Flows
- A18: Recycled Water
- A21: Emerging Contaminants
- A22: Health Risks of Contaminants
- A24: Public Access
Address emerging contaminants in the Estuary’s waters.

Advance action plans for specific contaminants of emerging concern (CECs), and the associated Regional Monitoring Program (RMP) CECs monitoring strategy. Support and expand existing education and public outreach and other pollution prevention efforts to reduce CECs.

**TASK 21-1**

Review and update the San Francisco Bay Regional Monitoring Program contaminants of emerging concern (CEC) and microplastics monitoring strategies every two years. Develop management-relevant information to support selection and implementation of management measures addressing CECs and microplastics by the Department of Toxic Substances Control (DTSC) and the San Francisco Bay Regional Water Quality Control Board.

**MILESTONE**

Updated RMP monitoring strategies every two years with distribution of associated management-relevant information.

**COST ESTIMATE** – $$

**TASK 21-2**

Reduce pesticides coming into the Estuary, particularly from pet flea and tick control products by supporting and working with the Department of Pesticide Regulation and veterinarians.

**MILESTONE**

At least one pesticide-reduction management measure implemented.

**COST ESTIMATE** – $$_$$

**TASK 21-3**

Support statewide efforts to address microplastic pollution by providing management-relevant information to the Ocean Protection Council, the Department of Toxic Substances Control, and other agency partners to support management actions.

**MILESTONE**

Management-relevant information to support two management actions.

**COST ESTIMATE** – $$$_$$

**TASK 21-4**

Support the Department of Toxic Substances Control’s (DTSC) Safer Consumer Products Program’s efforts to reduce CECs like PFAS (Per- and polyfluoroalkyl substances: stain and water repelling chemicals widely used in industrial and consumer products) and ethoxylated surfactants found in cleaning products and detergents to protect people (e.g., fish consumers) and the Bay ecosystem by providing management-relevant information, and through local implementation of measures to promote safer alternatives (e.g., purchasing preferences).

**MILESTONE**

Management-relevant information provided to support two management actions.

**COST ESTIMATE** – $$$_$$

---

**Overview**

Over 100,000 chemicals have been registered or approved for commercial use in the United States; however, the lack of complete information about these chemicals limits the ability of scientists to assess their potential risk. Contaminants of Emerging Concern (CECs) have the potential to harm people and wildlife, and have not yet been adequately addressed through regulation. In the San Francisco Estuary, a tiered, risk-based approach is used to classify CECs as high, moderate, or low concern, with an additional category of possible concern where risks are uncertain or unknown.

**Updates and Emerging Issues**

Since 2016, the Estuary’s Regional Monitoring Program has classified microplastics and key plastic ingredients, two common ant, termite, and flea pesticides, and per- and polyfluoroalkyl substances (PFAS) as contaminants of moderate concern for the Estuary. This Action continues to monitor and research CECs and their potential impacts on the Estuary. Looking forward to 2027, pesticides related to pet products are anticipated to become a bigger issue.

**Climate Change Considerations**

CECs can be mobilized from the soil due to sea level rise, and leach into groundwater supplies. While the Regional Monitoring Program and the San Francisco Estuary Institute track CECs, the effects of climate change on high-risk locations have yet to be identified. Task 1-8 will be a first step in studying the potential influence of rising sea level on contaminated sites around Bay margins.

**Equity Considerations**

Frontline, disadvantaged, underserved, and Tribal communities carry the highest risk of exposure to CECs due to their proximity to contaminated lands and practices such as subsistence fishing.

**Connections to Other Actions**

CECs negatively and inequitably impact water quality and public health; thus, this Action is closely related to:

- A2: Equity
- A18: Recycled Water
- A19: Stormwater Management
- A20: Nutrients
- A22: Health Risks of Contaminants
Reduce human health risks due to legacy contaminants and contaminants in fish.
Addresses legacy contaminants and contaminants in fish and health risks related to fish consumption, and cultural and traditional uses. Support underserved and disadvantaged communities and Tribes’ efforts to collect toxic site and fish consumption data and to implement projects to mitigate health impacts.

**TASK 22-1**
Collaborate with Tribes and subsistence fishing communities to acknowledge the importance of Tribal cultural and traditional uses of water as well as subsistence fishing, and designate Tribal Tradition and Culture, Tribal Subsistence Fishing, and Subsistence Fishing Beneficial uses of water bodies in the San Francisco Bay Region.

**MILESTONE**
San Francisco Bay Regional Water Quality Control Board’s Basin Plan amended to designate additional Beneficial uses.

**COST ESTIMATE – $**

**TASK 22-2**
Partner with community-based organizations to collect information on subsistence fishing in the Estuary, focusing on disadvantaged and underserved communities, to develop an understanding of health risks and how stakeholder values, and cultural, recreational, natural resource, and agricultural uses vary geographically and across demographics.

**MILESTONE**
Funding secured for community-based organizations to collect data on subsistence fishing practices and consumption in at least two communities in the San Francisco Estuary.

**COST ESTIMATE – $**

**TASK 22-3**
Conduct thorough fish monitoring in the locations where communities with high rates of consumption collect fish from the Bay. Analyze the species they consume and the pollutants that they are concerned about. Coordinate this monitoring with the consumption survey work of Task 22-2 in partnership with community-based organizations.

**MILESTONE**
Fish contamination in priority locations identified and monitored in at least two communities in the San Francisco Estuary.

**COST ESTIMATE – $$$**

**TASK 22-4**
Develop Advisory Tissue Levels for one or more chemicals found in San Francisco Estuary fish, such as PFAS (per- and polyfluoralkyl substances) chemicals.

**MILESTONE**
Advisory Tissue Levels developed for one or more chemicals and, as appropriate, fish advisories for specific water bodies (e.g., the Delta or San Francisco Bay) within the San Francisco Bay Estuary System.

**COST ESTIMATE – $**

**TASK 22-5**
Work with regulators and frontline, underserved, or disadvantaged communities to collect information on community-identified and -prioritized potential toxic water quality sites not listed on regulatory lists for cleanup.

**MILESTONE**
Develop community-based toxic sites maps under the guidance of at least three frontline, underserved, and/or disadvantaged communities around the Estuary in partnership with regulatory agencies.

**COST ESTIMATE – $**

**TASK 22-6**
Use the results of community-based toxic sites mapping to produce an updated and prioritized list of toxic sites, including the status of sediment quality and indicators of bioaccumulation associated with fish consumption warnings, to inform management needs.

**MILESTONE**
Updated and prioritized known toxic sites lists, including community-identified toxic sites, to inform management needs.

**COST ESTIMATE – $**

---

**Overview**
Organisms living in or near the Estuary can absorb contaminants in the water, such as mercury, polychlorinated biphenyls (PCBs), and per-/polyfluoroalkyl substances (PFAS). In a food web, contaminants become more and more concentrated as predators consume prey and accumulate contaminants through their diet. The concentration of contaminants in fish can make them unsafe for human consumption in the Estuary, and can disproportionately impact Tribal, disadvantaged, and underserved communities that fish for cultural and subsistence purposes.

**Updates and Emerging Issues**
Since 2016, this Action has shifted to addressing water quality from a habitat-centric approach (Total Maximum Daily Loads, or TMDLs) to a human-centric approach (exposure to hazardous levels of contaminants by subsistence fishers).

**Climate Change Considerations**
With sea level rise and, in some areas, associated groundwater rise, contaminants from current and former industrial sites along the Bay margins may be mobilized in groundwater or leach into the Estuary. Task 1-8 will be a first step in studying the potential influence of rising sea level on contaminated sites around Bay margins.

**Equity Considerations**
Some contaminants may be more concentrated in waters near former industrial sites, disproportionately affecting communities that fish for subsistence or cultural purposes, including communities of color and lower income residents, and Tribes. In addition, Tribes feel strongly that a Tribal Beneficial use designation is appropriate for all watersbodies throughout the Estuary, on the basis of widespread and varied Tribal traditional use of Estuary waterbodies since time immemorial.

**Connections to Other Actions**
The contamination of fish negatively and inequitably impacts public health, and is closely related to water quality; thus, this Action is connected to:

- A2: Equity
- A18: Recycled Water
- A19: Stormwater Management
- A20: Nutrients
- A21: Emerging Contaminants
- A24: Public Access
Action 23: Trash

**Reduce trash and marine debris in the Estuary.**

Support regional municipalities and agencies in attaining trash reduction objectives by assisting in source reduction activities. Prevent and remove abandoned and derelict vessels (ADVs) as a source of marine debris and develop new indicators and metrics for tracking trash.

**GOALS**

- Resilience
- Water
- Stewardship

### TASK 23-1

Continue partnerships with municipalities, counties, pollution prevention organizations, and other stakeholders to research and implement effective extended producer responsibility (EPR) strategies or bans for items such as plastic products, microplastics, and tobacco products in the Estuary.

**MILESTONE**

New bans or extended producer responsibility (EPR) strategies such as reduction ordinances based on recommendations (i.e., source control).

**COST ESTIMATE – $**

### TASK 23-2

Develop an indicator based on regionally meaningful metrics of trash in the Estuary and its watersheds for use in the State of the Estuary report.

**MILESTONE**


**COST ESTIMATE – $**

### TASK 23-3

Advance new or modified statutory authority to prevent abandoned and derelict vessels (ADVs), potentially pertaining to registration requirements, insurance requirements, and resale restrictions for recreational and commercial vessels, and seek funding for removal of ADVs such as time of purchase fees or insurance requirements.

**MILESTONE**

Findings and recommendations report released by inter-agency U.S. Coast Guard Abandoned and Derelict Vessel Subgroup, for use by state and local agencies and legislators.

**COST ESTIMATE – $**

### TASK 23-4

Control trash discharges from municipal storm drain systems to the Estuary and its tributaries through implementation of trash capture systems or other equivalent controls in accordance with the San Francisco Bay Municipal Regional Stormwater Permit and the Statewide Water Quality Control Plans forTrash.

**MILESTONE**

Complete implementation of full trash capture systems or other equivalent controls by municipalities subject to the San Francisco Bay Municipal Regional Stormwater Permit and 40 percent implementation by other municipalities.

**COST ESTIMATE – $**

---

**Cost Estimate Key**

- $ - Up to $100,000
- $$ - Up to $1 million
- $$$ - Up to $10 million
- $$ - Over $10 million
Provide equitable public access and recreational opportunities compatible with wildlife.

Provide Estuary-oriented and upper watershed access to open space that avoids adverse impacts to sensitive habitats and wildlife while providing buffers to climate change impacts and accommodating equitable access and cultural uses, environmental education, biking, commuting, hiking, paddling, wildlife viewing, and other activities. These opportunities will increase citizen and decision-maker appreciation of the value of natural resources, and foster support for Estuary protection and restoration.

**TASK 24-1**

Add to the San Francisco Bay Trail, closing critical gaps in the main alignment (the “spine”) that links the shoreline of all nine Bay Area counties, while avoiding adverse effects on sensitive resources and wildlife.

**MILESTONE**

18 miles of new trail segments to the Bay Trail Spine.

**COST ESTIMATE** – $$$$

**TASK 24-2**

Add to the San Francisco Bay Area Water Trail, creating or enhancing high quality public water access and paddle-in camping opportunities. Access should be designed to avoid adverse impacts to sensitive resources and wildlife.

**MILESTONE**

Six (with two specifically in the Suisun Marsh area) new or enhanced San Francisco Bay Area Water Trail sites, including two new or enhanced kayak-in campgrounds.

**COST ESTIMATE** – $$

**TASK 24-3**

Advance the consideration of equity and resilience within parks and open space planning efforts through development of two new Bay Area Greenprint modules using Geographic Information System (GIS)-based analytics and tools.

**MILESTONE**

Resilience and Equity Modules for Bay Area GreenPrint released.

**COST ESTIMATE** – $ 

**TASK 24-4**

Track progress towards increasing quality and quantity of shoreline and upper watershed open spaces for habitat health and connectivity, reduced carbon emissions, improved air quality, and other climate change benefits, and multiple public uses including recreational, cultural, religious, and stewardship uses.

**MILESTONE**

Revised shoreline open space indicator and new riparian corridor indicator for the State of the Estuary Report.

**COST ESTIMATE** – $$

**Overview**

The Estuary provides unique opportunities for recreational and educational experiences due to its vital role in providing refuge, forage, and nesting habitat for wildlife. Public access to the Estuary’s natural resources inspires people to take an active interest in Estuary protection and restoration efforts, however, public access can also have adverse effects on wildlife and habitats if it is not sited, designed, and managed responsibly.

**Updates and Emerging Issues**

Since 2016, this Action has updated its Milestones for the San Francisco Bay Trail and the San Francisco Bay Area Water Trail.

**Climate Change Considerations**

This Action supports efforts to avoid adverse impacts to habitat and wildlife while supporting public access to open space. Looking to the future, rising sea levels may decrease acreage of open space for both wildlife and public access, and this Action will need to balance public access against adverse impacts to wildlife habitat.

**Equity Considerations**

This Action recognizes that public access to open space is not equitable for all populations and seeks to consider equity modules in local open space planning efforts. Additionally, this Action now considers the use of open space for cultural and religious purposes and acknowledges its positive effect on public health.

**Connections to Other Actions**

Public access to open space plays an important role in cultivating diverse and active stewardship of the Estuary. Consequently, this Action is closely connected to:

A1: Climate Resilience
A2: Equity
A3: Adaptation Planning
A4: Adaptation Implementation
A5: Watershed Connections
A8: Wetland Monitoring
A10: Tidal Marsh
A12: Managed Wetlands
A14: Creeks
A25: Champion the Estuary
Champion the Estuary.

Educate partners, stakeholders, national, local, and regional leaders, and other targeted audiences about the priorities in the Estuary Blueprint. Provide local decision-makers, the public, and youth with the kind of reliable information necessary to make policy and personal decisions in favor of Estuary health.

**TASK 25-1**

Update and advance implementation of the Estuary Partnership’s Strategic Communications Plan, leveraging existing platforms and partnerships to increase awareness of and engagement in the goals of the Estuary Blueprint.

**MILESTONE**

Update and fund the Strategic Communications Plan.

**COST ESTIMATE** – $$

**TASK 25-2**

Provide the latest information on the science and management of the Estuary and advance integrated conferences that span the Estuary.

**MILESTONE**

Annual conferences that focus on the San Francisco Estuary.

**COST ESTIMATE** – $$$

**TASK 25-3**

Provide current information on the health of the Estuary and results of management approaches by periodically updating the State of the Estuary Report.

**MILESTONE**

Updated State of the Estuary Report.

**COST ESTIMATE** – $$

**TASK 25-4**

Support and expand Estuary-oriented outreach and education programs provided by local and community-based organizations, either through direct funding, by developing materials, or through other tools to be identified in collaboration with existing programs.

**MILESTONE**

Existing or new outreach and education programs expanded to reach 500 new participants.

**COST ESTIMATE** – $$

Overview

The future of the Estuary depends on support from diverse, engaged audiences. Support can be cultivated through place-based environmental education and outreach in Estuary watersheds. The San Francisco Estuary Partnership is actively developing, expanding, and funding public engagement initiatives to increase support for the restoration and protection of the San Francisco Estuary.

Updates and Emerging Issues

Since 2016, this Action has shifted away from a focus on the Estuary Blueprint itself and toward support for the Estuary as a whole. The Action has been updated to include Tasks on K-12 outreach and education, with particular emphasis on climate change.

Climate Change Considerations

Communicating the urgency of the climate crisis to current and future audiences can garner support for a healthy, resilient Estuary and can foster greater participation in Estuary Blueprint priorities.

Equity Considerations

Estuary-oriented outreach and education programs are most effectively conducted by local and community-based organizations, which have established trust and relationships in the communities they serve. While providing resources to these organizations, the San Francisco Estuary Partnership must consider dimensions of equity to appropriately prioritize and allocate resources.

Connections to Other Actions

Championing the Estuary connects this Action to all Actions in the Estuary Blueprint. However, this Action is most directly related to:

A2: Equity

A24: Public Access
### Table 2. Task Leads and Collaborating Partners for Estuary Blueprint Actions

<table>
<thead>
<tr>
<th>ACTION</th>
<th>TASK</th>
<th>TASK LEAD(S)</th>
<th>COLLABORATING PARTNERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Climate Resilience</td>
<td>1-1</td>
<td>San Francisco Bay Conservation &amp; Development Commission</td>
<td>Bay Area Climate Adaptation Network, Bay Area Regional Collaborative, California Department of Transportation, California State Coastal Conservancy, Delta Conservancy, Delta Stewardship Council, Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Bay Regional Coastal Hazards Adaptation Resiliency Group (CHARG), San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute, San Francisco Estuary Partnership, U.S. Army Corps of Engineers, community-based organizations, environmental organizations, local jurisdictions</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>Delta Stewardship Council</td>
<td>Delta Conservancy, San Francisco Estuary Institute, San Francisco Estuary Partnership, U.S. Army Corps of Engineers, community-based organizations, environmental organizations, local jurisdictions</td>
</tr>
<tr>
<td></td>
<td>1-3</td>
<td>Bay Area Climate Adaptation Network, NorCal Resilience Network, San Francisco Bay Regional Water Quality Control Board, community-based organizations</td>
<td>Bay Area Regional Collaborative, California State Coastal Conservancy, Delta Stewardship Council, Metropolitan Transportation Commission and Association of Bay Area Governments, National Oceanic and Atmospheric Administration - Fisheries, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Partnership, West Oakland Environmental Indicators Project, local jurisdictions</td>
</tr>
<tr>
<td></td>
<td>1-4</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>Bay Area Council, Sierra Club California, regulatory agencies</td>
</tr>
<tr>
<td></td>
<td>1-5</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>Bay Area Climate Adaptation Network, Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute, San Francisco Estuary Partnership, U.S. Army Corps of Engineers, community-based organizations, environmental organizations, local jurisdictions</td>
</tr>
<tr>
<td></td>
<td>1-6</td>
<td>San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute</td>
<td>Local jurisdictions</td>
</tr>
<tr>
<td></td>
<td>1-7</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Estuary Partnership, local jurisdictions</td>
<td>Bay Area Climate Adaptation Network, Bay Area Regional Collaborative, California State Coastal Conservancy, Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute, Strategic Growth Council</td>
</tr>
<tr>
<td></td>
<td>1-8</td>
<td>Pathways Climate Institute, San Francisco Estuary Institute, University of California-Berkeley</td>
<td>San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, Counties</td>
</tr>
<tr>
<td>2 Equity</td>
<td>2-1</td>
<td>San Francisco Bay Conservation &amp; Development Commission in coordination with Bay Area-based organizations, San Francisco Bay Conservation &amp; Development Commission’s Environmental Justice (EJ) Advisors, and regional partners</td>
<td>Bay Area Climate Adaptation Network, Bay Area Regional Health Inequities Initiative, Delta Stewardship Council, San Francisco Bay Regional Water Quality Control Board, community-based organizations, interested Bay Area counties</td>
</tr>
<tr>
<td></td>
<td>2-2</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>Audubon California, California State Coastal Conservancy, San Francisco Bay Restoration Authority, non-governmental organizations, other grantmaking institutions, regulatory agencies</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission</td>
<td>California Department of Fish &amp; Wildlife, California Department of Water Resources, San Francisco Bay Regional Water Quality Control Board, University of California-Davis</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>California Indian Environmental Alliance (CIEA), San Francisco Estuary Partnership (Coordinator), Tribes</td>
<td>California State Coastal Conservancy, Centers for Disease Control and Prevention, Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Bay Conservation &amp; Development Commission</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>3 Adaptation Planning</td>
<td><strong>3-1</strong> Bay Area Climate Adaptation Network, Bay Area Regional Collaborative</td>
<td>California Department of Water Resources, California State Coastal Conservancy, Metropolitan Transportation Commission and Association of Bay Area Governments, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Restoration Authority, San Francisco Estuary Partnership, U.S. Army Corps of Engineers, community-based organizations, local jurisdictions</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-2</strong> Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Bay Conservation &amp; Development Commission</td>
<td>Bay Area Climate Adaptation Network, Bay Area Regional Collaborative, California State Coastal Conservancy, Delta Stewardship Council, National Oceanic and Atmospheric Administration, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Water Quality Control Board, San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-3</strong> San Francisco Estuary Partnership (Coordinator)</td>
<td>Audubon California, California Department of Fish &amp; Wildlife, Central Valley Regional Water Quality Control Board, Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, U.S. Fish &amp; Wildlife Service</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-4</strong> San Francisco Bay Restoration Regulatory Integration Team (BRRIT) Policy Management Committee</td>
<td>Project Implementers</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-5</strong> Metropolitan Transportation Commission and Association of Bay Area Governments</td>
<td>California State Coastal Conservancy, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Partnership, local jurisdictions</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-6</strong> Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Bay Conservation &amp; Development Commission</td>
<td>California State Coastal Conservancy, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Restoration Authority, San Francisco Estuary Partnership</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3-7</strong> Metropolitan Transportation Commission and Association of Bay Area Governments</td>
<td>Local jurisdictions</td>
<td></td>
</tr>
<tr>
<td>4 Adaptation Implementation</td>
<td><strong>4-1</strong> San Francisco Estuary Partnership (Coordinator)</td>
<td>Audubon California, California Department of Fish &amp; Wildlife, California State Coastal Conservancy, Central Valley Regional Water Quality Control Board, Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Restoration Authority, U.S. Army Corps of Engineers, U.S. Fish &amp; Wildlife Service</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>4-2</strong> San Francisco Estuary Partnership (Coordinator)</td>
<td>California Department of Fish &amp; Wildlife, California State Coastal Conservancy, Central Valley Regional Water Quality Control Board, Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Restoration Authority, U.S. Army Corps of Engineers, U.S. Fish &amp; Wildlife Service</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>4-3</strong> California State Coastal Conservancy</td>
<td>Audubon California, California Department of Fish &amp; Wildlife, National Oceanic and Atmospheric Administration, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Estuary Institute, San Francisco State University Estuary &amp; Ocean Science Center, Smithsonian Environmental Research Center, U.S. Fish &amp; Wildlife Service</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>4-4</strong> San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute</td>
<td>California State Coastal Conservancy, San Francisco Bay Regional Water Quality Control Board, Metropolitan Transportation Commission and Association of Bay Area Governments</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>4-5</strong> San Francisco Estuary Partnership</td>
<td>Central Valley Regional Water Quality Control Board, Delta Stewardship Council, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute, local jurisdictions</td>
<td></td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>5 Watershed Connections</td>
<td>5-1</td>
<td>San Francisco Estuary Institute, local watershed management agencies</td>
<td>California Department of Fish &amp; Wildlife, California Department of Water Resources, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, Santa Clara Valley Water District, State Water Resources Control Board, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td></td>
<td>5-2</td>
<td>San Francisco Estuary Institute</td>
<td>Delta Stewardship Council, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Partnership</td>
</tr>
<tr>
<td></td>
<td>5-3</td>
<td>San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td>Bay Area Flood Protection Agencies Association, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Regional Coastal Hazards Adaptation Resiliency Group (CHARG), San Francisco Bay Regional Water Quality Control Board</td>
</tr>
<tr>
<td></td>
<td>5-4</td>
<td>Marin Department of Public Works Engineering Sea Level Rise Program (E-SLR)</td>
<td>California State Coastal Conservancy, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute, San Francisco Estuary Partnership, Santa Clara Valley Water District</td>
</tr>
<tr>
<td></td>
<td>6-3</td>
<td>San Francisco Bay Regional Water Quality Control Board</td>
<td>California State Coastal Conservancy, Centers for Disease Control and Prevention, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute, U.S. Environmental Protection Agency, U.S. Fish &amp; Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>6-4</td>
<td>San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute</td>
<td>San Francisco Bay Joint Venture, San Francisco Bay Regional Water Quality Control Board, U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td></td>
<td>6-5</td>
<td>California State Coastal Conservancy, San Francisco Bay Conservation &amp; Development Commission</td>
<td>San Francisco Estuary Partnership, U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td></td>
<td>6-7</td>
<td>Delta Stewardship Council</td>
<td>San Francisco Estuary Institute</td>
</tr>
<tr>
<td>7 Carbon Management</td>
<td>7-1</td>
<td>California Department of Water Resources, Delta Conservancy</td>
<td>Delta Stewardship Council, Ducks Unlimited</td>
</tr>
<tr>
<td></td>
<td>7-3</td>
<td>Delta Conservancy, Delta Stewardship Council</td>
<td>American Carbon Registry</td>
</tr>
<tr>
<td></td>
<td>7-4</td>
<td>California State Coastal Conservancy, San Francisco State University Estuary &amp; Ocean Science Center</td>
<td>California Ocean Protection Council, San Francisco Estuary Partnership, U.S. Geological Survey</td>
</tr>
<tr>
<td></td>
<td>7-5</td>
<td>San Francisco Bay National Estuarine Research Reserve</td>
<td>California State University East Bay, Delta Stewardship Council, U.S. Geological Survey, University of California-Berkeley</td>
</tr>
<tr>
<td></td>
<td>7-6</td>
<td>California Department of Water Resources, Delta Conservancy</td>
<td>American Carbon Registry, California State University East Bay, California Air Resources Board</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>8-2</td>
<td>San Francisco Estuary Institute</td>
<td>WRMP Steering Committee and WRMP Technical Advisory Committee</td>
</tr>
<tr>
<td></td>
<td>8-4</td>
<td>San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td>WRMP Steering Committee and WRMP Technical Advisory Committee</td>
</tr>
<tr>
<td></td>
<td>8-5</td>
<td>Delta Stewardship Council, San Francisco Bay National Estuarine Research Reserve, San Francisco Estuary Institute, San Francisco Estuary Partnership, WRMP Technical Advisory Committee Chair &amp; Vice Chair</td>
<td>WRMP Steering Committee and WRMP Technical Advisory Committee</td>
</tr>
<tr>
<td>9 Intertidal/Subtidal Habitats</td>
<td>9-1</td>
<td>Audubon California, San Francisco State University Estuary &amp; Ocean Science Center</td>
<td>California Department of Fish &amp; Wildlife, Merkel &amp; Associates, National Oceanic and Atmospheric Administration, Ocean Protection Council, San Francisco Bay Joint Venture</td>
</tr>
<tr>
<td></td>
<td>9-2</td>
<td>California State Coastal Conservancy</td>
<td>California Department of Fish &amp; Wildlife, National Oceanic and Atmospheric Administration, San Francisco Bay Joint Venture, San Francisco State University Estuary &amp; Ocean Science Center, Smithsonian Environmental Research Center, U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td></td>
<td>9-3</td>
<td>California State Coastal Conservancy</td>
<td>National Oceanic and Atmospheric Administration, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Restoration Authority, San Francisco State University Estuary &amp; Ocean Science Center, Smithsonian Environmental Research Center</td>
</tr>
<tr>
<td></td>
<td>9-4</td>
<td>California State Coastal Conservancy</td>
<td>California Department of Fish and Wildlife, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Estuary Institute, San Francisco State University Estuary &amp; Ocean Science Center, State Water Resources Control Board, U.S. Army Corps of Engineers, U.S. Fish &amp; Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>9-5</td>
<td>California State Coastal Conservancy</td>
<td>California Department of Fish &amp; Wildlife, National Oceanic and Atmospheric Administration, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco State University Estuary &amp; Ocean Science Center, Smithsonian Environmental Research Center, U.S. Fish &amp; Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>9-6</td>
<td>California State Coastal Conservancy</td>
<td>California Department of Fish &amp; Wildlife, National Oceanic and Atmospheric Administration, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco State University Estuary &amp; Ocean Science Center, Smithsonian Environmental Research Center, U.S. Fish &amp; Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>9-7</td>
<td>California Department of Fish &amp; Wildlife, San Francisco Bay Joint Venture</td>
<td>California State Coastal Conservancy, San Francisco Estuary Institute, San Francisco State University Estuary &amp; Ocean Science Center</td>
</tr>
<tr>
<td>10 Tidal Marsh</td>
<td>10-1</td>
<td>California EcoRestore, San Francisco Bay Joint Venture</td>
<td>San Francisco Bay National Estuarine Research Reserve, restoration community including government agencies, non-profit organizations, and private entities</td>
</tr>
<tr>
<td></td>
<td>10-2</td>
<td>San Francisco Bay Joint Venture</td>
<td>Restoration community including government agencies, non-profit organizations, and private entities</td>
</tr>
<tr>
<td></td>
<td>10-3</td>
<td>San Francisco Bay Joint Venture</td>
<td>San Francisco Bay National Estuarine Research Reserve, restoration community including government agencies, non-profit organizations, and private entities</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Transition Zones</td>
<td>11-1 San Francisco Bay Joint Venture, San Francisco Estuary Partnership</td>
<td>San Francisco Bay National Estuarine Research Reserve, restoration community including government agencies, non-profit organizations, and private entities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-2 San Francisco Bay Joint Venture, San Francisco Estuary Partnership</td>
<td>San Francisco Bay National Estuarine Research Reserve, restoration community including government agencies, non-profit organizations, and private entities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-3 San Francisco Estuary Institute</td>
<td>Geospatial Workgroup and WRMP Technical Advisory Committee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-4 Central California Vegetation Managers’ Workgroup</td>
<td>Central California Vegetation Managers’ Workgroup (Novato Baylands Stewards; others), Point Blue’s Students and Teachers Restoring A Watershed (STRAW) Program, San Francisco Bay National Estuarine Research Reserve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-4 California State Coastal Conservancy</td>
<td>California Department of Fish &amp; Wildlife, California Waterfowl, Ducks Unlimited, Point Blue Conservation Science, San Francisco Bay Bird Observatory, Suisun Resource Conservation District, U.S. Fish &amp; Wildlife Service, U.S. Geological Survey, University of California-Davis, Yolo Basin Foundation</td>
</tr>
<tr>
<td>13</td>
<td>Seasonal Wetlands</td>
<td>13-1 San Francisco Bay Joint Venture</td>
<td>Natural Resources Conservation Service, Resource Conservation Districts, San Francisco Bay National Estuarine Research Reserve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13-3 Natural Resources Conservation Service, Resource Conservation Districts</td>
<td>San Francisco Bay Joint Venture, San Francisco Bay National Estuarine Research Reserve, San Francisco Estuary Partnership</td>
</tr>
<tr>
<td>14</td>
<td>Creeks</td>
<td>14-1 San Francisco Bay Joint Venture, San Francisco Estuary Partnership (Coordinator)</td>
<td>California Department of Fish &amp; Wildlife, Conservation Lands Network, Delta Plan Interagency Implementation Committee (DPIIC), National Oceanic and Atmospheric Administration, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute, Santa Clara Valley Water District, TOGETHER Bay Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-2 San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Partnership</td>
<td>Bay Area Flood Protection Agency Association, Bay Area Watershed Network, California Department of Fish &amp; Wildlife, Conservation Lands Network, National Oceanic and Atmospheric Administration, ReScape California, Resource Conservation Districts, TOGETHER Bay Area, U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-3 Delta Stewardship Council, San Francisco Estuary Partnership</td>
<td>California Department of Fish &amp; Wildlife, Conservation Lands Network, Delta Plan Interagency Implementation Committee (DPIIC), National Oceanic and Atmospheric Administration, Resource Conservation Districts, TOGETHER Bay Area, U.S. Army Corps of Engineers, flood control districts, land trusts, local municipalities, non-governmental organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-5 San Francisco Estuary Partnership (Coordinator)</td>
<td>Downtown Streets Team, city/county health services departments, homeless advocacy organizations, local non-governmental organizations</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>15-4</td>
<td>California Department of Fish &amp; Wildlife, California Invasive Plant Council, California State Coastal Conservancy’s Invasive Spartina Project, California State Lands Commission, California State Parks Division of Boating and Waterways, Central Valley Regional Water Quality Control Board, Delta Conservancy, Delta Stewardship Council, National Oceanic and Atmospheric Administration, San Francisco Bay National Estuarine Research Reserve, San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, U.S. Department of Agriculture, U.S. Environmental Protection Agency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Freshwater Flows</td>
<td>State Water Resources Control Board</td>
<td>California Department of Fish and Wildlife, National Oceanic and Atmospheric Administration, San Francisco Estuary Partnership, Tribes, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, non-governmental organizations, water agencies</td>
</tr>
<tr>
<td>16-2</td>
<td>The Bay Institute</td>
<td>National Oceanic and Atmospheric Administration, Virginia Institute of Marine Science</td>
<td></td>
</tr>
<tr>
<td>16-3</td>
<td>Tribes, California Indian Environmental Alliance</td>
<td>California Department of Water Resources, San Francisco Estuary Partnership, State Tribal Liaisons</td>
<td></td>
</tr>
<tr>
<td>16-4</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>California Indian Environmental Alliance, Delta Protection Commission, Tribes, fishing organizations, local universities or colleges, recreation organizations, tourist organizations</td>
<td></td>
</tr>
<tr>
<td>16-5</td>
<td>National Oceanic and Atmospheric Association</td>
<td>California Indian Environmental Alliance, San Francisco Baykeeper, The Nature Conservancy, Tribes, U.S. Environmental Protection Agency</td>
<td></td>
</tr>
<tr>
<td>16-6</td>
<td>San Francisco Estuary Partnership</td>
<td>Lower Columbia Estuary Partnership, Puget Sound Partnership, The Bay Foundation, Tillamook Estuaries Partnership, Tribes</td>
<td></td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>17</td>
<td>Water Conservation</td>
<td>17-1</td>
<td>Bay Area Regional Reliability (BARR) water agencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17-2</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17-3</td>
<td>ReScape California</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17-4</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17-5</td>
<td>Bay Area One Water Network</td>
</tr>
<tr>
<td>18</td>
<td>Recycled Water</td>
<td>18-1</td>
<td>San Francisco Estuary Partnership</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18-2</td>
<td>Bay Area Clean Water Agencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18-3</td>
<td>Bay Area Clean Water Agencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18-4</td>
<td>Santa Clara Valley Water District</td>
</tr>
<tr>
<td>19</td>
<td>Stormwater Management</td>
<td>19-1</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments, San Francisco Estuary Partnership</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-2</td>
<td>San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-3</td>
<td>City of San Pablo, City of Walnut Creek, Contra Costa County, Contra Costa Countywide Clean Water Program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19-4</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-2</td>
<td>Bay Area Clean Water Agencies, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-3</td>
<td>Bay Area Clean Water Agencies, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-4</td>
<td>Bay Area Clean Water Agencies, San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-5</td>
<td>Central Valley Regional Water Quality Control Board, Delta Stewardship Council, State Water Resources Control Board</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>21</td>
<td>21-1</td>
<td>San Francisco Bay Regional Water Quality Control Board, San Francisco Estuary Institute</td>
<td>Bay Area Clean Water Agencies’ Bay Area Pollution Prevention Group</td>
</tr>
<tr>
<td></td>
<td>21-2</td>
<td>Bay Area Clean Water Agencies’ Bay Area Pollution Prevention Group, California Department of Pesticide Regulations</td>
<td>Veterinarians</td>
</tr>
<tr>
<td></td>
<td>21-3</td>
<td>San Francisco Estuary Institute</td>
<td>California Department of Toxic Substances Control, Ocean Protection Council</td>
</tr>
<tr>
<td></td>
<td>21-4</td>
<td>San Francisco Estuary Institute</td>
<td>Bay Area Clean Water Agencies including member agencies</td>
</tr>
<tr>
<td>22</td>
<td>22-1</td>
<td>San Francisco Bay Regional Water Quality Control Board</td>
<td>Tribes, California Indian Environmental Alliance</td>
</tr>
<tr>
<td></td>
<td>22-2</td>
<td>San Francisco Estuary Institute (Coordinator)</td>
<td>All Positives Possible, California Indian Environmental Alliance, First Generation Environmental Health &amp; Economic Development, Greenaction for Health and Environmental Justice, National Oceanic and Atmospheric Administration, Tribes, other community-based organizations representing disadvantaged and underserved communities</td>
</tr>
<tr>
<td></td>
<td>22-3</td>
<td>San Francisco Estuary Institute</td>
<td>All Positives Possible, First Generation Environmental Health &amp; Economic Development, Greenaction for Health and Environmental Justice, and other community-based organizations</td>
</tr>
<tr>
<td></td>
<td>22-4</td>
<td>California Office of Environmental Health Hazard Assessment (OEHHA)</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td></td>
<td>22-5</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>All Positives Possible, California Department of Toxic Substances Control, First Generation Environmental Health &amp; Economic Development, Greenaction for Health and Environmental Justice, San Francisco Bay Regional Water Quality Control Board, U.S. Environmental Protection Agency, other community-based organizations representing disadvantaged and underserved communities</td>
</tr>
<tr>
<td></td>
<td>22-6</td>
<td>San Francisco Bay Regional Water Quality Control Board</td>
<td>All Positives Possible, California Indian Environmental Alliance, First Generation Environmental Health &amp; Economic Development, Greenaction for Health and Environmental Justice, San Francisco Estuary Partnership, Tribes, other community-based organizations representing disadvantaged and underserved communities</td>
</tr>
<tr>
<td>23</td>
<td>23-1</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>Bay Area Clean Water Agencies’ Bay Area Pollution Prevention Group, California Product Stewardship Council, San Francisco Bay Regional Water Quality Control Board, U.S. Environmental Protection Agency, and various municipalities</td>
</tr>
<tr>
<td></td>
<td>23-2</td>
<td>San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td>California Coastal Commission, San Francisco Bay Regional Water Quality Control Board, U.S. Environmental Protection Agency, and municipalities</td>
</tr>
<tr>
<td></td>
<td>23-3</td>
<td>San Francisco Bay Conservation &amp; Development Commission</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>23-4</td>
<td>San Francisco Bay Regional Water Quality Control Board</td>
<td>Local governments within the San Francisco Bay and the Estuary subject to the Statewide Water Quality Control Plan for Trash</td>
</tr>
<tr>
<td>24</td>
<td>24-1</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments</td>
<td>California State Coastal Conservancy, San Francisco Bay Conservation &amp; Development Commission, Bay area cities, counties, special districts, and non-profit organizations</td>
</tr>
<tr>
<td>ACTION</td>
<td>TASK</td>
<td>TASK LEAD(S)</td>
<td>COLLABORATING PARTNERS</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>-------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>24-2</td>
<td>Metropolitan Transportation Commission and Association of Bay Area Governments, California State Coastal Conservancy</td>
<td>California State Parks Division of Boating and Waterways, San Francisco Bay Conservation &amp; Development Commission, San Francisco Bay National Estuarine Research Reserve</td>
</tr>
<tr>
<td></td>
<td>24-3</td>
<td>San Francisco Estuary Partnership (Coordinator)</td>
<td>San Francisco Bay National Estuarine Research Reserve, The Nature Conservancy</td>
</tr>
<tr>
<td></td>
<td>24-4</td>
<td>San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td>San Francisco Bay National Estuarine Research Reserve, Tribes, community-based organizations</td>
</tr>
<tr>
<td>25 Champion the Estuary</td>
<td>25-1</td>
<td>San Francisco Estuary Partnership</td>
<td>Estuary NEWS Magazine, San Francisco Bay Joint Venture, Metropolitan Transportation Commission and Association of Bay Area Governments</td>
</tr>
<tr>
<td></td>
<td>25-2</td>
<td>Delta Stewardship Council, San Francisco Estuary Partnership</td>
<td>Conference planning partners and attendees</td>
</tr>
<tr>
<td></td>
<td>25-3</td>
<td>Delta Stewardship Council, San Francisco Estuary Institute, San Francisco Estuary Partnership</td>
<td>Scientific agencies and organizations, academia</td>
</tr>
<tr>
<td></td>
<td>25-4</td>
<td>San Francisco Estuary Partnership</td>
<td>Community-based organizations offering outreach and education programs</td>
</tr>
</tbody>
</table>
The 2022 Estuary Blueprint recognizes the connection between healthy, thriving communities and a healthy, resilient Estuary. It goes further than previous versions to elevate equity to a priority concern for the present and future.

The Estuary Blueprint update anticipates the disproportionate impacts of climate change on vulnerable, underserved, and marginalized communities, especially those that are non-White, non-native English speakers, elderly, poor, chronically ill, uninsured, and/or renters. Program leaders and partners acknowledge the subjugation, near decimation, and unjust theft of land from Indigenous peoples, the redlining and pollution of Black and other non-White communities, and the prolonged underinvestment and lack of accountability by government agencies and environmental groups. The 2022 Estuary Blueprint reflects upon and seeks to understand its place, and act towards ameliorating decades of mistrust, discrimination, and wrongdoing.

The Equity action in the 2022 Estuary Blueprint aims to promote environmental equity in the San Francisco Estuary region in concurrent, complementary ways. Equity is both integrated in actions throughout the Estuary Blueprint, and explicitly featured as its own action. This deliberate decision recognizes that if equity is not prioritized in our work, it will fail to the wayside and perpetuate an inequitable status quo. It also recognizes the need for broader stakeholder representation at the planning table in earlier phases of development. It seeks to prioritize the needs of those that have been marginalized from previous adaptation and other regional environmental planning processes and those that have historically lacked the ability to participate due to systemic and institutional barriers.

Second, Blueprint actions recognize that the region is on the cusp of scaling up and more connected nature-based adaptation projects. Those spearheading nature-based projects and living shorelines are moving beyond pilots to proposals for whole groups of projects that can be permitted all at once, rather than project by project.

To support this push, the Blueprint aims to make the process of creating these adaptation projects more timely and less onerous. Actions and tasks include facilitation of interagency coordination on permitting, help desks offering technical support, and incentives and funding for nature-based approaches to adaptation. They also recommend a serious review of existing regional, state and federal policies and priorities for conservation of natural lands and hazard response. Building more resilience to a climate-changed future may require policy and regulatory change. Without these kinds of actions, all of the enthusiasm for, and investment in, innovations in bayshore adaptation could stall out before meaningful progress can be made.

Third, Blueprint actions now deepen the region’s commitment to listening to local knowledge and honoring the views of both Indigenous people and people living in highest risk zones, who may not have the ability to adapt or flee as easily as richer neighbors. In the process, partners again recognize the importance of honoring the natural riches and ecosystems remaining around the Estuary. As Valentin Lopez, chairman of the Amah Mutsun Tribal Band, recently shared: “We don’t need to create infrastructure, we need to restore infrastructure given to us by the Creator.”

Blueprint actions commit planners to empower local communities to add their views and voices to the region’s adaptation vision. Planning resilient infrastructure must involve the communities who will be living with it as full partners. If adaptation is inequitable, it cannot last. Similarly, the Blueprint recognizes that underserved communities, already bearing more than their share of environmental injustices, shouldn’t be saddled with more. Preemptive action must be taken to secure legacy contaminants lurking in shoreline landfills and industrial and military zones, soon to be infiltrated by rising groundwater and sea levels.

The Blueprint calls for all these efforts and actions to be both place-based—centered in the local environment and local vision—as well as coordinated across the region. If all of these projects aren’t connected, and transparent to those around them, somebody will be left out. One city may succeed in adapting at the expense of their neighbor, or a community at the other end of the Estuary. Our changing Estuary, rainfall, and fire danger levels cannot be managed by a single jurisdiction.

In sum, Blueprint actions seek to facilitate broader cross-sector collaboration among those with local knowledge, those caring for the environment, those working on nature-based adaptations to climate change, and those building hard and soft infrastructure around the Estuary. Collaboration in adaptation often remains in the shadows when the big yellow backhoes and planting crews begin their work. Yet it is perhaps more central to progress than any other activity undertaken by Estuary management partners in the past. Adaptation cannot move forward without painstaking collaboration. Hidden or not, this uphill battle remains at the core of Blueprint actions to sustain the Estuary and adapt to the future.
**Introduction**

Monitoring represents a critical component of an adaptive management cycle. For the 2022 Estuary Blueprint, our monitoring approach includes two primary components: 1) linking environmental outcomes in the Blueprint to the State of the Estuary Reports, and 2) linking programmatic success, or outputs, through implementation of tasks with clear milestones.
Tracking Environmental Outcomes

The State of the Estuary Report is the most comprehensive health report for the San Francisco Bay and Delta together. The report uses the best available science and most recent data to assess the status of various parts of the ecosystem and identify trends in the Estuary's health. Published regularly since 1998, the report updates key indicators of ecological health, so that conservation and restoration efforts can target areas of greatest need.

For evaluating wildlife health, the Sensitive Species tables in the Appendix also provide a resource for understanding linkages between Blueprint actions and critical management issues for threatened and endangered species. The San Francisco Estuary Partnership does not perform monitoring directly, but relies on partners to undertake the monitoring necessary to assess the health of the Estuary. Monitoring data provided in future revisions of the State of the Estuary Report will inform future Blueprint updates and revisions.

For this update, Blueprint goals and actions were linked to environmental indicators in the State of the Estuary Report. The following table depicts these linkages. When considering the stressors, threats, and existing conditions described for each health indicator, most have direct ties to the Blueprint at all levels. Two actions do not have a direct link: Actions 2 and 25 represent programmatic approaches to engaging the Estuary's human communities with work to advance estuarine health and resilience.

Some aspects of the Estuary’s health are much more challenging to measure with science-based indicators. These are described as “emerging indicators” in the table below. These emerging indicators will inform priorities in future updates to the Blueprints and may be included in future State of the Estuary reports.

Finally, there are many management decisions at multiple scales of governance, from local to federal, that have bearing on any evaluation of progress in sustaining estuarine health but that are not called out specifically in the Blueprint. Future revisions of both the State of the Estuary Report and the Estuary Blueprint will identify new points of alignment and will make even stronger linkages between science, assessment, and management actions.

Tracking Programmatic Outputs

Programmatic outputs reflect the work of many partners who have carefully provided input to develop outputs that are both achievable and that reflect a larger, ambitious vision for the Estuary. Each task in the Estuary Blueprint links to a specific, measurable milestone. In addition, tasks are linked to “Task Leads” in the document. Task Leads are entities convening, stewarding, tracking, or implementing an action. “Collaborating Partners” include entities working to support and sometimes implement tasks.

The San Francisco Estuary Partnership will be working to encourage ongoing partner engagement and partnership expansion. The State of the Estuary Report, and its alignment with the Blueprint, will continue to serve as a powerful tool for detecting and interpreting trends in reaching Estuary goals related to ecosystem health, resilience, water quality and quantity, and stewardship. However, because of the natural variability of the Estuary, and the time it may take to detect improvements based upon the goals in the Blueprint, management actions are also tracked quarterly to provide early indications of program success. This information provides the basis for expected changes in environmental conditions as described in Blueprint Goals, Objectives, and Actions. Partnership staff have developed a suite of resources to track and communicate programmatic outputs. An internal tracking database will allow staff to report on progress for tasks and milestones. This database will link directly to an external tracking system and will be made available online.

<table>
<thead>
<tr>
<th>SOTE 2015 WATER</th>
<th>EBP 2022 GOALS</th>
<th>EBP 2022 OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe for Swimming</td>
<td>1, 3</td>
<td>A, B, I</td>
<td>20, 21</td>
</tr>
<tr>
<td>Safe for Aquatic Life</td>
<td>1, 3</td>
<td>A, B, I</td>
<td>19, 20, 21</td>
</tr>
<tr>
<td>Fish Safe to Eat</td>
<td>1, 3</td>
<td>A, B, I</td>
<td>21, 22</td>
</tr>
<tr>
<td>Freshwater Flow*</td>
<td>3</td>
<td>A, B, H</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 HABITAT</th>
<th>EBP 2022 GOALS</th>
<th>OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water Habitat</td>
<td>3</td>
<td>H</td>
<td>6, 16, 20</td>
</tr>
<tr>
<td>Eelgrass</td>
<td>1, 2</td>
<td>A, D, E</td>
<td>9, 15, 5, 6, 4, 16, 20</td>
</tr>
<tr>
<td>Tidal Marsh*</td>
<td>1, 2</td>
<td>A, D, E</td>
<td>4, 6, 7, 8, 10, 11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 WILDLIFE</th>
<th>EBP 2022 GOALS</th>
<th>OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benthic Invertebrates</td>
<td>2</td>
<td>A, E</td>
<td>15</td>
</tr>
<tr>
<td>Fish*</td>
<td>2, 3</td>
<td>A, E, H</td>
<td>5, 6, 9, 10, 12, 14, 16</td>
</tr>
<tr>
<td>Harbor Seals</td>
<td>2, 3</td>
<td>A, E, I</td>
<td>20, 21, 24</td>
</tr>
<tr>
<td>Winter Waterfowl</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>9, 10, 11, 12, 13</td>
</tr>
<tr>
<td>Breeding Waterfowl</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>9, 10, 11, 12, 13</td>
</tr>
<tr>
<td>Shorebirds</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>5, 11</td>
</tr>
<tr>
<td>Herons and Egrets</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>5, 11</td>
</tr>
<tr>
<td>Tidal Marsh Birds</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>9, 10, 11, 12, 13, 15</td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>1, 2</td>
<td>A, B, E</td>
<td>9, 10, 11, 12, 13, 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 PROCESSES</th>
<th>EBP 2022 GOALS</th>
<th>EBP 2022 OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration Space</td>
<td>1, 2, 4</td>
<td>A, B, D, F, K</td>
<td>1, 3, 4, 5, 6, 11</td>
</tr>
<tr>
<td>Beneficial Floods*</td>
<td>2</td>
<td>D, E</td>
<td>5, 6</td>
</tr>
<tr>
<td>Zooplankton as Food</td>
<td>1, 3</td>
<td>A, B, C, H</td>
<td>15, 16</td>
</tr>
<tr>
<td>Feeding Chicks</td>
<td>1</td>
<td>B, E</td>
<td>10, 12, 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 PEOPLE</th>
<th>EBP 2022 GOALS</th>
<th>EBP 2022 OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Water Use*</td>
<td>3</td>
<td>G</td>
<td>16, 17, 18, 19</td>
</tr>
<tr>
<td>Recycled Water Use</td>
<td>3</td>
<td>G</td>
<td>18</td>
</tr>
<tr>
<td>Public Access/Trail Access</td>
<td>4</td>
<td>J, K, L</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 EMERGING INDICATOR</th>
<th>EBP 2022 GOALS</th>
<th>EBP 2022 OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive Pesticides</td>
<td>1, 3</td>
<td>B, I</td>
<td>14, 22</td>
</tr>
<tr>
<td>Oyster Beds</td>
<td>1, 2</td>
<td>A, D, E</td>
<td>3, 4, 9</td>
</tr>
<tr>
<td>Woody Riparian</td>
<td>1, 2</td>
<td>A, E</td>
<td>14, 24</td>
</tr>
<tr>
<td>Watersheds</td>
<td>1</td>
<td>A</td>
<td>5, 6, 14, 19</td>
</tr>
<tr>
<td>Managed Ponds</td>
<td>1</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>Sediment</td>
<td>1, 2</td>
<td>A, D, E</td>
<td>5, 6, 14</td>
</tr>
<tr>
<td>Invasions</td>
<td>1, 3</td>
<td>A, B, I</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOTE 2015 EMERGING INDICATOR</th>
<th>EBP 2022 GOALS</th>
<th>EBP 2022 OBJECTIVES</th>
<th>EBP 2022 ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsided Lands</td>
<td>1, 3, 4, 5, 6, 7, 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shore Resilience</td>
<td>M, N</td>
<td></td>
<td>1, 3, 4, 5, 6, 8, 9, 10, 11</td>
</tr>
<tr>
<td>Urban Green Space</td>
<td>M, N</td>
<td></td>
<td>2, 24</td>
</tr>
</tbody>
</table>

*Updated in 2019 State of the Estuary Report
Looking ahead, the 2022 Estuary Blueprint provides a comprehensive plan to address priority concerns about natural resource management and Estuary health. It provides ambitious, meaningful goals for its partners to achieve by 2050 and a prioritized five-year action plan for advancing those goals in the immediate future.

In five years, partners will develop and negotiate priorities for the next five-year time frame and will incorporate them in the 2028-2033 Estuary Blueprint. As the tangible and collaborative outgrowth of more than 25 years of planning and partnership, the 2022 Blueprint offers an inspiring call to continue, expand, and improve our efforts to protect the San Francisco Estuary.

In particular, the 2022 Estuary Blueprint makes critical advances in several key areas, including focusing on a limited number of priority actions that strategically and collaboratively move the region towards our long-term goals, building the flexibility and adaptability required by projected climate change, and providing a structure to track programmatic and environmental progress.

Several areas of the 2022 Estuary Blueprint provide important building blocks for future updates. A few are highlighted below:

Focus on Equity. The 2022 update of the Estuary Blueprint elevates the role that Indigenous and frontline communities play in advancing Estuary health and resilience as reflected by the addition of a new objective, the integration of equity through many updated actions, and a new action specifically focused on creating more equitable outcomes for Indigenous and frontline communities. A racial equity analysis of the current Blueprint will inform continued efforts to build on and expand the integration of equity in the next update.

Align the Blueprint further with the State of the Estuary Report. The State of the Estuary Report assesses indicators of environmental health that are linked to a variety of Estuary Blueprint actions, advancing an adaptive management cycle for the region. There are areas, however, where the connections between actions and environmental indicators can be strengthened, such as climate resilience and equity. The next revision cycles of both the State of the Estuary Report and the Estuary Blueprint provide an opportunity to strengthen our ability to track environmental outcomes.

Advance an Estuary-wide Approach to Ecosystem Resilience. The 2022 Estuary Blueprint makes great strides towards a more comprehensive approach to managing the Estuary as a whole. The next update will build on these efforts to further advance coordination throughout the entire Estuary.
Integrate Estuary Health with Community Well-being. The Estuary Blueprint recognizes that the health of the Estuary and the health of our communities are interdependent. The 2022 Blueprint provides a foundation for a more integrated perspective with a new objective on incorporating social science and cultural knowledge. An integrated approach to increasing the health and resilience of the Estuary and its surrounding communities is increasingly important, necessitating new partnerships with professionals and communities.

Adapt to a Changing Environment. By the time the next Blueprint update occurs, we will be facing yet more difficult decisions that may require trade-offs between species, habitats and communities at risk, choosing between shoreline protection and strategic relocation, and allocating shrinking resources such as fresh water. Continuing to provide a collaborative forum and plan for conversations and strategic decision-making concerning these difficult choices will remain, as it has for the past 30 years, a priority among Blueprint partners.

As a comprehensive guide toward a healthy, resilient future for the Estuary, the 2022 Estuary Blueprint, and the hard work of the hundreds of people who created it, represents the strength and power in collaboration. Putting this plan to work will ultimately be the best demonstration of partnership in action.

APPENDIX

Sensitive Species

Numerous individuals and organizations work tirelessly to protect the fish and wildlife that make the San Francisco Estuary unique. The Estuary Blueprint supports their efforts by taking a habitat- and process-based approach, examining the connections between the San Francisco Bay (the lower Estuary) and the Delta (upper Estuary). This approach leads to actions that build stronger ecosystems across the Estuary as a whole. Rather than focus on individual species, the Blueprint emphasizes actions that can have a broad range of benefits to fish and wildlife, including bringing attention and funding to restoration efforts, as well as building species-level resilience to climate change. This section provides an overview of these benefits. Nineteen species of concern were selected for analysis. While this list is not exhaustive, it represents some of the Estuary’s key species, especially those that are already threatened or endangered.

The overarching goals of the Blueprint, especially Goal 1, to “sustain and improve the Estuary’s habitats and living resources,” aim to promote and protect species in this Estuary. Here, the impacts of the Blueprint are broken into more species-specific topics to provide a better understanding of the benefit of each action to sensitive species in the Estuary.
### Table 4. Estuary Blueprint Sensitive Species

<table>
<thead>
<tr>
<th>SPECIES NAME / TYPE</th>
<th>STATUS FEDERAL / STATE</th>
<th>PRIMARY HABITAT</th>
<th>GREATEST THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander Amphibian</td>
<td>Federal: Endangered State: Threatened</td>
<td>• Annual grass, with seasonal ponds and/or vernal pools</td>
<td>• Habitat loss</td>
</tr>
<tr>
<td>Red-legged Frog Amphibian</td>
<td>Federal: Threatened State: Not Listed</td>
<td>• Quiet pools of streams, marshes, and occasionally ponds • Permanent pools for larval development</td>
<td>• Habitat loss (draining of wetlands and pools)</td>
</tr>
<tr>
<td>California Black Rail Bird</td>
<td>Federal: Not Listed State: Threatened</td>
<td>• Tidal emergent wetlands dominated by pickleweed, or brackish marshes supporting bulrushes</td>
<td>• Habitat loss (tidal marsh)</td>
</tr>
<tr>
<td>California Least Tern Bird</td>
<td>Federal: Endangered State: Endangered</td>
<td>• Migratory • Can be found in abandoned salt ponds and along estuarine shores</td>
<td>• Habitat loss (dredging and nesting disturbance)</td>
</tr>
<tr>
<td>Canvasback Bird</td>
<td>Federal: Not Listed State: Not Listed</td>
<td>• Migratory • Prefers shallow water for diving and foraging</td>
<td>• Habitat loss and degradation (wetland fill and nesting disturbance) • Food limitation – reduction in submerged aquatic vegetation</td>
</tr>
<tr>
<td>Greater Scaup Bird</td>
<td>Federal: Not Listed State: Not Listed</td>
<td>• Migratory • Marshy, flat, and sheltered grasses, such as those found in large bays and inshore waters. Rarely found in freshwater</td>
<td>• Habitat loss and degradation (shrinking marshlands) • Food limitation – reduction in mollusks, crustaceans, and insects</td>
</tr>
<tr>
<td>Ridgway’s Rail Bird</td>
<td>Federal: Endangered State: Endangered</td>
<td>• Saline or brackish emergent wetlands dominated by pickleweed, cordgrass, and bulrush</td>
<td>• Habitat loss (filling and diking of emergent wetland) • Fragmentation through disruption of habitat corridors • Predation by non-native red fox and feral cats</td>
</tr>
<tr>
<td>Snowy Plover Bird</td>
<td>Federal: Threatened State: Not Listed</td>
<td>• Sandy marine and estuarine shores • Salt pond levees can be used as nesting habitat</td>
<td>• Habitat loss (tidal marsh dredging and nesting disturbance)</td>
</tr>
</tbody>
</table>

### Table 4. Continued

<table>
<thead>
<tr>
<th>SPECIES NAME / TYPE</th>
<th>STATUS FEDERAL / STATE</th>
<th>PRIMARY HABITAT</th>
<th>GREATEST THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook Salmon (Various ESUs) Fish</td>
<td>Federal: Threatened /Endangered State: Threatened / Endangered</td>
<td>• Migratory • Freshwater streams and rivers for spawning, travel from ocean</td>
<td>• Habitat loss and degradation • Fragmentation and deterioration of natural linkages for migration and spawning • Range minimization</td>
</tr>
<tr>
<td>Coho Salmon (Central California Coast ESU) Fish</td>
<td>Federal: Endangered State: Endangered</td>
<td>• Migratory • Freshwater streams and rivers for spawning, travel from ocean</td>
<td>• Habitat loss and degradation • Fragmentation and deterioration of natural linkages for migration and spawning • Range minimization</td>
</tr>
<tr>
<td>Delta Smelt Fish</td>
<td>Federal: Threatened State: Endangered</td>
<td>• Migratory • Brackish-water associated with the mixing zone • Disperse widely into river channels and tidally influenced backwater sloughs • Spawn in shallow, fresh, or slightly brackish water upstream of the mixing zone</td>
<td>• Habitat loss and degradation • Direct entrainments by state and federal water export facilities • Summer and fall increases in salinity and water clarity • Predation by introduced species • Habitat loss and degradation</td>
</tr>
<tr>
<td>Green Sturgeon Fish</td>
<td>Federal: Threatened State: Not Listed</td>
<td>• Migratory • Freshwater streams and rivers for spawning, travel from ocean</td>
<td>• Habitat loss and degradation • Fragmentation and deterioration of natural linkages for migration and spawning • Range minimization</td>
</tr>
<tr>
<td>Longfin Smelt Fish</td>
<td>Federal: Not Listed State: Threatened</td>
<td>• Migratory • Low salinity/freshwater reaches of coastal rivers and tributary streams for spawning • Bays, estuaries, and coastal areas for most of adult lives</td>
<td>• Range minimization • Decreases in volume of seasonal freshwater flows in the Estuary, influenced by drought and state and federal pumping operations • Invasive species (overbite clam)</td>
</tr>
<tr>
<td>SPECIES NAME / TYPE</td>
<td>STATUS FEDERAL / STATE</td>
<td>PRIMARY HABITAT</td>
<td>GREATEST THREATS</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Sacramento Splittail Fish</td>
<td>Federal: Not Listed State: Not Listed</td>
<td>Migratory Estuarine waters, such as slow moving rivers and sloughs Flooded vegetation for spawning</td>
<td>Habitat degradation (contaminants) Range minimization Decreases in volume of seasonal freshwater flows in the Estuary, influenced by drought and state and federal pumping operations</td>
</tr>
<tr>
<td>Steelhead Trout Fish</td>
<td>Federal: Threatened State: Not Listed</td>
<td>Migratory Freshwater streams and rivers for spawning, travel from ocean</td>
<td>Habitat loss and degradation Fragmentation and deterioration of natural linkages for migration and spawning Range minimization</td>
</tr>
<tr>
<td>Salt Marsh Harvest Mouse Mammal</td>
<td>Federal: Endangered State: Endangered</td>
<td>Saline emergent wetlands and marshes Pickleweed and adjacent grasslands are preferred for cover</td>
<td>Habitat loss (filling, diking, and urban development of diked salt marshes)</td>
</tr>
<tr>
<td>California Seablite Plant</td>
<td>Federal: Endangered State: Not Listed</td>
<td>Tidally influenced salt marsh and estuaries Most commonly found in the narrow ecotone between salt marsh and stable dune scrub communities occurring at the edge of the salt marsh</td>
<td>Habitat loss Range reduction</td>
</tr>
<tr>
<td>Soft Bird’s-beak Plant</td>
<td>Federal: Endangered State: Rare</td>
<td>Upper reaches of salt grass/pickleweed marshes near the limits of tidal action</td>
<td>Habitat loss (diking of Suisun Marsh, conversion of tidal brackish marsh to non-tidal wetlands) Invasive species (Lepidium latifolium in brackish tidal marsh)</td>
</tr>
<tr>
<td>Suisun Thistle Plant</td>
<td>Federal: Endangered State: Not Listed</td>
<td>Upper intertidal marsh plain near the smallest branches of natural, small tidal creeks, banks, ditches, and marsh edges that are very infrequently flooded</td>
<td>Habitat loss (diking of Suisun Marsh, conversion of tidal brackish marsh to non-tidal wetlands) Invasive species (Lepidium latifolium in brackish tidal marsh)</td>
</tr>
</tbody>
</table>

Key Management Concepts Legend

A. Habitat Protection and Recovery
Actions that protect, enhance, restore, or rebuild both aquatic and terrestrial habitat of species of concern.

B. Migratory Benefit
Actions that protect or restore essential migration routes for species of concern.

C. Advocacy for Species
In alignment with Blueprint Goal 4, these actions bring attention, funding, and research to species of concern.

D. Resilience to Climate Change
Actions that enhance the ability of species of concern to withstand impacts of climate change.

E. Invasive Species Reduction
Actions that remove or reduce the efficacy of invasive species that threaten species of concern.
<table>
<thead>
<tr>
<th>SENSITIVE SPECIES</th>
<th>1. CLIMATE RESILIENCE</th>
<th>2. EQUITY</th>
<th>3. ADAPTATION PLANNING</th>
<th>4. ADAPTATION IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander</td>
<td>A, B, C</td>
<td>A, B, C</td>
<td>A, B, C</td>
<td>A, B, C</td>
</tr>
<tr>
<td>Red-legged Frog</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>California Black Rail</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>California Least Tern</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Canvasback</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Delta Smelt</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Green Sturgeon</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Longfin Smelt</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Sacramento Splittail</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Steelhead Trout</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Salt Marsh Harvest Mouse</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>California Seablite</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Soft Bird’s-beak</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
<tr>
<td>Suisun Thistle</td>
<td>A, B, C</td>
<td>C, D</td>
<td>A, C, D</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SENSITIVE SPECIES</th>
<th>5. WATERSHED CONNECTIONS</th>
<th>6. SEDIMENT</th>
<th>7. CARBON MANAGEMENT</th>
<th>8. WETLAND MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander</td>
<td>A, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Red-legged Frog</td>
<td>A, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>California Black Rail</td>
<td>A, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>California Least Tern</td>
<td>A, B, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Canvasback</td>
<td>A, B, D</td>
<td>A, B, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>A, B, D</td>
<td>A, B, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>A, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>A, B, D</td>
<td>A, D</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Delta Smelt</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Green Sturgeon</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Longfin Smelt</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Sacramento Splittail</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Steelhead Trout</td>
<td>A, B, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Salt Marsh Harvest Mouse</td>
<td>A, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>California Seablite</td>
<td>A, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Soft Bird’s-beak</td>
<td>A, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
<tr>
<td>Suisun Thistle</td>
<td>A, D</td>
<td>A, D</td>
<td>B, D</td>
<td>C, D</td>
</tr>
</tbody>
</table>

Key Management Concepts Legend
A - Habitat Protection and Recovery
B - Migratory Benefit
C - Advocacy for Species
D - Resilience to Climate Change
E - Invasive Species Reduction
<table>
<thead>
<tr>
<th>SENSITIVE SPECIES</th>
<th>9. INTERTIDAL/ SUBTIDAL HABITATS</th>
<th>10. TIDAL MARSH</th>
<th>11. TRANSITION ZONES</th>
<th>12. MANAGED WETLANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander</td>
<td></td>
<td></td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>Red-legged Frog</td>
<td>D</td>
<td></td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>California Black Rail</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>California Least Tern</td>
<td>A, D</td>
<td>B, D</td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Canvasback</td>
<td>A, D</td>
<td>B, D</td>
<td>B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>A, D</td>
<td>B, D</td>
<td>B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>A, D</td>
<td>B, D</td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>B</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Delta Smelt</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Green Sturgeon</td>
<td>B</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Longfin Smelt</td>
<td>B</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Sacramento Splittail</td>
<td>B</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Steelhead Trout</td>
<td>B</td>
<td></td>
<td>A, B, D</td>
<td>B</td>
</tr>
<tr>
<td>Salt Marsh</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>Harvest Mouse</td>
<td></td>
<td></td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>California Seablite</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A</td>
</tr>
<tr>
<td>Soft Bird’s-beak</td>
<td>D</td>
<td></td>
<td>A, D</td>
<td>A, D</td>
</tr>
<tr>
<td>Suisun Thistle</td>
<td>D</td>
<td></td>
<td>A, D</td>
<td>A, D</td>
</tr>
</tbody>
</table>

Key Management Concepts Legend
A - Habitat Protection and Recovery
B - Migratory Benefit
C - Advocacy for Species
D - Resilience to Climate Change
E - Invasive Species Reduction
<table>
<thead>
<tr>
<th>SENSITIVE SPECIES</th>
<th>13. SEASONAL WETLANDS</th>
<th>14. CREEKS</th>
<th>15. INVASIVE SPECIES</th>
<th>16. FRESHWATER FLOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander</td>
<td></td>
<td></td>
<td>A, D, E</td>
<td>A</td>
</tr>
<tr>
<td>Red-legged Frog</td>
<td></td>
<td></td>
<td>A, D, E</td>
<td>A</td>
</tr>
<tr>
<td>California Black Rail</td>
<td>D</td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>California Least Tern</td>
<td>A, B, D</td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>Canvasback</td>
<td>B, D</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>B, D</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>D</td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>A, B, D</td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>D, E</td>
</tr>
<tr>
<td>Delta Smelt</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Green Sturgeon</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>D, E</td>
</tr>
<tr>
<td>Longfin Smelt</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Sacramento Splittail</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>D, E</td>
</tr>
<tr>
<td>Steelhead Trout</td>
<td>B, D</td>
<td></td>
<td>A, B, D</td>
<td>B, D</td>
</tr>
<tr>
<td>Salt Marsh Harvest Mouse</td>
<td>A, D</td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>California Seablite</td>
<td></td>
<td></td>
<td>D, E</td>
<td></td>
</tr>
<tr>
<td>Soft Bird’s-beak</td>
<td></td>
<td></td>
<td>A, D, E</td>
<td></td>
</tr>
<tr>
<td>Suisun Thistle</td>
<td></td>
<td></td>
<td>A, D, E</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SENSITIVE SPECIES</th>
<th>17. WATER CONSERVATION</th>
<th>18. RECYCLED WATER</th>
<th>19. STORMWATER</th>
<th>20. NUTRIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Tiger Salamander</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Red-legged Frog</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>California Black Rail</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>California Least Tern</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Canvasback</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>A, D</td>
<td>D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Ridgway’s Rail</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Delta Smelt</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Green Sturgeon</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Longfin Smelt</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Sacramento Splittail</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Steelhead Trout</td>
<td>A, D</td>
<td>A, D</td>
<td>A, D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Salt Marsh Harvest Mouse</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>California Seablite</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Soft Bird’s-beak</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Suisun Thistle</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>A, C, D</td>
</tr>
</tbody>
</table>

Key Management Concepts Legend
A - Habitat Protection and Recovery
B - Migratory Benefit
C - Advocacy for Species
D - Resilience to Climate Change
E - Invasive Species Reduction
By emphasizing planning and action around diverse habitat mosaics and whole watersheds, the 2022 Estuary Blueprint supports the health of the larger estuarine ecosystem and natural communities that support threatened, endangered, migratory, and resident species alike.

The San Francisco Estuary flows through a variety of urban, rural, and natural habitats and across myriad socioeconomic and political boundaries. The Estuary Blueprint addresses these challenging and changing conditions for sensitive species in a holistic way. It accounts for conditions across the entire plan area, ranging from stream flows to transitional habitats and migration corridors. It ensures that actions appropriately target critical, science-based recommendations for improving the health of the Estuary.

The 2015 State of the Estuary Report is the most comprehensive assessment of the Estuary's conditions ever completed for the San Francisco Estuary. Its findings, along with the updates from the 2019 State of the Estuary Report, are meticulously detailed for many species and biological communities, ranging from benthic invertebrates to wintering waterfowl. The report's assessment of ecosystem health includes specific indicators for various sensitive species such as Ridgway's Rail, as well as for the degree of invasion by non-native aquatic organisms and plants, among other indications of healthy life in the Estuary. These indicators were used to guide development of Estuary Blueprint goals, objectives, and actions.
Collaborative regional efforts are promoting wildlife monitoring to understand how populations are responding to environmental change and conservation action. The Wetlands Regional Monitoring Program will track the response of wildlife indicators (resident tidal marsh birds, small mammals, and fishes) to environmental change and inform adaptive management of baylands habitats. Additionally, the San Francisco Bay Joint Venture (SFBJV) Implementation Plan, due to be released in 2022, identifies habitat goals and associated bird indicators. The SFBJV and Point Blue will also be releasing a State of the Birds Framework which aims to inform future and existing habitat restoration, acquisition, and management practices with the current science on the state of the Bay’s bird populations. Population trends, threats, and recommended actions for land and water managers, policy-makers, non-profit conservation groups, and researchers will be included. The report will enhance conservation in San Francisco Bay by (1) guiding habitat restoration, management, and acquisition, (2) increasing knowledge of the population status of San Francisco Bay’s birds and the threats to their habitats; and (3) influencing public policy and public awareness of bird and ecosystem conservation needs.

The Tracking Progress section of the Blueprint links the species-specific indicators in the State of the Estuary Reports to Blueprint Actions designed to protect native aquatic flora and fauna.

The Sensitive Species section details how the recommendations in this Blueprint benefit selected threatened and endangered fish, birds, mammals, and plants of critical management concern. The Appendix also ties the Blueprint’s habitat and watershed approach to central concepts in species protection, including habitat protection and recovery, protection of essential migration routes, resilience to climate change, and reduction of negative impacts from invasive species.

The San Francisco Estuary Partnership recognizes the numerous individuals and organizations working tirelessly to protect the species that make both San Francisco Bay and the Delta special, and has developed a whole-habitat mindset for the 2022 Estuary Blueprint that supports their efforts and strengthens collaboration on sensitive species issues across the entire Estuary.

Photo: Ben Botkin

Report Production Credits
Technical Editor
Lisa Owens-Viani
Graphics and Layout Design
Miguel A. Osorio, Metropolitan Transportation Commission
Spotlight Contributor
Diana Fu, San Francisco Estuary Partnership
Maps
Peter Beeler, Metropolitan Transportation Commission
Printing
J.T. Litho, Oakland, California

Front Cover Photography Credits
A. Florence Low
B. Karl Nielsen
C. Ben Botkin
D. Dale Kolke
E. Shira Bezalel
F. Ken James
G. Nick Sebastian
H. Barrie Rokeach
I. Karl Nielsen