

COASTAL MONITORING

Needs Assessment For California Communities



Co-developed by



RESILIENT
CITIES
CATALYST



Farallon
Strategies

As part of



ABOUT THE CALIFORNIA COASTAL ACCELERATOR

The California Coastal Accelerator (“Accelerator”) supports five coastal communities (or “Cohort”) —Alameda, Fort Bragg, Oceanside, Santa Barbara, and Santa Cruz—in advancing resilience projects and strengthening local leadership to address the impacts of climate change. These communities span the length of California’s coastline and reflect the diverse geographic, environmental, and social conditions that shape the state’s coastal challenges. While each community faces unique circumstances, all are working to address threats posed by sea level rise and coastal hazards to their environments, economies, infrastructure, and residents.

The Accelerator provides tailored technical assistance and capacity-building support that responds to each community’s specific priorities and local context. As a result, no two cohort members have the same experience. The program is intentionally adaptive, with activities and support evolving in response to stakeholder feedback and emerging on-the-ground needs. This flexible approach enables each community to maximize the value of the partnership while contributing to a broader statewide learning network that advances best practices for coastal resilience.



Context and Framing

As part of the Accelerator, Cohort members convened to discuss individual and shared challenges related to coastal monitoring and its role in informing adaptive shoreline management in the face of sea level rise.

For the purposes of this report, coastal monitoring refers to three interconnected areas of practice:



Sediment monitoring, which improves understanding of littoral transport, sediment budgets, beach nourishment performance, and sediment availability;



Erosion monitoring, which tracks bluff retreat, shoreline change, beach loss, and broader geomorphic processes; and



Flood risk monitoring, which assesses wave runup, tidal flooding, compound flooding, overtopping, and other coastal flood hazards.

While monitoring is necessary to support project implementation, evaluate project performance, and satisfy permitting requirements, this needs assessment refers to monitoring that informs long-term adaptation planning and adaptive management.

To develop this needs assessment, RCC and Farallon Strategies synthesized insights from [Coastal Accelerator](#) cohort members, stakeholder briefings with regional agencies and scientific organizations, and a review of existing monitoring efforts. The needs assessment summarizes current monitoring mechanisms, challenges related to data quality and accessibility, governance and funding constraints, and opportunities to improve coordination and standardization. Stakeholders expressed a specific interest in strategies to expand access to decision-relevant data that can support adaptive management approaches based on thresholds and triggers, consistent with the [State of California Sea Level Rise Guidance 2024 Science and Policy Update](#).

Community Monitoring Landscape

Through conversations with the Cohort, RCC and Farallon Strategies identified existing monitoring approaches and persistent challenges faced by California's diverse coastal communities (see below). Specifically, participants emphasized the need for monitoring systems to identify thresholds and triggers to support adaptation pathway planning, and guide timely decision-making as coastal conditions change.

	Current Strengths	Remaining Gaps	Primary Need
Oceanside	– Long-term shoreline monitoring through SANDAG (San Diego Association of Governments) transects – Access to Surfline coastal data streams – Drone-based monitoring capabilities – Presence of regional approach to monitoring through SANDAG	– Limited staff capacity for processing and analyzing large datasets – Backlog of CoastSnap imagery awaiting analysis	– Additional capacity to process and analyze large datasets – Systems to translate monitoring results into adaptive management actions
Alameda	– Permit-driven beach and shoreline monitoring program – Scientific guidance from SFEI and technical partners – Targeted studies addressing specific vulnerabilities	– Limited monitoring of hard shorelines and shoreline protection structures – Insufficient wetland condition monitoring – Lack of groundwater and groundwater emergence monitoring – Fragmented monitoring responsibilities	– Clear governance structure for monitoring and data management – Dedicated funding to expand monitoring scope and coverage
Santa Barbara	– More than 15 years of USGS shoreline transect data – Established regional partnerships and technical collaboration	– Significant volumes of data remain unanalyzed – Groundwater monitoring is largely absent	– Additional capacity for data analysis and interpretation from the State – Regional coordination to connect monitoring with adaptation planning
Fort Bragg	– Baseline monitoring established through grant-funded projects – Coordination with county partners – Access to NOAA and California Ocean Observing System (CalOOS) resources	– Limited staff and technical capacity in rural communities – No dedicated, long-term funding source for monitoring	– State-supported monitoring programs for rural and tribal communities – Sustained funding and technical assistance to maintain long-term datasets
Santa Cruz	– Advanced concept for a coastal decision-support system – Multiple existing data streams and monitoring inputs	– Decision-support tool development has stalled – Limited operational funding for decision support tools	– State-defined monitoring metrics and performance indicators – Funding for data analysis, tool development, and long-term operation of decision-support systems

Key Findings

A central challenge is that California lacks a coordinated, practitioner-oriented coastal monitoring system capable of tracking shoreline change, erosion, sediment dynamics, and flood risk across both outer coast and bayshore environments. Such a system is critical for informing adaptive shoreline management, strategic relocation, infrastructure investments, and long-term resilience planning. Coastal communities, technical experts, funders, and regulators consistently recognize monitoring as foundational infrastructure for climate adaptation. Yet monitoring efforts remain fragmented, underfunded, and inconsistently supported across the state.

State agencies have historically been reluctant to fund ongoing monitoring and decision-support tools. State agencies often place the responsibility on local jurisdictions to fund ongoing monitoring. This lack of funding occurs despite local jurisdictions demonstrating existing data are insufficient and even when scientific experts and consultants agree that significant information gaps remain. As a result, local governments are frequently left without the resources needed to generate, maintain, and apply the data required for effective adaptation planning.

Across California, substantial amounts of coastal data are collected by local governments, regional agencies, universities, and scientific organizations, often through permitting requirements or short-term grant-funded projects. However, these efforts are typically project-specific and lack the sustained funding, analytical capacity, and statewide coordination necessary to convert data into actionable guidance that supports long-term and adaptive decision-making. In many cases, data are collected but not adequately processed, analyzed, synthesized, or translated into practical guidance for decision-makers. Emerging technologies such as CoastSnap, fixed cameras, drones, satellites, and other image-based monitoring tools generate vast quantities of data, but limited capacity, automation, interoperability, and funding constrain their usefulness.

Participants identified significant potential for artificial intelligence (AI), satellite-based monitoring, and automated analytics to help address these challenges by reducing processing burdens, accelerating analysis, and improving the accessibility of coastal data. However, they emphasized these technologies are only as effective as the underlying data and require consistent monitoring inputs, standardized methodologies, clear state guidance, and sustained investment. Participants also highlighted the importance of considering the environmental and energy implications associated with large-scale data processing and AI applications as these tools become more widely adopted.

Significant monitoring assets and expertise already exist that could support a more integrated statewide approach. These existing assets include: U.S. Geological Survey (USGS) remote sensing capabilities, NASA satellite monitoring programs, and [NOAA's Digital Coast platform](#). Regional observing systems, such as the [Southern California Coastal Ocean Observing System \(SCCOOS\)](#) and the [Central and Northern California Ocean Observing System \(CeNCOOS\)](#), also provide valuable oceanographic and coastal data. However, the current monitoring landscape remains fragmented, with varying methodologies, geographic coverage, and products that are not always aligned with local adaptation planning needs. The policies of the current federal administration will also continue to fragment and outright dismantle federal monitoring programs. Consequently, local governments often struggle to identify, access, and apply available data to support resilience planning and investment decisions.

Another key theme to emerge from the Accelerator Cohort was the **importance of establishing baselines and maintaining consistent monitoring programs over time.** Participants repeatedly cited programs such as [San Diego Association of Governments' \(SANDAG\) Shoreline Monitoring Program](#) and long-term USGS monitoring efforts as valuable, not necessarily because they employ perfect methodologies, but because they have been sustained over decades. Long-term continuity enables practitioners to identify large-scale trends, distinguish short-term variability from meaningful change, and build the scientific credibility needed to support management decisions.

California can build on lessons learned from several successful regional monitoring programs that have integrated data collection, governance, and decision-making across jurisdictions. Examples of existing regional monitoring programs include the [San Francisco Estuary Wetlands Regional Monitoring Program \(WRMP\)](#) and the [Southern California Wetlands Recovery Project's Regional Monitoring Program](#), both of which provide coordinated frameworks for tracking ecosystem conditions and informing management actions at landscape scales. Additional California models include the [Beach Erosion Authority for Clean Oceans and Nourishment \(BEACON\)](#), which has coordinated long-term shoreline monitoring and regional coastal management across multiple counties, and the [SANDAG's Shoreline Monitoring Program](#), which provides consistent data on beach conditions, coastal processes, and shoreline change to support regional planning and resilience investments. **Sustaining regional monitoring programs requires dedicated governance structures, ongoing facilitation, and reliable funding mechanisms.** Existing regional entities, such as Joint Powers Authorities (JPAs), often encounter barriers because they lack clear authority, stable funding sources, or the ability to directly receive and manage funds, limiting their effectiveness in coordinating long-term regional monitoring programs.

California can also learn from successful monitoring frameworks outside the state.

The [Washington State Department of Ecology's Coastal Monitoring Program](#) provides consistent statewide shoreline and coastal hazard monitoring, while international examples such as the [Digital Earth Australia Map Viewer](#) demonstrate how satellite-derived environmental data can be integrated into a centralized, user-friendly platform for monitoring landscape and coastal change. Together, these programs illustrate how standardized methodologies, shared data platforms, sustained funding, and collaborative governance structures can improve data accessibility, reduce duplication of effort, and support more effective adaptation planning across multiple jurisdictions and scales.

Strategic Recommendations

A clear message emerged from Cohort participants: **local jurisdictions cannot effectively meet their monitoring needs independently**. State-level leadership and coordination are needed to establish priorities, standardize methodologies, support data integration, and fund capacity for core monitoring activities. Agencies such as the Ocean Protection Council (OPC), California State Coastal Conservancy (SCC), and California Natural Resources Agency are well-positioned to lead in developing a coordinated statewide monitoring framework that provides the information and decision-support tools necessary to advance climate resilience across California's coast.

The following recommendations are concrete actions for the OPC, SCC, and the Governor's Office, recognizing their complementary roles in science, funding, and statewide coordination. Importantly, they are not new obligations, and instead operationalize existing mandates and funding authorities, particularly under Proposition 4, the California Climate Adaptation Strategy, and OPC's mandate to provide the best available science to decision-makers and the public ([California OPC Strategic Plan 2026-2030](#)). California Ocean Science Trust's [California's 2026 Coast and Ocean Assessment](#) specifically calls for the development of new coordinated statewide monitoring of data-limited categories, including coastal flooding.

Ultimately, all these actions would require a statewide body to manage them, and together could result in the establishment of a **California Coastal Monitoring Initiative**, to best align science, funding, and governance across regions, synthesize lessons from pilot projects, and more directly feed into permitting, adaptation planning, and asset management. This approach not only will operationalize the CA Climate Adaptation Strategy's science and monitoring goals, but also provide an implementation vehicle for Proposition 4 coastal investments and consequently will establish OPC as the coordinating science authority for California.

1. Establish a funded statewide mandate or directive for coastal monitoring

The Governor's Office of Land Use and Climate Innovation, in coordination with OPC, should formally recognize coastal monitoring as foundational infrastructure for climate adaptation. By establishing a statewide funded mandate for monitoring to support adaptive management, the State would reduce the burden on local jurisdictions to repeatedly justify why existing data are insufficient when scientific consensus already supports this need.

Policy Alignment

- Monitoring is a prerequisite for effective deployment of infrastructure, according to Proposition 4 which seeks to advance climate resilience investments that protect communities and natural systems
- Directly advances the CA Climate Adaptation Strategy's goal of grounding adaptation in best available science and actionable information
- Positions OPC as the science-to-decision bridge for coastal resilience in the state

2. Develop standards for statewide monitoring metrics

OPC, with Ocean Science Trust and California Council on Science and Technology, should convene a technical advisory group to define core coastal monitoring metrics. This would reduce bespoke local systems, increase transferability, and provide clarity for permitting and funding. The San Francisco Bay Regional Wetland Monitoring Program and Southern California Wetland Regional Monitoring Program are models for how regional programs with specific objectives have standardized metrics and collection processes.

Policy Alignment

- Create efficiency and consistency for Proposition 4-funded projects statewide
- Advances statewide coordination and consistency across regions
- Core to OPC's coordination and standard-setting role

3. Fund data analysis and operationalization

OPC and SCC should prioritize investments that unlock the value of existing data, including imagery, shoreline transects, groundwater information, and long-term monitoring records. While data collection efforts have generated substantial information, limited capacity to process, and analyze, these dataset reduces their usefulness for decision-making. Funding should support automation, analytics, and decision-support tools to transform data into actionable insights.

Investments should also emphasize the long-term stewardship, governance, and maintenance of data systems. Rather than creating new standalone platforms, funding should target sustaining and enhancing existing tools, data, and monitoring networks to ensure they remain accessible, interoperable, and useful over time.

Policy Alignment

- Eligible as climate resilience implementation support under Proposition 4, maximizing ROI of prior public investments
- Supports the CA Climate Adaptation Strategy’s Actionable Science priority: translating data into decisions
- Aligns with OPC’s role to ensure the best available science is provided to decision-makers

4. Learn from and Invest in Regional Monitoring Programs

SCC should prioritize funding for regional monitoring entities organized around littoral cells and coastal systems, rather than individual jurisdictional boundaries, recognizing that coastal processes and impacts do not align with jurisdictional boundaries. Building on successful regional models such as SANDAG and BEACON—while strengthening governance structures where needed—can improve coordination, data consistency, and resource efficiency. Funding should also support facilitation and consensus-building efforts that provide objective, science-based information grounded in coastal geography, supporting jurisdictions to navigate cross-boundary challenges and make coordinated adaptation decisions.

Policy Alignment

- Enables regional-scale resilience investments and cost savings for Proposition 4 funding
- Supports system-scale adaptation beyond jurisdictional boundaries
- Reinforces OPC’s mandate to coordinate across agencies and regions

5. Provide technical assistance and support to disadvantaged and rural communities.

The Governor's Office and the State Coastal Conservancy should **create a technical assistance program to support the use of monitoring tools in SLR planning**. Practitioners struggle to operationalize scientific information, and smaller jurisdictions especially lack capacity. Expert support networks and technical assistance programs for how to utilize the data to inform may be equally important as the monitoring system itself.

Policy Alignment

- Aligns with Proposition 4 equity and capacity-building intent
- Advances equitable adaptation and avoids structural disadvantage
- Supports inclusive science access and participation

6. Advance public-benefit applications of emerging technology

The Governor's Office, in coordination with the California Attorney General's Office, should explore mechanisms to secure public-benefit data contributions and partnerships with technology, geospatial, and AI organizations operating in California. Coastal monitoring presents a compelling public-interest use case for applying emerging technologies, including remote sensing and automated monitoring, to support climate adaptation. However, there is a need for additional guidance on best practices for the use of AI, remote sensing, and automated analytics, including considerations related to transparency, energy use, environmental impacts, data quality, and long-term stewardship.

California should build on examples from the USGS, which has demonstrated the ability to rapidly assess coastal erosion, landslides, shoreline change, and storm impacts using aerial surveys, lidar, photogrammetry, and other remote sensing technologies. Following major storm events, USGS has produced high-resolution datasets and three-dimensional visualizations that provide near real-time information on coastal change, enabling decision-makers to quickly assess impacts and prioritize response actions. Similar capabilities could support statewide monitoring of erosion hotspots, flood-prone areas, sediment movement, and adaptation thresholds.

Policy Alignment

- Maximizes public return from private-sector innovation
- Encourages innovation in climate tools and methods
- Fits OPC's science innovation and evaluation role

Addendum. Detailed Existing Monitoring Approaches

Alameda (San Francisco Bay)

Alameda's shoreline monitoring is fragmented and largely project- or permit-driven:

- **BCDC Permit Requirements:** Twice-annual beach surveys tied to shoreline permits; data analyzed by SFEI as part of a grant-funded scope of work.
- **Sand Management by East Bay Regional Park District:** Periodic sand replenishment and redistribution, though without a broader adaptive monitoring framework.
- **Adaptation Planning Support:** CMG Landscape & Pathways Climate Institute coordinates adaptation projects, with SFEI serving as a scientific advisor.

Significant gaps exist outside the sandy beach area, including hard shoreline infrastructure, wetlands, groundwater rise and salinity, and bayfront erosion along trails. Governance complexity—particularly unclear roles between the City and East Bay Regional Park District—complicates both monitoring and adaptation implementation.

Fort Bragg (North Coast)

Fort Bragg represents the challenges of small, rural jurisdictions:

- **Grant-Funded Baseline Studies:** Sea level rise analyses and LCP Round 8 grants coordinated with Mendocino County to ensure consistent datasets.
- **NOAA / C(N)OOS Data:** Anticipated integration with regional ocean observation systems, though spatial gaps and lag times remain an issue.
- **Project-Driven Monitoring:** Water quality monitoring tied to aquaculture feasibility and wave-powered desalination pilots, often at high cost (\$40,000/year) unless managed locally or through nonprofits.

Key issues include lack of sustained funding, limited local capacity, and difficulty accessing nearby data sources. There is strong interest in state-led or tribally-framed monitoring initiatives that emphasize capacity building rather than traditional “operations and maintenance.”

Oceanside (Greater San Diego)

Oceanside benefits from a relatively robust monitoring ecosystem anchored by regional and private-sector partnerships. Key mechanisms include:

- **SANDAG Shoreline Monitoring Program:** Biannual beach width and volume surveys along established transects since 1997, providing one of the longest continuous datasets in the state.
- **Surflife / Coastal Intelligence Program:** Surf and beach attendance data, public-facing cameras, and analytics, funded in part through a California Coastal Commission RE:BEACH grant to establish pre-project baselines.
- **Drone Surveys:** Quarterly drone-based shoreline monitoring extending into Carlsbad to capture down-coast impacts, integrated through an existing prime contract with GHD.

Strengths include long-term consistency, regional scale, and integration with nourishment and bypass projects. Challenges center on the capacity to process data collected (e.g., CoastSnap images), reliance on consultants, and the need for adaptive management plans tied to baseline monitoring.

Santa Barbara (South Central Coast)

Santa Barbara illustrates both the promise and pitfalls of regional monitoring:

- **BEACON Partnership:** A regional collaboration across Santa Barbara and Ventura counties, similar in concept to SANDAG.
- **USGS Field Transects:** Nearly 15 years of beach and shoreline data collected, but largely unprocessed and underutilized.
- **RCAMP (Regional Coastal Adaptation and Monitoring Program):** Intended to align data for regional adaptation decision-making, but challenged by governance, funding eligibility (JPA limitations), and unclear prioritization.

Despite substantial data collection, the region faces a critical capacity gap in the ability to analyze data and apply learnings to coastal management. The City is currently paying significant consultant costs for basic shoreline metrics, while groundwater rise and salinity—already affecting wastewater systems—remain largely unmonitored. There is strong consensus that data exist, but state-level investment is needed to analyze, standardize, and operationalize it.

Santa Cruz (Central Coast)

Santa Cruz has invested heavily in planning and conceptual monitoring tools, but struggles with implementation:

- **LCP Amendment (Beaches and Bluffs):** Recently completed, incorporating adaptation pathways and coastal monitoring specifications.
- **Existing Data Sources:** Tidal gauge data, SCOOS cameras at the wharf, surf community monitoring, potential use of Surfline cameras and CoastSnap via university partnerships.
- **Coastal Change Monitoring Network & Decision Support Tool:** A public-facing dashboard and backend analytics engine developed through prior grants, currently development is dormant due to lack of funding.

The City estimates an initial \$350,000 to operationalize the system, with relatively low ongoing costs but a need for at least 0.25 FTE staff capacity. Santa Cruz is cautious about bespoke systems that cannot be scaled or transferred statewide, and prefers state-defined metrics, data analysis and funding to support consistent implementation.