

Final

NOYO HARBOR SEA LEVEL RISE, TSUNAMI HAZARDS, AND EROSION RESILIENCE STRATEGY

Noyo Harbor SLRRS

Prepared for
City of Fort Bragg
416 North Franklin Street
Fort Bragg, CA 95437

September 2026



FORT BRAGG, CA
**NOYO
HARBOR**

39°25'40" N  123°48'20" W



CALIFORNIA
COASTAL
COMMISSION

FINAL NOYO HARBOR SEA LEVEL RISE, TSUNAMI HAZARDS, AND EROSION RESILIENCE STRATEGY

Noyo Harbor SLRRS

Prepared for
City of Fort Bragg
416 North Franklin Street
Fort Bragg, CA 95437

September 2026

Funded in part by Coastal Commission Grant Agreement LCP-22-07

Services provided pursuant to this Agreement are intended solely for the use and benefit of the City of Fort Bragg and the Noyo Harbor District.

No other person or entity shall be entitled to rely on the services, opinions, recommendations, plans or specifications provided pursuant to this agreement without the express written consent of ESA, 44 Montgomery Street, Suite 1900, San Francisco CA 94105.

775 Baywood Drive
Suite 100
Petaluma, CA 94954
707.795.0900
esassoc.com



Atlanta	Pasadena	San Francisco
Bend	Pensacola	San Jose
Irvine	Petaluma	Santa Barbara
Los Angeles	Portland	Sarasota
Mobile	Rancho Cucamonga	Seattle
Oakland	Sacramento	Tampa
Orlando	San Diego	Thousand Oaks
Palm Beach County		

CONTENTS

Resilience Strategy

	<u>Page</u>
Acronyms and Other Abbreviations	ii
Executive Summary	ES-1
Key Findings	ES-1
Critical Vulnerabilities	ES-1
Resilience Strategy Framework	ES-2
Priority Actions	ES-2
Conclusion	ES-2
1. Introduction and Background	1
1.1 Introduction	1
1.2 Vulnerability and Risk Assessment	3
1.3 Public Participation and Input	5
2. Resilience Goals and Adaptation Strategies	6
2.1 Near-Term Resilience Strategies	13
2.2 Medium-Term Resilience Strategies	16
2.3 Long-Term Resilience Strategies	19
2.4 Considerations Regarding Effectiveness & Feasibility	23
3. Conclusions and Summary of Recommendations	25
4. References	26
5. Acknowledgments	27

Figures

Figure 1. SLRRS Study Area	2
----------------------------------	---

Tables

Table 1. SLRRS Strategies and Actions (Priority Actions in Bold)	8
Table 2. Priority Resilience Actions	12

Appendices

A. SLRRS Public Outreach Summary	
----------------------------------	--

ACRONYMS AND OTHER ABBREVIATIONS

Abbreviation	Definition
BEVRI	Blue Economy Visioning, Resiliency, and Implementation
CEQA	California Environmental Quality Act
City	City of Fort Bragg
CoSMoS	Coastal Storm Modeling System
ESA	Environmental Science Associates
LCP	Local Coastal Program
NOAA	National Oceanic and Atmospheric Administration
OPC	California Ocean Protection Council
SLR	Sea Level Rise
SLRRS	Sea Level Rise, Tsunami Hazards, and Erosion Resilience Strategy
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VRA	<i>Sea Level Rise, Tsunami Hazards, and Erosion Resilience Strategy for Noyo Harbor, Vulnerability and Risk Assessment</i>

EXECUTIVE SUMMARY

The City of Fort Bragg and Noyo Harbor District conducted a Sea Level Rise Vulnerability and Resilience Strategy (SLRRS) to evaluate risks to Noyo Harbor and identify actions to maintain safe navigation, protect infrastructure, and support long-term harbor operations under projected sea level rise conditions.

Noyo Harbor is a critical economic and community asset that supports commercial fishing, recreation, and public access. However, its location within a dynamic coastal and riverine environment makes it highly vulnerable to flooding, erosion, and storm impacts. Recent storm damage, including impacts to the dredge containment cell, highlights the harbor's exposure to extreme events and the increasing risks associated with rising sea levels.

Key Findings

The vulnerability assessment identified several areas of concern:

- Increasing frequency and extent of tidal flooding and storm-driven inundation
- Erosion and structural stress on shoreline protection systems
- Exposure of low-lying infrastructure, including roads, utilities, and harbor facilities
- Constraints on dredging operations due to reliance on a single containment and drying area

A comparison with recently released Coastal Storm Modeling System (CoSMoS) projections developed by the U.S. Geological Survey indicates generally consistent patterns of flooding and exposure, reinforcing confidence in the assessment findings.

Critical Vulnerabilities

Three primary system vulnerabilities drive risk at Noyo Harbor:

- **Dredging and sediment management:** The harbor depends on regular dredging to maintain navigability, but current sediment handling infrastructure is vulnerable to damage and regulatory constraints.
- **Access and circulation:** Harbor access roads are low-lying and subject to flooding, creating risks for emergency response, evacuation, and daily operations.
- **Shoreline protection systems:** Jetties, revetments, and other engineered features are essential to maintaining harbor function but will require upgrades and ongoing maintenance under future conditions.

Resilience Strategy Framework

The SLRRS organizes actions into near-term (0–2 years), medium-term (2–5 years), and long-term (5+ years) implementation horizons. Strategies are further grouped by adaptation approach, including:

- **Protect:** Maintain and upgrade engineered systems such as jetties and revetments
- **Accommodate:** Retrofit infrastructure to function under periodic flooding
- **Avoid / Plan:** Update policies and planning tools to reduce long-term risk
- **Relocate (as feasible):** Support voluntary transition of non-coastal-dependent uses over time, where appropriate and interest aligns with needs.

Given the harbor’s high-energy coastal setting, engineered protection measures will remain the primary strategy, supplemented by targeted accommodation and planning actions.

Priority Actions

The following actions represent the highest priorities for maintaining harbor operations and reducing long-term risk:

- Develop and implement a Dredged Sediment Reuse Plan for the mooring basin
- Evaluate and transition to a long-term sediment management solution for the mooring basin
- Rehabilitate and upgrade shoreline protection systems, including jetties and revetments
- Improve and maintain access, including long-term elevation or realignment of N. Harbor Drive
- Partner with the City to upgrade critical water, sewer, and transportation infrastructure
- Conduct marina infrastructure condition and needs assessment and geotechnical assessments to inform future investments
- Update the City of Fort Bragg and Mendocino County Local Coastal Program (LCP) to incorporate sea level rise adaptation policies
- Partner with USACE to develop and implement a Dredged Sediment Reuse Plan for the federal channel

Conclusion

Sea level rise will increasingly affect Noyo Harbor over time, but proactive planning and targeted investments can maintain harbor operations and reduce long-term risk. The actions identified in this report provide a clear and phased pathway to prioritize funding, coordinate with regional and federal partners, and adapt to changing coastal conditions.

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

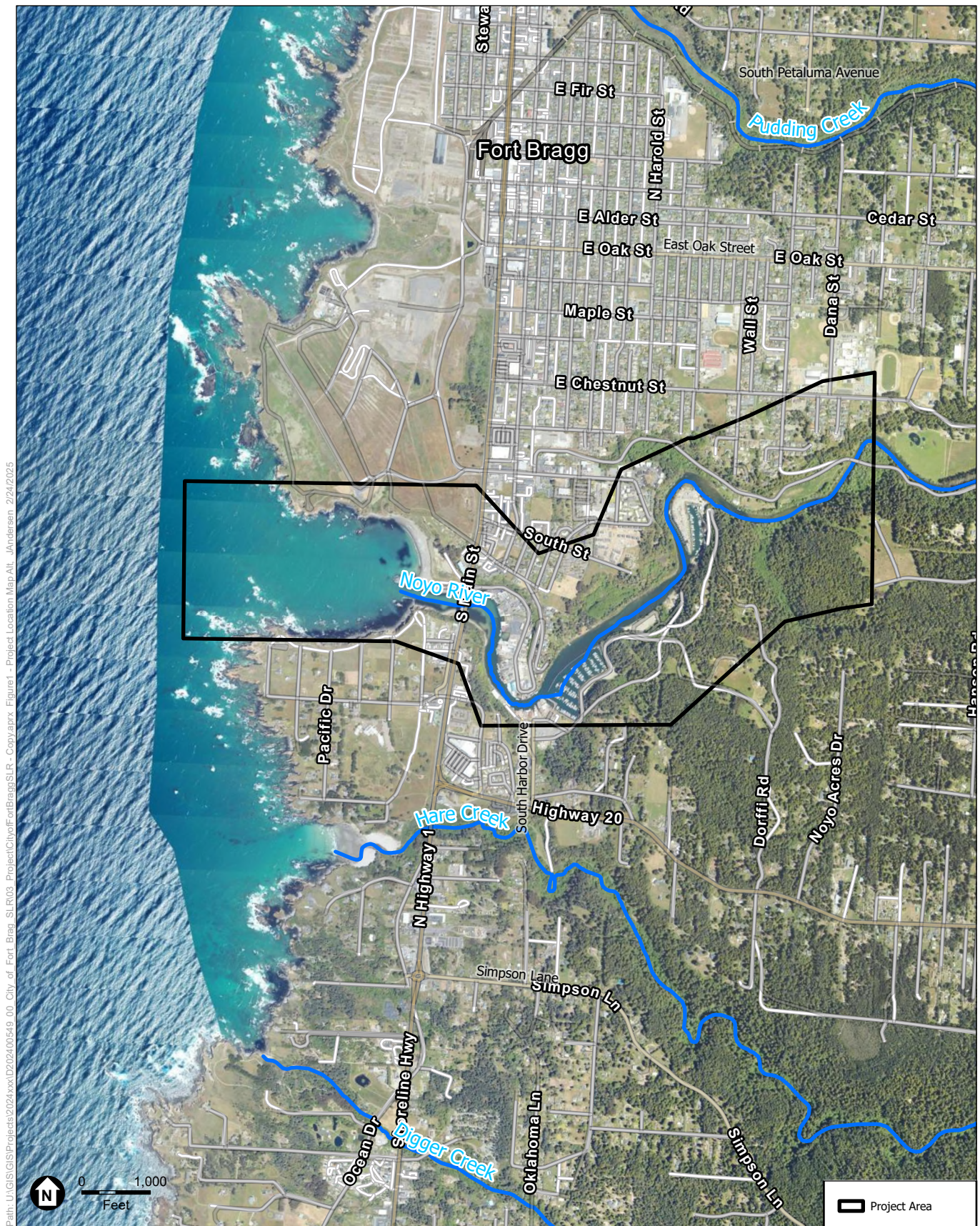
1.1.1 SLRRS Purpose and Scope

The Sea Level Rise, Tsunami Hazards, and Erosion Resilience Strategy (SLRRS) for Noyo Harbor is a grant-funded planning effort led by the City of Fort Bragg (City) and the Noyo Harbor District (Harbor District) to evaluate coastal hazards and develop long-term strategies to improve resilience of the harbor and surrounding community. The SLRRS is intended to assess existing conditions, identify infrastructure and community assets that may be vulnerable to sea level rise, tsunami hazards, coastal flooding, and erosion, and evaluate how these risks may change under future sea level rise scenarios. It ultimately provides a roadmap to help guide future project development, funding opportunities, and coordination among agencies and harbor stakeholders. **Figure 1** shows the extent of the SLRRS study area.

The Noyo Harbor Blue Economy Visioning, Resiliency, and Implementation (BEVRI) initiative is a collaborative planning effort led by the City of Fort Bragg in partnership with the Noyo Harbor District and California Sea Grant. The BEVRI is ultimately a long-term strategy for strengthening the economic and environmental sustainability of Noyo Harbor. This SLRRS is one component of the overall BEVRI initiative. Other BEVRI components include an aquaculture feasibility study, a harbor facilities conditions analysis, a harbor special districts analysis, and a parcel inventory. The BEVRI initiative is intended to guide investments, policies, and projects that support the harbor’s working waterfront while enhancing coastal resilience and stewardship.

1.1.2 What is “Resilience”

In the context of sea level rise and coastal hazards, resilience refers to the ability of coastal communities, ecosystems, and infrastructure to anticipate, prepare for, respond to, and recover from hazards such as flooding, erosion, storm surge, and tsunami events while continuing to function over time. The National Oceanic and Atmospheric Administration (NOAA) describes coastal resilience as the capacity of coastal systems to absorb impacts and adapt to changing environmental conditions while maintaining essential functions and services (2026). Similarly, guidance from the California Ocean Protection Council (OPC) emphasizes that resilience planning involves understanding current and projected sea level rise hazards, reducing vulnerabilities through adaptation strategies and pathways, and ensuring that communities and natural systems can adjust to future conditions (2024). In practice, resilience strategies may include protecting or relocating vulnerable infrastructure, restoring natural coastal buffers such as wetlands and dunes, updating land-use policies, and strengthening emergency preparedness. Together, these approaches help coastal communities adapt to rising seas and coastal hazards while minimizing long-term damage, disruption, and loss of environmental and economic resources.



SOURCE: Nearmap 2025; ESA, 2025

City of Fort Bragg SLR, Tsunami Hazards, Erosion Resiliency Strategy

Figure 1
Study Area

1.1.3 What This Document Provides

The SLRRS for Noyo Harbor provides a planning framework to help the City, the Harbor District, and regional partners understand and respond to coastal hazards associated with sea level rise. The SLRRS effort included an inventory of assets, coastal hazard mapping, and a vulnerability and risk assessment that considers exposure, sensitivity, and adaptive capacity of infrastructure, ecosystems, and community resources. The SLRRS also incorporates stakeholder outreach and community engagement to inform the analysis and ensure that the perspectives of local residents, harbor users, and disadvantaged communities are included. Building on the 2026 *Sea Level Rise, Tsunami Hazards, and Erosion Resilience Strategy for Noyo Harbor, Vulnerability and Risk Assessment* (VRA), the strategy identifies and prioritizes vulnerable assets, including infrastructure and community resources within the harbor area, and evaluates potential impacts from coastal flooding, erosion, tsunami hazards, and rising sea levels under future scenarios. This document identifies and prioritizes potential adaptation measures, such as protection, accommodation, and retreat options, including nature-based solutions. The SLRRS also provides a roadmap for future resilience projects and research, policy development, and updates to both the City and County of Mendocino's Local Coastal Program.

1.1.4 What This Document Does Not Provide

The SLRRS is a conceptual planning and strategy document, and it does not provide detailed engineering designs, construction plans, or final decisions about specific adaptation projects. The strategy identifies potential resilience actions and project concepts, but additional feasibility studies, environmental review, design work, and funding would be required before implementation could occur. Similarly, the document does not itself amend land use regulations or adopt new policies; rather, it recommends potential policy directions that may inform future updates to the City of Fort Bragg and Mendocino County Local Coastal Programs and other planning efforts. The strategy also relies largely on existing data and modeling tools to assess hazards and vulnerabilities and therefore does not include new site-specific modeling or comprehensive analysis for every asset in the harbor area. Instead, it is intended to guide future planning, investment, and policy development related to sea level rise, tsunami hazards, and coastal erosion resilience in Noyo Harbor.

1.2 Vulnerability and Risk Assessment

1.2.1 Key Takeaways

The VRA prepared for the SLRRS identified the primary coastal hazards affecting Noyo Harbor and study area and evaluated how these hazards may affect harbor infrastructure, operations, and surrounding uses over time (see **ESA 2026**). The analysis showed that the harbor is already vulnerable to tidal flooding, extreme storm events, coastal erosion, and tsunami hazards, with historic storms such as those in 2022–2023 demonstrating the potential for wave overtopping, flooding of harbor facilities, sediment deposition in the marina, and damage to shoreline protection structures. The VRA evaluated and mapped future conditions under three sea level rise scenarios: 1 foot (near-term); 3 feet (mid-century to late-century); and 6 feet (long-term). While present-day tidal flooding mainly affects docks and water-dependent infrastructure, increasing sea levels expand flood exposure to additional harbor facilities, commercial fishing infrastructure, roads, parking areas, and portions of Noyo Beach, particularly under the 3-foot and 6-foot scenarios.

A key takeaway from the VRA is that many of the harbor's most critical operational assets, such as the marine rail and cradle system, harbor docks and hoists, commercial fish processing facilities, access roads, and shoreline protection infrastructure, are increasingly exposed to flooding and storm hazards. Storm scenarios, especially the modeled 100-year storm event, already flood large portions of the harbor area and disrupt multiple operational goals, including safe vessel navigation, commercial fishing operations, emergency response capabilities, and public access. Additionally, infrastructure such as the dredge containment cell represents a potential vulnerability and environmental risk because damage from storm events could release dredged sediment onto nearby beaches if the structure fails. These findings highlight the importance of maintaining and improving shoreline protection, dredging infrastructure, and harbor access routes to preserve the harbor's operational continuity in the near-term.

The assessment ultimately provides the analytical foundation for the SLRRS by identifying where hazards are most likely to affect harbor assets and by highlighting priority areas for adaptation planning. Key implications for longer-term adaptation strategies include protecting or upgrading critical shoreline infrastructure (such as jetties, revetments, and harbor protection structures), maintaining reliable dredging and navigation infrastructure, improving harbor access and transportation resilience, and planning for long-term changes to shoreline conditions and water levels. The VRA also underscores the need to consider both near-term operational resilience and long-term planning, as rising sea levels may gradually shift flooding from occasional storm impacts to more frequent or permanent inundation in low-lying areas. These findings help guide the SLRRS in identifying near-term resilience projects and long-term strategies that support the continued economic, operational, and environmental viability of Noyo Harbor.

1.2.2 Comparison to CoSMoS Sea Level Rise Hazard Mapping

The project team compared the ESA-developed VRA hazard maps to the recently released Coastal Storm Modeling System (CoSMoS) projections produced by the U.S. Geological Survey (USGS). The CoSMoS dataset was released after completion of the draft VRA. CoSMoS incorporates updated modeling of coastal processes, including wave dynamics, storm surge, and shoreline response, and represents an advancement in regional-scale hazard projections for the California coast.

The comparison indicates that the CoSMoS projections generally show consistent patterns of inundation and areas of exposure at Noyo Harbor. In particular, both datasets identify low-lying areas of the harbor, roadway access routes, and shoreline-adjacent infrastructure as vulnerable to flooding. Differences in modeling approach, resolution, and assumptions result in some localized variation in flood extents and depths, but these differences do not substantially change the overall findings of the VRA.

Both datasets indicate increasing frequency and extent of flooding under higher sea level rise scenarios, reinforcing the identification of access, dredging infrastructure, and shoreline protection systems as critical vulnerabilities. The consistency between datasets provides additional confidence in the hazard characterization and supports the resilience strategies identified in this study.

1.3 Public Participation and Input

The City, Harbor District, and regional partners conducted a range of public outreach activities to inform and engage the community in developing the SLRRS. Outreach included maintaining an online project webpage that provided background information on sea level rise and shared the draft VRA for public review, along with social media campaigns promoting public events, encouraging community participation in surveys, and highlighting king tide events to illustrate potential flooding impacts. The City also conducted a community survey between February and July 2025 to gather input on concerns about sea level rise and preferred adaptation strategies. In addition, the City and Harbor District hosted and participated in outreach events, including a Noyo Harbor Blue Economy Open House in June 2025 and a public open house during North Coast KelpFest in October 2025. Public input was also collected through numerous smaller outreach efforts involving Mendocino College, Grassroots Institute, and tabling at community events, such as Fiesta Latina and First Friday. These efforts helped inform the VRA and the development of adaptation strategies for Noyo Harbor. **Appendix A**, *Public Outreach Summary*, elaborates on the public outreach efforts and community feedback received.

2. RESILIENCE GOALS AND ADAPTATION STRATEGIES

The following SLRRS goals establish a coordinated framework to guide how the Noyo Harbor District, City of Fort Bragg, and project partners will address increasing coastal hazards in the Noyo Harbor area. These goals reflect the findings of the VRA and input gathered through community outreach, and they are intended to be implemented through a series of adaptation strategies and specific actions that reduce risk, improve resilience, and support the long-term functionality of the Harbor. Together, the goals provide direction for protecting critical infrastructure, maintaining safe harbor operations, and preparing for future sea level rise, storm events, and coastal change. Based on the VRA, the highest priority resilience actions focus on maintaining harbor access, ensuring continued dredging operations, and improving shoreline protection systems.

The goals are designed to inform and align with the BEVRI Plan, while remaining consistent with the policies and requirements of the California Coastal Act, applicable City of Fort Bragg and Mendocino County plans and regulations, and the Harbor District's key operational goals. They also reflect priorities identified by the Noyo Harbor Community Sustainability Plan (2019), harbor users, residents, and stakeholders. By integrating these planning efforts and perspectives, the SLRRS goals provide a cohesive foundation for guiding future resilience strategies, policy updates, and investment decisions in Noyo Harbor.

- ***Goal 1 – Protect Harbor Operations and Critical Infrastructure.*** Maintain the safe and reliable operation of Noyo Harbor by protecting critical infrastructure, navigation access, existing shoreline protection structures, and harbor facilities from the impacts of sea level rise, coastal flooding, erosion, and other coastal hazards.
- ***Goal 2 – Strengthen Coastal Hazard Resilience.*** Improve the Harbor's ability to withstand and recover from sea level rise, storm surge, tidal flooding, erosion, and tsunami hazards through proactive planning, adaptation strategies, and coordination with local, state, and federal partners.
- ***Goal 3 – Support a Resilient Working Waterfront and Blue Economy.*** Sustain and enhance the economic vitality of Noyo Harbor by supporting commercial fishing, harbor-dependent businesses, and emerging blue economy opportunities while ensuring these uses can adapt to changing coastal conditions.
- ***Goal 4 – Incorporate Nature-Based and Adaptive Solutions.*** Promote adaptation strategies that incorporate natural coastal processes and ecosystem restoration, alongside engineered solutions where necessary, to provide long-term protection and environmental benefits.
- ***Goal 5 – Protect Public Access, Safety, and Community Resources.*** Maintain safe public access to the harbor, beaches, and coastal recreation areas while improving emergency access, evacuation planning, and community safety during coastal hazard events.

- **Goal 6 – Guide Future Planning, Policy, and Investment.** Provide a framework to inform future resilience projects, infrastructure investments, and updates to the City of Fort Bragg and Mendocino County Local Coastal Programs and related planning efforts to address sea level rise and coastal hazards over time.

The following strategies are ordered by implementation timeline, with near-term actions listed first, followed by longer-term opportunities. Each strategy begins with the Approach (e.g., Emergency Resilience, Protect, Accommodate), followed by the Strategy, and then tailored Noyo Harbor-specific actions. The strategies are informed by the 2026 VRA (ESA 2026), and community feedback on that document. The strategies also incorporate information from community input at public workshops; input from the Harbor District, City of Fort Bragg, and other stakeholders; California Coastal Commission guidance; current best available science and practices; lessons from other similar projects; and other relevant information.

The adaptation strategies are primarily geared toward actionable tasks that the Harbor District and City can initiate or coordinate, to avoid overburdening or overregulating other property owners and users of the harbor area. This method will allow for community coordination to occur over time for longer-term planning.

Table 1 summarizes all strategies and actions described in Section 2. See **Table 2** for only the highest-priority resilience actions.

Priority levels reflect the relative importance of actions for maintaining harbor operations and reducing risk, based on VRA findings, urgency, and feasibility. The tables characterize the priority based on the following:

- High-priority actions address critical vulnerabilities or system-wide risks.
- Medium-priority actions support adaptation planning and infrastructure upgrades.
- Low-priority actions provide supportive or long-term benefits.

Implementation of the SLRRS will require coordination among the Harbor District, City, County and state and federal partners, as well as alignment with funding cycles, permitting processes, and capital improvement planning. Actions identified in this strategy are intended to be advanced incrementally, with near-term efforts focused on maintaining operations and reducing immediate risks, and longer-term actions implemented as conditions change and funding becomes available. Adaptive management will be necessary to refine strategies over time as new data, monitoring results, and sea level rise conditions evolve.

The highest priority actions identified in Table 2 are regarding maintaining dredging operations, ensuring reliable harbor access, and upgrading shoreline protection systems. These actions represent critical system-level interventions necessary to sustain harbor operations under future conditions.

TABLE 1. SLRRS STRATEGIES AND ACTIONS (PRIORITY ACTIONS IN BOLD)

Section	Approach and Category	Strategy and Numbered Actions	Lead Agency	Priority
Near-Term (0–2 years)				
2.1.1 A	Emergency Preparedness	Share knowledge for planning and preparedness		
	Community Awareness	1. Provide public-facing hazard maps and web-based tools	Harbor District / County	Low
		2. Conduct outreach to vulnerable property owners	City / Harbor District	Low
		3. Conduct regular tsunami siren drills	County	Medium
2.1.1 B	Emergency Preparedness	Improve navigation and wayfinding during storm or tsunami events		
	Access & Wayfinding	1. Integrate emergency access/egress into wayfinding system	Harbor District	Medium
2.1.2 A	Accommodate	Undertake minor retrofits and floodproofing for Harbor District facilities and infrastructure		
	Harbor Infrastructure	1. Incorporate floodproofing upgrades into Harbor District facilities	Harbor District	Medium
		2. Upgrade utility/service infrastructure with flood-resistant systems	Harbor District	High
		3. Implement floodable infrastructure retrofits (drainage, permeable surfaces)	Harbor District	Medium
2.1.2 B	Accommodate	Integrate flood resilience into City-owned harbor infrastructure improvements		
	City Infrastructure	1. Integrate flood resilience into water distribution upgrades	City	Medium
		2. Upgrade sewer lift stations with flood-resilient systems	City	High

Section	Approach and Category	Strategy and Numbered Actions	Lead Agency	Priority
2.1.3 A	Protect	Maintain dredging operations through sediment management and reuse		
	Dredging / Sediment Management	1. Maintain coordination with USACE and partners for dredging the federal channel	Harbor District / City / USACE	High
		2. Evaluate sediment characteristics and conduct hazardous materials study	Harbor District / City / USACE	Medium
		3. Conduct pilot/test sediment reuse placements	Harbor District / City / USACE	Low
		4. Identify beneficial reuse opportunities	Harbor District / City / USACE	High
		5. Prepare and implement Dredged Sediment Reuse Plan	Harbor District / USACE	High
Medium-Term (2–5 years)				
2.2.1 A	Emergency Preparedness	Improve emergency access and redundancy		
	Access / Transportation	1. Coordinate to evaluate emergency access needs	City	Medium
		2. Develop design concepts and pursue funding for emergency access route	City	High
2.2.1 B	Accommodate	Reduce risks to private properties and hazardous materials		
	Private Property Risk Reduction	1. Use facility condition data to guide hazard mitigation repairs	Harbor District	High
		2. Develop hazardous materials storage/disclosure standards	City / County	High
2.2.2 A	Accommodate	Plan and design marina infrastructure upgrades		
	Marina Infrastructure	1. Conduct marina infrastructure condition and needs assessment	Harbor District	High
		2. Develop conceptual designs for marina upgrades	Harbor District	High
		3. Identify funding sources for marina improvements	Harbor District	High

Section	Approach and Category	Strategy and Numbered Actions	Lead Agency	Priority
2.2.3 A	Study and Plan	Conduct studies to support adaptation planning and design		
	Supporting Studies	1. Conduct municipal water source feasibility study	City	Medium
		2. Perform geotechnical assessments of fill and wharf conditions	Harbor District	High
		3. Conduct detailed erosion and bluff mapping	City / Harbor District	Medium
Long-Term (5+ years)				
2.3.1 A	Protect	Upgrade and maintain engineered shoreline protection systems		
	Shoreline Protection	1. Rehabilitate and upgrade north and south jetties	Harbor District / USACE	High
		2. Upgrade harbor revetments with armoring and hybrid approaches	Harbor District / USACE	High
2.3.1 B	Protect	Maintain long-term dredging and sediment management systems		
	Dredging	1. Coordinate long-term dredging strategy for federal channel with USACE	Harbor District / USACE	High
		2. Evaluate alternatives for long-term sediment management and containment cell retrofits	Harbor District / City / USACE	High
2.3.2 A	Accommodate	Upgrade critical harbor access and infrastructure systems		
	Access / Transportation	1. Elevate or realign North and South Harbor Drive	Harbor District	High
		2. Develop pedestrian connection from the Noyo Headlands Trail to Noyo Beach	City	Medium
		3. Develop secondary vehicular emergency access from north harbor	City	High
	Marina Infrastructure	4. Implement marina upgrade program (docks, pilings, utilities)	Harbor District	High
		5. Consider Public Works Plan or Programmatic EIR	Harbor District	Low

Section	Approach and Category	Strategy and Numbered Actions	Lead Agency	Priority
2.3.2 A	Relocate	Support voluntary relocation of non-coastal-dependent uses to outside hazard areas		
	Land Use	1. Engage stakeholders interested in potential relocation to understand concerns, priorities, and needs.	Harbor District	Low
		2. Explore potential voluntary policies and incentives, connecting with local resources where available.	County / Harbor District	Low
2.3.3 A	Avoid	Establish policy framework for long-term adaptation		
	Policy / LCP Update	1. Update LCP with sea level rise standards and adaptation policies	Harbor District / City / County	Medium
		2. Update flood hazard maps with sea level rise projections	Harbor District / City / County	Medium
2.3.4 A	Study and Plan	Maintain adaptive planning and data updates		
	Future Planning	1. Update sea level rise adaptation plan with new data and studies	Harbor District / City / County	Low
		2. Integrate updated hazard modeling into Hazard Mitigation Plan updates	Harbor District / City / County	Low

TABLE 2. PRIORITY RESILIENCE ACTIONS

Section	Category	Action	Timeframe	Lead Agency	Priority	Dependency
2.1.3 A.5	Dredging / Sediment Management	Develop and implement Dredged Sediment Reuse Plan	Near	Harbor District / USACE	High	Permitting, funding
2.3.1 B.2	Dredging / Sediment Management	Evaluate long-term sediment management alternatives and retrofit dredge cell	Long	Harbor District / City / USACE	High	Permitting, design
2.2.1 A 1	Access / Transportation	Elevate or realign North and South Harbor Drive	Long	Harbor District	High	Design, funding
2.2.1 A.1–2; 2.3.2 A 2-3	Access / Transportation	Develop emergency access route (Noyo Point Road connection)	Medium	City	High	Easements, funding
2.3.1 A.1	Shoreline Protection	Rehabilitate and upgrade north and south jetties	Long	Harbor District / USACE	High	USACE coordination, funding
2.3.1 A.2	Shoreline Protection	Upgrade harbor revetments with armoring and hybrid approaches	Long	Harbor District / USACE	High	Design, funding
2.1.2 A.2	Harbor Infrastructure	Upgrade harbor utility and service infrastructure for flood resilience	Near	Harbor District	High	Funding
2.1.2 B.2	City Infrastructure	Upgrade sewer lift stations with flood-resilient systems	Near	City	High	Funding
2.2.2 A.1	Marina Infrastructure	Conduct marina infrastructure condition and needs assessment	Medium	Harbor District	High	Funding
2.3.2 A.4	Marina Infrastructure	Implement marina infrastructure upgrade program (docks, pilings, utilities)	Medium	Harbor District	High	Design, funding
2.2.3 A.2	Studies and Planning	Perform geotechnical assessments of fill and wharf conditions	Medium	Harbor District	High	Funding
2.3.3 A.1	Policy (LCP Update)	Update Local Coastal Program to incorporate sea level rise standards and adaptation policies	Long	City / County	Medium	Coastal Commission

2.1 Near-Term Resilience Strategies

Near-term strategies can begin immediately or within the first two years after SLRRS adoption. These strategies focus on maintaining current harbor operations, addressing immediate vulnerabilities identified in the VRA (particularly storm flooding and access disruptions), and initiating planning efforts for long-term adaptation.

2.1.1 Emergency Preparedness

A. Share knowledge for planning & preparedness.

Community members requested more information on sea level rise hazards and preparedness resources, including flood risk maps, educational materials, and emergency response plans. Survey respondents preferred newsletters/mailers, websites, and community meetings as the top forms of receiving information. Under this strategy, the City and Harbor District would share existing maps and information, and establish methods for sharing future studies and resources. This effort complements ongoing public education, community meetings, and risk-map communications [e.g., BEVRI Plan, CoSMos, 2026 County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update, Noyo Ocean Collective public information, Grassroots Institute meetings, etc.].

1. **Action:** Provide an accessible website or an online hazards map (webmap) where users can view sea level rise scenarios, tsunami risk, and coastal flooding within or near the harbor area. The website could display the SLRRS mapping results or guide users to the USGS CoSMoS mapping tool.
Priority: Low; Lead: Harbor District / County
2. **Action:** Conduct outreach to vulnerable property owners to provide information on hazard maps and resources, emergency preparedness tools, and sources of financial or other support as warranted. The outreach could include a newsletter mailed or delivered to each property, or a community open house or meeting.
Priority: Low; Lead: Harbor District / City
3. **Action:** Conduct regular, recurring tsunami siren drills. The County Office of Emergency Services has been holding annual tsunami preparedness drills in coordination with the National Weather Service and local agencies. The siren alert system has been part of the drills, when not recently tested otherwise (e.g., as part of a tsunami warning alert). It is important for the annual drills to continue, with sirens when possible, to prepare Harbor businesses, visitors, and others in the event of an actual emergency.
Priority: Medium; Lead: County

B. Improve navigation and wayfinding during storm or tsunami events.

Currently, North and South Harbor Drive, Coast Road, and Basin Street provide essential accessways for harbor-area commercial and business operations, residents, visitors, and emergency responders. However, portions of the roads already experience flooding during significant storm events, which will worsen over time. Directional and informational signage in and near the harbor area will assist residents, workers, and visitors in preparing for and evacuating from flooding events. This short-term strategy supports longer-

term transportation resilience and safety planning activities contained in the SLRRS, the Noyo Harbor Multimodal Circulation Access Plan, and the 2026 County MJHMP.

1. **Action:** Incorporate emergency access/egress information in the Harbor Area into the comprehensive wayfinding system proposed under the Noyo Harbor Multimodal Circulation Access Plan.
Priority: Medium; Lead: Harbor District

2.1.2 Accommodate

A. Undertake minor retrofits/waterproofing for Harbor District facilities and infrastructure.

The Noyo Harbor District owns and operates a number of facilities that support harbor operations, vessel services, and public access. Both existing storm and “sunny day” flooding events have historically damaged Harbor District structures and amenities, particularly ocean-facing facilities such as the public parking lot, marina pilings, the dredge soils containment cell, and the marina floor. The dredge soils containment cell is a longer-term project addressed in Strategy 2.1.3, but essential repairs to other Harbor District facilities are imperative. Additionally, essential structures for harbor operations, including the Harbor District office, should use future maintenance opportunities to retrofit or upgrade structural components to provide near-term floodproofing where possible. This would provide quick-win protection for critical rooms/equipment while larger capital projects undergo the planning and design phases. These actions align with ongoing projects identified for Noyo Harbor (e.g., the Sustainability Plan and the Facilities Assessment).

1. **Action:** Incorporate floodproofing upgrades into planned maintenance for the Harbor District Administrative Office, maintenance and storage areas, and associated utility connections. Upgrades may include installing watertight doors, sealing wall penetrations, using waterproof coatings, fitting vents with flood shields or backflow preventers, and moving electrical panels to be located above projected flood levels.
Priority: Medium; Lead: Harbor District
2. **Action:** Incorporate “wet floodproofing” upgrades into Harbor utility and service infrastructure associated with the docks, loading areas, and vessel services. Measures can include using flood-resistant materials (e.g., concrete, pressure-treated lumber, corrosion-resistant metals), elevating or anchoring electronic or mechanical equipment (e.g., pumps, motors), and installing deployable barriers around critical equipment in times of emergency.
Priority: High; Lead: Harbor District
3. **Action:** Incorporate “floodable” infrastructure retrofits into planned upgrades for parking areas, sidewalks, docks, and other paved, developed, or landscaped areas. Tools may include permeable pavement in parking areas, rain gardens or rain capture structures in landscaped areas, and road/sidewalk culverts designed to capture/shunt stormwater from critical road/parking areas to reduce nuisance flooding and improve drainage performance.
Priority: Medium; Lead: Harbor District

B. Incorporate minor retrofits/waterproofing into the City's capital improvement plan for City-owned harbor infrastructure.

While most land and structures in the Harbor are owned by the Harbor District or private owners, the City also owns some land, public access areas, and municipal infrastructure. Planning for public access areas (e.g., Noyo Beach, segments of the California Coastal Trail within Pomo Bluffs Park) is a longer-term strategy discussed in subsequent strategies. In the near-term, upgrades to municipal water and sewer connections and local roads as those facilities become due for maintenance/repair would assist with service continuity during emergency events. This effort aligns with the drainage capacity/resilience upgrades identified for Noyo Harbor (e.g., Noyo Harbor Multimodal Circulation Access Plan).

1. **Action:** Assess the municipal water distribution facilities within the harbor area (e.g., pipe and valve type and condition) and compare against the SLRRS coastal hazard maps. Incorporate adaptive measures such as corrosion-resistant materials and coatings (to protect from saltwater-induced corrosion), deeper burials or protective casings (to protect from erosion), and sealed manholes (to reduce nuisance flooding).

Priority: Medium; Lead: City

2. **Action:** As part of the City's wastewater collection system capital improvements planning, assess the conditions of the two sewer lift stations at the harbor (north and south sides) and compare against the SLRRS coastal hazard maps. Incorporate adaptive measures such as submersible pumps and motors, waterproof conduit, and elevating electrical panels, control systems, and backup systems above projected flood elevations.

Priority: High; Lead: City

2.1.3 Protect

A. Develop and implement a dredged sediment plan for marina maintenance dredging.

To improve the long-term resilience of Noyo Harbor to sea level rise, erosion, and storm impacts, the Harbor District should prepare and implement a Dredged Sediment Reuse Plan for sediment removed during routine marina maintenance dredging, to maintain the required depths. A sediment plan would evaluate opportunities to beneficially reuse dredged sediment within the harbor or nearby coastal areas to support shoreline resilience, habitat enhancement, and harbor maintenance. It would establish procedures for drying, storing, transporting, and placing dredged sediment for reuse projects while minimizing environmental impacts. The Plan would integrate the sediment reuse or disposal strategy into routine harbor dredging operations and capital improvement planning to ensure that beneficial reuse opportunities are considered during future dredging cycles. It would also mitigate flooding impacts from large storm events, including flooding expected to be exacerbated due to projected sea level rise. Maintaining a functional dredging program is a critical near-term priority, as the VRA identified the dredge containment system as a single point of failure for harbor operations, i.e., failure of the dredge containment system would cause the entire Harbor to stop functioning. Implementation should occur in the near-term due to current operational constraints and ongoing risk to the dredge containment system.

1. **Action:** Maintain ongoing coordination with the U.S. Army Corps of Engineers and necessary federal, state, and local partners (e.g., California Coastal Commission, U.S. Army Corps of Engineers, and the North Coast Regional Water Quality Control Board) to plan for the dredge cell retrofitting, associated beach restoration, and beneficial reuse or disposal of sediment per applicable regulations, permitting requirements, regional resilience efforts, and funding programs.
Priority: High; Lead: Harbor District / City / USACE
2. **Action:** Evaluate the physical and chemical characteristics of marina dredged sediments to determine their suitability for beneficial reuse applications such as beach nourishment, habitat restoration, or shoreline stabilization. Given the potential for contaminants in dredged sediment, concurrently undertake a hazardous materials study.
Priority: Medium; Lead: Harbor District / City / USACE
3. **Action:** Consider test placements of dredged sediment coordinated with Harbor maintenance and U.S. Army Corps of Engineers' pilot study.
Priority: Low; Lead: Harbor District / City / USACE
4. **Action:** In coordination with the City of Fort Bragg, U.S. Army Corps of Engineers, County of Mendocino, and other regional partners, identify potential locations and projects where dredged sediment could support coastal resilience objectives (e.g., Noyo Beach restoration, shoreline stabilization, or habitat enhancement).
Priority: High; Lead: Harbor District / City / USACE
5. **Action:** Prepare Dredged Sediment Reuse Plan, to include monitoring protocols to assess the effectiveness of sediment reuse projects in improving shoreline resilience, supporting habitat, or maintaining harbor operations, and update the plan as needed based on performance results.
Priority: High; Lead: Harbor District / USACE

2.1.4 Funding Opportunities and Mechanisms

- Local government budget allocations
- Small state or regional grants, e.g., Coastal Conservancy, Caltrans Sustainable Communities, California Governor's Office of Emergency Services
- Federal grants, e.g., USACE, FEMA

2.2 Medium-Term Resilience Strategies

Medium-term strategies are intended to advance planning, design, and funding for major infrastructure improvements that address ongoing vulnerabilities to flooding, erosion, and emergency access. These strategies build on near-term actions and position the Harbor District and City to implement larger capital projects as sea level rise progresses, including improvements to access, marina infrastructure, and shoreline protection systems.

2.2.1 Emergency Preparedness

A. Formalize an emergency access route and Coastal Trail connection.

Establish an emergency-only secondary exit route from North Harbor Drive to Noyo Point Road, in concert with implementation of the Multimodal Circulation Access Plan and ongoing community discussions regarding emergency access and response. The route would be designed for emergency and service vehicle use only, remaining closed to regular public vehicular traffic except during emergency situations or planned drills. In coordination with this effort, elevating the road and developing a new pedestrian connection from the Noyo Headlands Trail should be considered as long-term strategies.

1. **Action:** Work with adjacent property owners, the County, and emergency response agencies to evaluate access needs, potential easements, and operational requirements, including protocols for opening and managing the route during emergency events.
Priority: Medium; Lead: City
2. **Action:** Evaluate potential alignments for an emergency-only roadway connection between North Harbor Drive and Noyo Point Road, considering topography, property ownership, environmental constraints, and hazard exposure. Develop preliminary design concepts for the roadway connection, including grading, drainage, slope stabilization, emergency gates or barriers, and signage indicating emergency-only vehicular use. Pursue funding opportunities through state and federal resilience, hazard mitigation, or infrastructure programs to support design and construction.
Priority: High; Lead: City

B. Investigate incentive programs and standards to reduce existing hazards on private properties.

Noyo Harbor includes a mix of privately owned properties that support commercial fishing, seafood processing, visitor-serving uses, and other waterfront-dependent activities, many of which are located immediately adjacent to the shoreline or on low-lying parcels. Due to their proximity to the water, these properties are increasingly exposed to existing coastal hazards, including tidal flooding, storm surge, wave run-up, and shoreline erosion, which have already caused damage during recent storm events. In several locations, aging shoreline stabilization features, utilities, and structural foundations show signs of deterioration or vulnerability, indicating a need for near-term repairs and maintenance to prevent further damage and ensure continued safe operations. Addressing these issues is critical not only for protecting private investments and maintaining economic activity within the harbor, but also for reducing safety risks and preventing localized failures that could affect adjacent infrastructure and public areas.

1. **Action:** Use information from the Noyo Harbor Facilities Condition Assessment to understand necessary emergency property repairs to protect existing harbor structures from flooding or erosion hazards. Pursue funding from state, federal, or nonprofit funders to facilitate incorporation of floodproofing/adaptation measures into maintenance/repairs.
Priority: High; Lead: Harbor District
2. **Action:** Develop standards for storing and disclosing hazardous materials within the mapped coastal hazard areas, to facilitate pre-event removal or secure storage of hazardous materials prior to emergency events, and safe response and handling during and after emergency events.
Priority: High; Lead: City / County

2.2.2 Accommodate

A. Initiate planning for Marina elevation/retrofit program.

Many of the docks, pilings, gangways, and associated utility systems serving the nine docks in the Noyo Harbor marina are aging and increasingly vulnerable to coastal hazards, highlighting the need for comprehensive upgrades to support safe and reliable harbor operations. Rising sea levels, stronger winter storms, and changing tidal conditions can increase stresses on floating docks and pile-supported infrastructure, while older gangways may not provide adequate clearance or safe access during extreme high tides or storm surge events. In addition, electrical and water utility connections on the docks can present reliability and safety concerns during flooding or saltwater exposure. Replacing or upgrading marina docks, pilings, gangways, and utility systems is a critical need to improve structural resilience, accommodate future water level changes, reduce maintenance needs, and ensure that the marina continues to safely serve commercial fishing vessels, harbor-dependent businesses, and recreational users as coastal conditions evolve.

1. **Action:** Conduct a Marina Infrastructure Condition and Operational Needs Assessment. Perform a detailed engineering assessment of the existing docks, pilings, gangways, and utility systems serving the nine marina docks to identify structural deficiencies, safety concerns, and vulnerabilities to sea level rise and storm impacts.
Priority: High; Lead: Harbor District
2. **Action:** Develop conceptual engineering designs. Prepare preliminary designs for upgraded floating docks, pile systems, gangways, and utility infrastructure that improve durability, accommodate future water levels, and support harbor-dependent uses.
Priority: High; Lead: Harbor District
3. **Action:** Identify funding and financing opportunities. Pursue state, federal, and regional funding sources for harbor resilience and maritime infrastructure improvements, including grants for climate adaptation and working waterfront preservation.
Priority: High; Lead: Harbor District

2.2.3 Study and Plan

A. Undertake the following targeted studies and plans to inform further detailed planning and adaptation efforts.

The studies will support siting and project selection noted by SLRRS stakeholders and the development of further site-specific adaptation projects.

1. **Action:** Municipal water source study for intake feasibility and resilience of City-owned water infrastructure.
Priority: Medium; Lead: City
2. **Action:** Geotechnical assessments of artificial fill and wharf conditions.
Priority: High; Lead: Harbor District
3. **Action:** Precise erosion/bluff mapping.
Priority: Medium; Lead: City

2.2.4 Funding Opportunities and Mechanisms

- State and federal grants, e.g., Ocean Protection Council, FEMA, EPA
- Sales tax add-ons or special assessments
- Public-private partnerships: Engage local businesses (e.g., fishing, hospitality) to co-invest in projects with direct benefits.

2.3 Long-Term Resilience Strategies

Long-term resilience strategies focus on implementing large-scale capital improvements and land use changes necessary to maintain harbor operations under higher sea level rise scenarios (approximately 3 to 6 feet). These strategies build on earlier planning and design efforts and address system-wide vulnerabilities that cannot be resolved through near- or medium-term actions. Long-term strategies include elevation or realignment of critical infrastructure, reconstruction of existing and construction of new shoreline protection or offshore structures, and incremental relocation or redesign of vulnerable assets where protection or accommodation is not feasible. These strategies are designed to allow the Harbor District and City to respond to evolving risks while maintaining harbor operations and public access. Implementation will require coordination with regional partners and integration with ongoing studies and planning efforts to ensure consistency and maximize effectiveness.

2.3.1 Protect

A. Engineered Harbor Shoreline Structure Upgrades/Improvements

Noyo Harbor relies on a combination of federal, local, and site-specific engineered structures to protect the marina, commercial/industrial uses, and overall harbor operations from waves, erosion, flooding, and sedimentation. The North Harbor Entrance Jetty, South Harbor Entrance Jetty & Breakwater, and Harbor Revetment are critical to protecting the harbor from ocean energy and storm surges. Below are long-term adaptation strategies and implementing action items for each of the key engineered protective devices in Noyo Harbor, focused on improving resilience to sea level rise, storm surge, erosion, and tsunami hazards.

1. **Action:** Improve the North and South Jetties (Breakwaters): Plan for phased rehabilitation, crest elevation, and structural reinforcement of the jetties to maintain effective wave attenuation and navigation safety under higher sea levels and more energetic storm conditions. Conduct detailed structural and hydraulic modeling under future sea level rise and storm scenarios. Coordinate with the U.S. Army Corps of Engineers to evaluate design alternatives (e.g., crest raising, armor stone enlargement). Assess sediment transport implications and navigation channel performance. Prepare engineering designs for phased upgrades.
Priority: High; Lead: Harbor District / USACE
2. **Action:** Upgrade and adapt Harbor revetments through regrading, armoring enhancement, and integration with nature-based features to maintain shoreline stability while reducing erosion and wave impacts. Inventory and assess condition and elevation of existing revetments. Evaluate performance under higher water levels and increased wave run-up. Design improvements such as larger armor stone, increased crest elevation, and toe protection. Incorporate hybrid approaches (e.g., beach

nourishment or vegetated buffers where feasible). Prioritize segments protecting critical infrastructure and access routes.

Priority: High; Lead: Harbor District / USACE

B. Ensure Timely Harbor Entrance/Channel and Marina Dredging

The Harbor's dredging program and coordination with the U.S. Army Corps will need to adapt to changing sediment dynamics and water levels to ensure continued navigational access and reduce flood risk. Additionally, as part of existing and mid-term sediment reuse planning, the dredge containment cell will need to be improved through structural reinforcement, elevation, and/or long-term redesign or relocation, while transitioning toward beneficial reuse of dredged sediment.

1. **Action:** Coordinate with the U.S. Army Corps of Engineers on their long-term dredging strategy. Monitor channel depth, shoaling patterns, and navigation safety. Reuse beneficial sediment to the greatest extent possible.
Priority: High; Lead: Harbor District / USACE
2. **Action:** Evaluate configurations of the sediment containment cell for short-term sediment storage and develop a long-term Dredge Sediment Reuse Plan. Conduct engineering evaluation of berm stability, overtopping risk, and failure modes. Design improvements such as raising berm elevations, reinforcing slopes, and improving drainage. Coordinate permitting and environmental review for upgrades or relocation.
Priority: High; Lead: Harbor District / City / USACE

2.3.2 Accommodate

A. Harbor Infrastructure Upgrades

To maintain safe and reliable access to Noyo Harbor under increasing sea level rise, storm surge, and flooding conditions, the Harbor District and City should implement a long-term, phased strategy to elevate and improve Harbor- and coastal-dependent uses and public access. The improvements would prioritize commercial harbor uses and public emergency access. Existing infrastructure is vulnerable to rising water levels, increased storm intensity, and saltwater exposure, which can compromise structural integrity and operational reliability. This strategy would replace aging components with resilient, adaptable systems designed to accommodate higher water levels, reduce damage during storm events, and support long-term harbor operations. This strategy should be initiated before sea level rise approaches approximately 3 feet, when storm-related access disruptions are expected to become frequent.

1. **Action:** Maintain reliable access to Noyo Harbor by elevating North and South Harbor Drive, which are currently the only access routes and represent a system-wide vulnerability under storm conditions. Develop conceptual engineering designs for roadway elevation, realignment, or reinforcement. Incorporate drainage improvements, backflow prevention, and erosion control measures. Coordinate with emergency services to define access and evacuation requirements.
Priority: High; Lead: Harbor District
2. **Action:** Develop pedestrian connection from the Noyo Headlands Trail to Noyo Beach, to complete the planning and coordination effort undertaken under 2.2.1 A, *Emergency Preparedness*.
Priority: Medium; Lead: City

3. **Action:** Develop secondary vehicular emergency access from the north harbor area, to effectuate the planning, design, and funding efforts undertaken under 2.2.1 A, *Emergency Preparedness*.
Priority: High; Lead: City
4. **Action:** Implement Marina upgrade program. Update docks, pilings, gangways, electrical and water utilities for all 9 docks that are in the marina. Develop design criteria for new docks, pilings, and gangways based on projected sea level rise and storm conditions. Replace or retrofit docks with floating systems capable of accommodating higher water levels. Install longer, more robust pilings to support future elevation changes. Upgrade gangways to maintain safe access during extreme tides and storm events. Replace electrical and water utilities with flood-resistant and corrosion-resistant systems. Phase construction to minimize disruption to marina operations.
Priority: High; Lead: Harbor District
5. **Action:** Consider developing a Public Works Plan to meet California Coastal Act requirements or a Programmatic Environmental Impact Report to meet California Environmental Quality Act requirements to streamline permitting and environmental review, respectively, of structures and infrastructure owned by the Harbor District.
Priority: Low; Lead: Harbor District

2.3.3 Relocate

A. Support Voluntary Relocation of Non-Coastal-Dependent Uses to Outside Hazard Areas

To reduce long-term exposure to sea level rise, coastal flooding, erosion, and tsunami hazards, the Harbor District should initiate discussions with interested stakeholders to gauge the appeal of a long-term relocation program for non-coastal-dependent and non-harbor-dependent uses located in vulnerable harbor areas. This strategy recognizes that, over time, certain uses that do not require a waterfront location may be more appropriately relocated out of high-risk areas to reduce public safety risks, minimize future economic losses, and allow space for shoreline adaptation and continued operation of essential harbor functions. Given economic, regulatory, and social constraints, relocation would be expected to occur incrementally and opportunistically over time through redevelopment, lease transitions, and voluntary participation, while prioritizing the retention and protection of coastal-dependent uses such as commercial fishing and harbor operations, as well as supportive economic endeavors.

1. **Action:** Engage affected stakeholders early to explore voluntary relocation interest and opportunities. Engage affected property and business owners, tenants, and other stakeholders early to understand their concerns, priorities, and long-term needs.
Priority: Low; Lead: Harbor District
2. **Action:** Explore policies and incentives (e.g., redevelopment flexibility, financial assistance, land swaps) to support voluntary relocation of non-coastal-dependent uses. Connect with City and County staff on any relevant resources they identify as part of local shoreline resiliency planning efforts. Where appropriate, identify potential alternative sites and pursue state and federal funding to support voluntary relocation planning.
Priority: Low; Lead: Harbor District

2.3.4 Avoid

A. Update the City and County LCPs to implement long-term planning efforts through a phased approach

Updating the LCP on regular intervals—approximately every 10 to 15 years—is a key long-term strategy for guiding land use, development standards, and adaptation pathways under sea level rise. This SLRRS informs an initial LCP update that will establish policies approved for initial efforts to adapt to sea level rise in the harbor area. A future LCP update would update any baseline policies approved as part of the region’s initial efforts to adapt to sea level rise, establish detailed policies and development standards to fully implement necessary adaptation and relocation strategies, and incorporate a longer-term vision for the harbor area. The LCP update could include land-use strategies such as rezoning and transfer-of-development-rights mechanisms. The updated LCP would also provide regulatory clarity for harbor-dependent uses while ensuring consistency with the California Coastal Act and California Coastal Commission’s best available guidance on sea level rise planning, factoring in future advances in sea level rise science. The actions below identify policy directions and implementation steps that would be incorporated through a future LCP update process.

1. **Action:** Develop objective standards for new and redeveloped structures in the harbor area, which may include elevation requirements, flood-resistant design, setbacks from erosion hazards, and infrastructure protection measures. Ensure the updated LCP recognizes and supports harbor-dependent uses such as commercial fishing, maritime services, and working waterfront infrastructure while integrating adaptation strategies for long-term resilience. Examine the incorporation of siting and design standards such as setbacks/buffers, rolling easements activated by sea level rise triggers, and disaster rebuild and repetitive loss guidance. Include technical guidance on performing site-specific analysis to support a standardized permitting process and consider permit incentive programs to streamline permitting for retrofits or redevelopment to support resiliency efforts and promote economic stability for harbor-dependent uses.
Priority: Medium; Lead: Harbor District / City / County
2. **Action:** Update flood hazard maps using sea level rise coastal hazard maps and considering future climate hydrology.
Priority: Medium; Lead: Harbor District / City / County

2.3.5 Study and Plan

These studies will support future comprehensive adaptation efforts and site-specific adaptation projects.

1. **Action:** Update sea level rise adaptation plan to incorporate additional detail and study results.
Priority: Low; Lead: Harbor District / County
2. **Action:** Integrate updated sea level rise, storm surge, tsunami, and flooding mapping and modeling into the County Multi-Jurisdictional Hazard Mitigation Plan Update in 2031.
Priority: Low; Lead: Harbor District

2.3.6 Funding Opportunities and Mechanisms

The following funding sources and mechanisms may support implementation of the strategies and actions described above.

- Tax increment financing (TIF): Prepare sales tax add-on or tax increment financing concept papers in alignment with the Noyo Harbor Facilities Condition Assessment recommendations.
- Resilience or geologic hazard abatement districts: Provide a dedicated, ongoing revenue stream for maintenance and long-term adaptation.
- SB 32 cap-and-trade funds: Support managed retreat and climate adaptation at scale.
- Large federal and state grants: (e.g., FEMA, Governor’s Office of Land Use and Climate Innovation) for multi-year, high-cost projects.
- Land purchase negotiations: State or federal acquisition of vulnerable properties to support voluntary relocation, ultimately for public benefit.

2.4 Considerations Regarding Effectiveness & Feasibility

Implementation of the strategies identified in this SLRRS will depend on their technical effectiveness, feasibility, cost, and ability to support continued harbor operations under future sea level rise conditions. The approaches described in this document reflect a balance between these factors, as well as site-specific constraints at Noyo Harbor, including its high-energy coastal setting, limited sediment supply, and reliance on engineered infrastructure to maintain navigation and harbor functionality.

2.4.1 Engineered Protection Measures

Engineered shoreline protection measures, including jetties, revetments, and related harbor protection structures, are expected to remain the primary means of reducing wave energy, erosion, and storm impacts at Noyo Harbor. These structures are critical to maintaining safe navigation, protecting harbor infrastructure, and supporting ongoing commercial and recreational uses.

While these approaches are generally effective in the near- and long-term, they are also capital-intensive and require ongoing maintenance, monitoring, and periodic upgrades to remain functional under increasing sea levels and more energetic storm conditions. As sea level rise progresses, these systems may require structural reinforcement, crest elevation, or redesign to maintain their level of protection. Despite these challenges, engineered protection measures are necessary to sustain core harbor operations and are therefore a central component of the long-term resilience strategy.

2.4.2 Nature-Based and Hybrid Approaches

Nature-based and hybrid approaches, such as beach nourishment, sediment placement, or vegetated shoreline features, can provide additional benefits by reducing wave energy, supporting sediment retention, and enhancing habitat. However, their effectiveness at Noyo Harbor is constrained by the site’s high-energy wave climate, limited sediment supply, and existing shoreline configuration.

Due to these conditions, nature-based strategies alone are unlikely to provide sufficient protection for critical harbor infrastructure, but may be incorporated as complementary measures where feasible. For example, beneficial reuse of dredged sediment may support localized shoreline stabilization, beach nourishment, or habitat enhancement when coordinated with dredging operations. Hybrid approaches that combine engineered structures with natural features may also provide incremental benefits, but would require careful design, monitoring, and maintenance to ensure performance over time.

2.4.3 Policy and Planning Tools

Policy and planning tools play an important role in supporting long-term adaptation and reducing future risk, particularly where physical protection or accommodation may not be feasible. These tools include updates to the Local Coastal Program, development standards for new or redeveloped structures, hazard disclosure requirements, and long-term land use planning strategies such as voluntary relocation.

Unlike large capital projects, many policy actions can be initiated in the near-term and implemented incrementally over time, allowing the Harbor District and County to guide future development patterns, reduce exposure to hazards, and support adaptive responses to changing conditions. Voluntary relocation of non-coastal-dependent uses, in particular, offers long-term benefits by reducing exposure and allowing space for shoreline adaptation, although it presents challenges related to cost, permitting, and stakeholder interest.

Together, these policy and planning tools complement engineered and operational strategies by providing a framework for long-term resilience, helping to align future investments with projected sea level rise conditions, and supporting adaptive management as new information becomes available.

3. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

This Sea Level Rise Resilience Strategy (SLRRS) identifies a set of priority actions to maintain the long-term functionality of Noyo Harbor under increasing coastal hazards, including sea level rise, storm flooding, erosion, and tsunami risk. The most critical actions include maintaining dredging operations, ensuring reliable harbor access, and upgrading shoreline protection systems. These actions address system-level vulnerabilities identified in the 2026 VRA and are necessary to sustain harbor operations under future sea level rise conditions. Implementation of this strategy will require a phased approach, coordinated across agencies, and supported by adaptive management over time.

In the near term, the highest priority actions focus on maintaining existing harbor operations and reducing immediate risks. These include restoring and improving the dredge containment system, developing a dredge strategy for both the federal channel and mooring basin, initiating planning activities to maintain reliable access along North and South Harbor Drives, and conducting condition assessments of marina infrastructure. These actions address existing vulnerabilities—particularly storm-related flooding and access disruptions—that already affect harbor functionality under present-day conditions.

Medium-term strategies focus on advancing planning, design, and funding for major infrastructure improvements. This includes development of a Marina Infrastructure Upgrade Program, evaluation of emergency access alternatives, and initiation of shoreline protection improvements such as jetty rehabilitation and revetment upgrades. These efforts are intended to position the Harbor District to respond proactively as sea level rise progresses and infrastructure reaches the end of its useful life.

Long-term strategies focus on implementation of large-scale capital improvements and land use changes necessary to maintain harbor operations under higher sea level rise scenarios (approximately 3 to 6 feet). These include elevation or realignment of critical access routes, formalization of coastal trail segments, construction of additional shoreline protection or offshore structures, long-term sediment management, and incremental, voluntary relocation or redesign of vulnerable assets where protection or accommodation is not feasible. Managed relocation is expected to occur opportunistically over time through redevelopment, lease transitions, and voluntary participation, given economic and regulatory constraints.

Implementation of the SLRRS will require coordination among the Harbor District, City, County, and state, federal, and tribal partners, including the Sherwood Valley Band of Pomo Indians, California Coastal Commission, and the U.S. Army Corps of Engineers. Many strategies are dependent on external funding, permitting, and other regulatory approvals, and will need to be aligned with capital improvement planning and grant funding cycles. Adaptive management will be critical, and strategies should be refined over time based on monitoring, updated sea level rise projections, and evolving site conditions.

Overall, this strategy provides a phased and prioritized framework for improving resilience at Noyo Harbor. By initiating near-term actions and advancing long-term planning, the Harbor District can reduce risk, maintain critical operations, and preserve the harbor's role as a critical economic, operational, and community asset along the North Coast.

4. REFERENCES

- California Coastal Commission (CCC), 2024. Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits, Adopted November 13, 2024.
- Environmental Science Associates (ESA), 2026. Sea Level Rise, Tsunami Hazards, and Erosion Vulnerability and Risk Assessment for Noyo Harbor, Prepared for the City of Fort Bragg and Noyo Harbor District, April 2026.
- Fehr & Peers, 2025. Draft Noyo Harbor Multimodal Circulation Access Plan. Prepared for Mendocino Council of Governments, August 13, 2025.
- Noyo Harbor District, 2019. Noyo Harbor Community Sustainability Plan. Adopted June 2019.
- Noyo Ocean Collective, 2026. Noyo Harbor Blue Economy Community Engagement Plan and Blue Economy Visioning, Resiliency, and Implementation Plan. Available at <https://noyooceancollective.org/>. Accessed April 28, 2026.

5. ACKNOWLEDGMENTS

The following staff from the City of Fort Bragg and Noyo Harbor District contributed to this effort:

Sarah McCormick (City of Fort Bragg)

Anna Neumann (Noyo Harbor District)

Jami Miller (City of Fort Bragg, California Sea Grant Coastal Mendocino Extension Fellow)

The following ESA staff and team members contributed to this report and supporting analyses:

Selena Whitney, AICP (Project Manager)

Louis White, PE

Shannon Fiala

Elizabeth Felter

Merritt Shepherd

Michelle Orr, PE

Elijah Davidian, AICP

Jack Hogan (Arup)

Jinal Mehta (Arup)

Vanessa Blodgett (Planwest Partners)

Sarah Wickman (Planwest Partners)

This page intentionally left blank

Appendix A. SLRRS Public Outreach Summary

SEA LEVEL RISE, TSUNAMI HAZARDS, AND EROSION RESILIENCE STRATEGY

Public Outreach Summary

This document provides a summary of the City of Fort Bragg (City) and Noyo Harbor District’s (Harbor District) public outreach efforts to support the Sea Level Rise, Tsunami Hazards, and Erosion Resilience Strategy (SLRRS). All original outreach materials and community member comments are available as part of the administrative record.

Online Outreach

The City, in partnership with the Harbor District, the Noyo Ocean Collective, and other regional partners, conducted a range of online public outreach efforts to inform and engage the community about the SLRRS. These efforts included a project webpage, social media campaigns, online surveys, and digital promotion of public workshops.

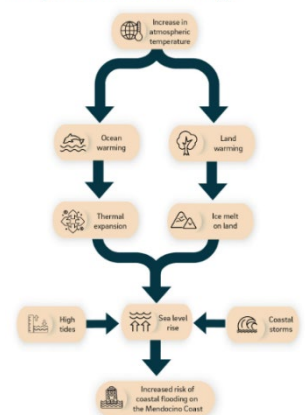
Webpage

The Noyo Ocean Collective’s SLR Resilience webpage served as a central information hub for the strategy. It provided a primer on sea level rise and described the SLRRS project. The site shared the draft Vulnerability and Risk Assessment for public review and comment. The webpage also shared technical resources (e.g., recommended sea level rise scenarios), planning documents (e.g., flooding projections), and links to additional state and national guidance and data related to sea level rise and flooding.

Social Media

To support community engagement, the City and Harbor District project partners used social media channels associated with the Noyo Harbor Blue Economy initiative to publicize opportunities for public input. Posts on Facebook and Instagram promoted the in-person events (discussed further under “Public Events”). These posts highlighted the City’s interest in strengthening coastal resilience and invited community members to attend meetings or learn more about the SLRRS. Social media outreach also encouraged public participation through online surveys (discussed further under “Survey”), asking residents and harbor users to provide input on priorities and concerns related to sea level rise and harbor infrastructure. Posts emphasized that public feedback would help shape the future of coastal resilience planning in Noyo Harbor and guide the development of adaptation strategies. In addition to promoting workshops and surveys, outreach materials linked the SLRRS planning effort to broader community events and initiatives, such as the Noyo Harbor Blue Economy Visioning, Resiliency and Implementation (BEVRI) initiative, aquaculture study, and KelpFest.

Why are sea levels rising?





Online engagement also referenced king tide events, to provide a real-world example of extreme high-tide conditions that resemble future sea level rise impacts. Social media posts and shared photographs of king tides in the Fort Bragg and Noyo Harbor area helped illustrate potential flooding and shoreline impacts, encouraging community awareness of coastal hazards and reinforcing the relevance of resilience planning. The social media posts also encouraged the public to submit their own photos.

Survey

City staff conducted a Sea Level Rise, Tsunami Hazards, and Erosion Resilience Survey between February and July 2025 to gather community perspectives on coastal hazards affecting Fort Bragg and Noyo Harbor and to inform the SLRRS within the BEVRI Plan. The survey was available both online and on paper, and 47 respondents participated. Most respondents lived locally, with 63% residing in Fort Bragg and 33% in coastal Mendocino County.

Overall, survey results indicated high levels of concern about sea level rise impacts in Noyo Harbor. Approximately 70% of respondents reported being “concerned” or “very concerned” about current impacts, and over 80% were concerned about impacts within the next 30–60 years. Respondents most commonly identified flooding of low-lying areas (85%), coastal erosion (83%), and damage to infrastructure such as roads, bridges, and utilities (81%) as likely impacts of sea level rise. Other frequently cited concerns included loss of beaches and recreational areas, impacts on local wildlife and ecosystems, and potential effects on the local economy.

Respondents expressed strong interest in additional information and planning resources to help prepare for future coastal hazards. The most requested resources included flood risk maps for the community (76%), educational materials about sea level rise (64%), and emergency response plans (60%). When asked about adaptation strategies, the most widely supported options were enhanced emergency response and evacuation planning (70%) and restoring natural coastal barriers such as wetlands or dunes (68%), followed by incentives for relocating development from high-risk areas and updated zoning or building regulations. Participants reported receiving information about sea level rise primarily from environmental organizations and local government communications, and they expressed a preference for receiving future updates through community meetings, newsletters or mailers, and online resources.

Public Events

Noyo Harbor Blue Economy Open House

The Noyo Harbor Blue Economy Open House was held at the Noyo Center Marine Field Station on Saturday, June 7, 2025. Nearly 100 participants attended, including community members, several harbor landowners, and representatives from local government. Local news reporters from outlets including The Mendocino Voice and The Mendocino Beacon were also present. Participants accessed several indoor and outdoor stations providing information on components of the



BEVRI effort, including sea level rise adaptation and aquaculture. Specifically regarding the SLRRS project, City and Harbor District staff and consultants provided information and solicited public input through maps, signs, videos, and interactive activities such as a photobooth and a walking tour.

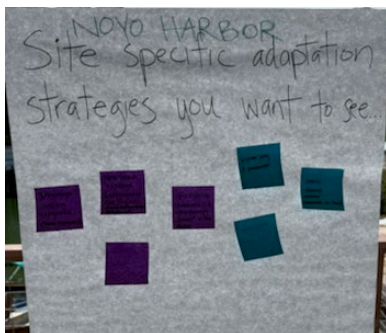


The open house also collected community feedback through surveys, written comments, and verbal discussions. Public feedback reflected a wide range of interests related to infrastructure improvements, environmental management, and economic development within Noyo Harbor. Several respondents emphasized the need for site-specific adaptation strategies to address climate and coastal hazards. Infrastructure improvements were also a common theme, including calls for upgrading the harbor drainage system to increase capacity, improving the jetty and breakwater, and establishing debris cleanup protocols with contractors available to respond quickly. Other suggestions focused on resilience measures such as providing generators for critical harbor buildings and improving overall harbor maintenance and preparedness.

Participants also proposed project-specific ideas related to shoreline and sediment management. One suggestion highlighted the Noyo Beach and Dredge Containment Cell Project, including concepts such as beach refurbishment and potentially relocating the dredge containment cell. Another idea involved providing dredging support to local businesses and reusing sediment to create oyster-growing structures (“oyster ticklers”), demonstrating interest in combining harbor maintenance with aquaculture development.



Economic development opportunities were also discussed, particularly in relation to the harbor’s emerging blue economy. Respondents suggested revitalizing underutilized “opportunity zones” within the harbor, providing seed funding for local aquaculture businesses through partnerships, and potentially establishing an aquaculture park where local operators could lease space. Other comments suggested longer-term concepts such as managed retreat and the creation of a natural park area, as well as improvements to pedestrian infrastructure to enhance access and connectivity around the harbor.



Finally, several attendees noted confusion about the relationships between the different organizations involved in harbor planning, including BEVRI, the Noyo Blue Economy initiative, the Noyo Center Science Center, and the Noyo Ocean Collective. One suggestion was to provide a clear FAQ or informational handout explaining the roles of each group and how they collaborate on projects affecting Noyo Harbor. This feedback highlighted the importance of clear communication and public education as planning efforts move forward.

KelpFest and Other Local Events

As part of the North Coast KelpFest events, the City hosted a public open house titled “A Rising Tide Lifts All Boats: Mobilizing the Blue Economy in Fort Bragg.” The event took place on October 3, 2025 at Fort Bragg Town Hall and served as an outreach opportunity to share findings from the BEVRI Plan. The open house allowed for community members to see and hear about all of the BEVRI Plan components, including the Noyo Harbor SLRRS, the Aquaculture Feasibility Study, and a Noyo Harbor Special District Analysis. The open house was scheduled to coincide with Fort Bragg’s **First Friday Art Walk**, which featured kelp-themed art and cultural programming throughout downtown as part of KelpFest, helping attract a broader audience and connect coastal resilience planning with the festival’s focus on marine ecosystems and ocean stewardship.

Specifically regarding the SLRRS, City and consultant staff displayed educational and outreach materials developed for the June 2025 open house, including the draft Vulnerability and Risk Assessment; showcased survey results; and solicited input on preliminary adaptation strategies.



The City and Harbor District also collected public input through numerous smaller outreach efforts involving Mendocino College, Grassroots Institute, and tabling at community events such as Fiesta Latina and First Friday.

Comments on Draft Vulnerability Assessment

The City and Harbor District staff solicited public input on the Draft Vulnerability and Risk Assessment at both in-person public events and through online access and solicitations during the second half of 2025. Comments generally supported the report as an important first step toward understanding coastal hazards in Noyo Harbor. Some commenters noted that the report focuses heavily on infrastructure vulnerability while giving limited attention to ecological impacts, including how sea level rise and shoreline changes could affect marine species and coastal ecosystems. Other comments emphasized that harbor assets vary significantly in economic and community value, suggesting that the report should evaluate the relative importance of different assets and the potential economic consequences of damage or loss.

Some commenters further argued that the analysis should more explicitly consider long-term planning horizons and the risks associated with public investment in vulnerable infrastructure. They recommended examining the full range of adaptation strategies, including retreat or relocation where appropriate, rather than assuming continued protection of existing assets. Commenters also encouraged consideration of broader community values, such as recreational and aesthetic benefits associated with Noyo Harbor and the surrounding coastline. Several informational comments were intended to provide additional context and resources for consideration, as well as sharing additional information about facilities and conditions in the South Harbor area that could be relevant to the analysis.

California Coastal Commission staff also reviewed the Draft Vulnerability and Risk Assessment. Their comments focused primarily on improving clarity, documentation, and coordination with relevant agencies. Several comments addressed technical details, such as clarifying the potential for seawall

overtopping and explaining conditions related to the dredge containment cell. They also encouraged the project team to incorporate or reference existing Coastal Commission mapping resources.

