

STATE OF THE ESTUARY

2019

UPDATE

STATUS AND TRENDS OF INDICATORS OF ECOSYSTEM HEALTH

THE ESTUARY

SAN FRANCISCO BAY AND SACRAMENTO-SAN JOAQUIN RIVER DELTA

EXECUTIVE SUMMARY

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Photo: Amber Manfree



The San Francisco Estuary is a large and diverse system. Hundreds of miles of coastline stretch from the wide valleys of the Sacramento

and San Joaquin Rivers to the steep headlands of the Golden Gate, with vast agricultural fields in the Delta and urbanized shorelines in Silicon Valley and many of the region's cities. The complexity and scale of this system means it can take years to detect and assess changes. This interim **State of the Estuary Report** checks in on a few indicators of health and explores where the assessment should head over time.

In the four years since the **2015 State of the Estuary Report**, two issues have emerged as critical to how we assess the health of the estuarine ecosystem at the heart of the Bay Area and the Delta. First, the health of the Estuary and of the people who live near it and depend on it are inextricably linked. We need a healthy Bay and Delta to protect our shorelines from sea level rise, help keep our waters clean, provide food and habitat for

fish and wildlife, and give people a place to enjoy nature. We also need to think more about human communities as we assess the health of natural communities. This focus means addressing environmental injustices that are deeply embedded in our culture and patterns of development. The second critical issue to emerge is the need for a greater focus on landscape resilience—how well the Bay and the Delta are equipped to respond to change—so that people and wildlife can thrive as climate change progresses. Taking these two ideas together, this report focuses on the nexus of social and ecological resilience as we look toward the future.

The first section of the Report updates indicators of ecological health that span the entire extent of the San Francisco Estuary (Bay and Delta). Recent data show continued progress along the trajectories of the past decade. Tidal marsh restoration is proceeding at a brisk pace in the Bay and gaining traction in the Delta, while urban water conservation continues to meet mandated benchmarks, even during the drought. On the other hand, flows through

the Estuary and across its floodplains continue to be well below levels that could increase and restore ecosystem health. Freshwater flows are a lynchpin of ecosystem processes that sustain physical habitats, fuel the food web, and regulate water quality. Creative approaches to using and re-using fresh water for environmental purposes are needed. Long-term trend analysis shows that fish communities in the Bay are declining. This analysis scores an index of 10 attributes of a healthy fish community. The index focuses on fish in offshore areas, and may not capture benefits to fish from near-shore wetland restoration projects. Despite this slow decline, fish communities in the saltier parts of the Estuary remain in good condition, while those in the brackish and freshwater areas are in poor condition.

The next section of the report discusses three emerging indicators of Estuary health, offering options for how to assess resilience in future reports. Here, for the first time, the resilience of the Estuary's shores is evaluated through the lens of subsidence and nature-based features.

Elevation relative to sea level is a basic currency that must be tracked as the Pacific Ocean rises into the Estuary. The potential for the Estuary shore to be resilient to climate change and continue to provide benefits to people is related to how much of the shore zone is nature-based. The final emerging indicator, urban green space, is a first attempt to assess how access to nature is distributed across more and less advantaged communities. More work is needed to finalize all these emerging indicators before they can be included in any future quantitative assessment of the State of the Estuary.

These emerging and updated indicators will help focus efforts to restore the Estuary's health. In addition to continuing the successful aspects of restoration and conservation that this report describes, we need more investment in creative ways to use and restore flows for environmental health, to expand and build resilient shorelines and to weave considerations of social equity more strongly into efforts to improve environmental health.

ESTUARY HEALTH UPDATE 2019

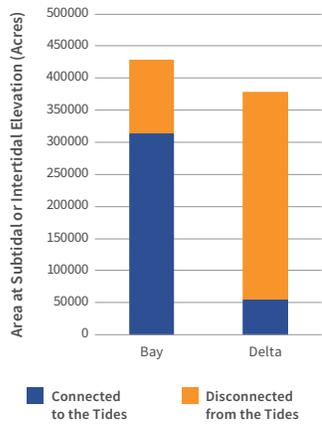
| INDICATOR | STATUS AND TREND | AT A GLANCE |
|--------------------------|---|---|
| FRESHWATER FLOW |  | <p>Freshwater flows in the Estuary have been highly altered, causing reductions in inter-annual and seasonal variability, and peak-flows. Freshwater flows into the Estuary in recent years reflect chronic artificial drought conditions, in sharp contrast to unimpaired flows.</p> |
| TIDAL MARSH |  | <p>Tidal marsh acreage throughout the Estuary has declined significantly from the historical amount, but restoration efforts are bringing back this critical ecosystem and associated benefits. Projects in the Bay are making extensive contributions to tidal marsh area, while efforts in the Delta are beginning to make progress towards regional goals.</p> |
| FISH |  | <p>The condition of fish communities varies across the Estuary. In the lower Estuary, fish communities are abundant, diverse, and dominated by native species. However, in the brackish and freshwater upper Estuary, native fish communities are in poor condition. Based on long-term monitoring data, native fish communities across the Bay are declining. In San Francisco and San Pablo Bays, this long-term data set is from sampling only the offshore areas of the Bay and may not reflect benefits to fish populations from recent wetland restoration.</p> |
| BENEFICIAL FLOODS |  | <p>The frequency, magnitude, and duration of floodplain inundation in both the Bay and the Delta are too low to support healthy estuarine habitats and sustain important ecological processes. While conditions have been variable over time, they have, in general, remained poor in the Delta and have declined in the Bay.</p> |
| URBAN WATER USE |  | <p>In both the Bay and Delta, total and per-capita urban water use have declined over the last several decades, despite growing populations. More efficient urban water use means that both regions met and exceeded benchmarks for per-capita use and drought-reduction targets. The regions have modestly increased water use since the end of the drought but still maintained improvements over their 2020 benchmarks for reductions in per-capita use.</p> |

LEGEND

| | |
|---|--|
| STATUS  Good  Fair  Poor | TREND  Improving  No Change  Declining  Mixed |
|---|--|

EMERGING INDICATORS

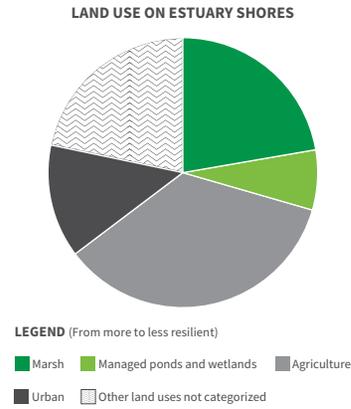
SUBSIDED LANDS



Significant portions of previously tidal areas in the Bay and Delta have been diked off and disconnected from tidal action to accommodate agriculture, urban development, duck ponds, salt ponds, and a diverse set of other land uses. The low elevation of these areas places them at increased risk of flooding

as sea level rises and intense rainstorms become more common. In addition, many of these former tidal marshes and mudflats have subsided significantly below sea level as a result of sediment oxidation and compaction. Subsidence and these accompanying processes exacerbate flood risk, contribute to greenhouse gas emissions, and reduce the potential for restoring important intertidal habitat types.

SHORE RESILIENCE



Levees and seawalls line many miles of the shorelines of San Francisco Bay and the Sacramento-San Joaquin Delta. By hardening the Estuary's once soft and absorbent shores, early developers intended to keep people and property safe from flooding.

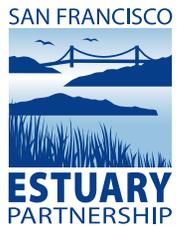
These engineered structures do not provide good habitat for native species, however. Nor are they designed to accommodate the kind of flooding projected for our future, flooding produced by a combination of rapid sea level rise, higher groundwater tables, storm surge, and more rainfall over shorter periods.

URBAN GREEN SPACE



Open spaces within urban areas provide a diverse set of benefits for wild animals, plants, and people that live nearby. Green spaces decrease urban runoff, improve downstream water quality, and provide habitat for native wildlife, while also benefiting human health and wellbeing. Urban parks improve local air quality and reduce local temperatures, contributing to lowered

rates of childhood asthma and heat-related deaths in nearby areas. Exposure to urban parks is also associated with improved mood, increased physical activity, lower heart rate, and additional human health benefits.



The San Francisco Estuary Partnership collaborates with partners throughout the Bay and Delta on regional, science-based programs to increase the health and resilience of the San Francisco Estuary.

More information can be found at sfestuary.org

SAN FRANCISCO ESTUARY PARTNERSHIP

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Access the full report at sfestuary.org/our-estuary/soter/



The Delta Stewardship Council was created in 2009 by the California Legislature to advance the state's coequal goals for the Sacramento-San Joaquin Delta through the development and enforcement of a long-term sustainable management plan.

More information can be found at deltacouncil.ca.gov

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