



Nature-based Solutions for Nutrient Management

BACWA Annual Meeting May 6, 2022

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RESTORATION
IN
PROGRESS





Innovating with Nature

Nature-based solutions beneficially exploit natural processes providing stand-alone solutions or hybrid approaches integrated with technology-based or engineered solutions to foster urban resilience and sustainability.

- Frantzeskaki et al, 2019

Motivations for NbS in the Bay Area

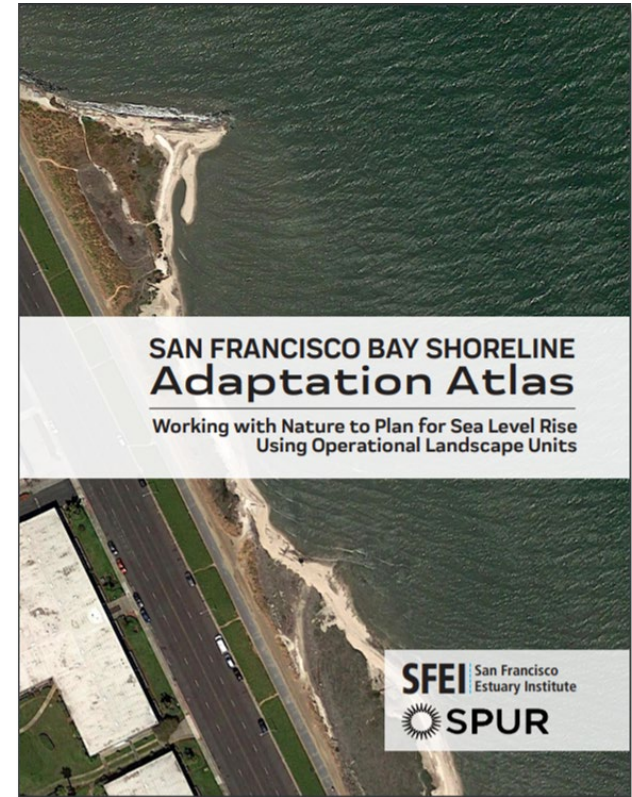
1. Anticipated flood risk
2. Sustainable habitat restoration
3. Water quality enhancement





Examples

- Ecotone levees / Living Shorelines
- Nearshore Reefs
- Tidal Marsh Restoration
- Migration Space Preparation
- Beach & Mudflat Nourishment
- Treatment Wetlands



Desk-based Study Complete

- GIS-driven analysis of NbS opportunity
- Brief fact sheets for each Permittee
- Agency-outreach to give a reality check
- Informed Phase 2 of the study



NATURE-BASED SOLUTIONS FOR NUTRIENT REMOVAL OPPORTUNITIES & CONSTRAINTS ANALYSIS



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Preliminary Results



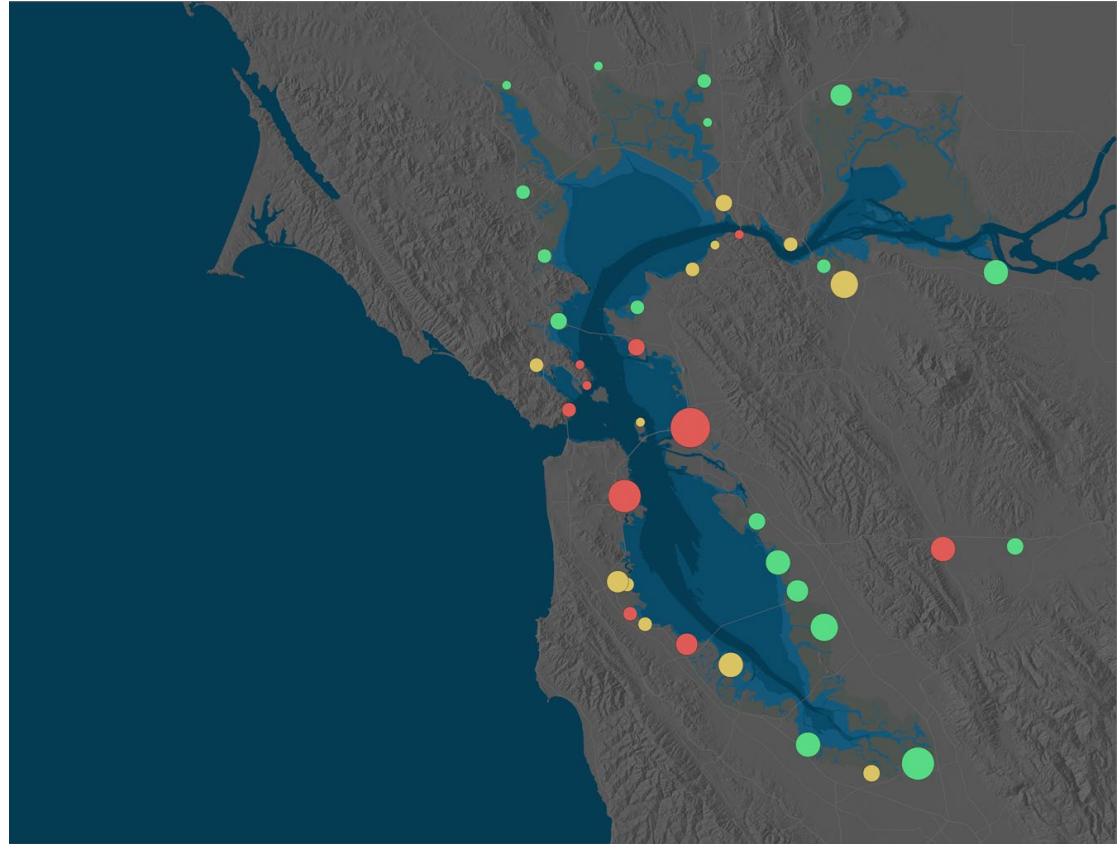
High Potential (18)



Medium Potential (12)



Low Potential (10)






Status Update: Phase 2 Opportunities & Constraints

Facility	Site Visit	Memo
Central Contra Costa Sanitary District	Complete	Draft in progress
Delta Diablo	Complete	Draft in progress
Fairfield-Suisun Sewer District	Complete	Draft out for facility review
Novato Sanitary District	Complete	Draft in progress
San Jose-Santa Clara	Complete	Draft in progress
Sewerage Agency of Southern Marin	Complete	Draft out for facility review
Union Sanitary District	scheduled	Draft in progress
South San Francisco and San Bruno	Complete	Draft in progress

NBS Concepts

SOUTHERN MARIN






-  Option 1: Coordinate with Bothin Marsh Evolving Shorelines project on a horizontal levee behind North Bothin Marsh
-  Option 2: Construct horizontal levee adjacent to the equalization basins, behind Mill Valley Marsh
-  Option 3: Dual-purpose wet-weather equalization and open water wetland with seepage slope sides



NBS Concepts

FAIRFIELD SUISUN






-  Option 1: Convert former recycled water basins into train of open water wetlands optimized for various purposes
-  Option 2: Dual-purpose wet-weather equalization and open water wetlands with seepage slope sides
-  Option 3: Convert existing alfalfa field to open water wetland or hybrid seepage slope/open water wetland
-  Option 4: Convert dry-farming area to open water wetland or hybrid seepage slope/open water wetland
-  Option 5: Partner with/purchase one or more neighboring duck club properties and convert to temporary freshwater wetland to build peat (elevation) to prepare for future tidal restoration

(3 mi SW) Option 6: Coordinate with Pacific Flyway Center to provide wastewater effluent for habitat creation efforts

NBS Concepts

DELTA DIABLO

-  Option 1: Convert part or all of the equalization/stormwater basin to open water wetlands
-  Option 2: Convert the newly purchased property southwest of the plant to an open water wetland
-  Option 3: Coordinate with BNSF and Corteva Preserve to construct horizontal levee north of rail line



NBS Concepts

CENTRAL CONTRA COSTA

All assuming development of a suitable nitrified effluent stream



Option 1: Convert Basins C, D, or both to open water treatment wetlands



Option 2: Convert Basin A North into a serpentine channel-type open water wetland

(1 mi N) Option 3: Coordinate with the Lower Walnut Creek Restoration Phase II (Middle Reach) on a horizontal levee



NBS Concepts

UNION SAN



Option 1: Coordinate with SBSRP/CDFW on beneficial use in the restoration of Pond E6



Option 2: Coordinate with SBSRP/CDFW to construct a horizontal levee at the back of Pond E6



Option 3: Coordinate with ACFCWCD to construct open water wetlands in one or more diked basins

Constraints

- Grey infrastructure is faster & sometimes cheaper
- Limited funding for flood risk, habitat & stormwater management
- Anticipatory action is hard to justify
- Equity & community engagement is unfamiliar
- Land is scarce & expensive
- Working across landowners is cumbersome
- Long-term maintenance is uncertain



Opportunities to Advance NbS

1. Lots of funding (State, Federal & Local grants)
2. Increased regulatory clarity from Water Board
3. EPA Nutrient Memo encouraging multi-benefit strategies

Water Board Permitting Framework

- Discharge points
- Exceptions to discharge prohibitions established in the Basin Plan
- Effluent limitations
- Operations & maintenance
- Compliance determination

Specific examples of NPDES permits for nature-based solutions

Permit Number	Order Number	Discharger	Facility	Discharge Prohibition Exception Based on Equivalent Protection	Discharge Prohibition Exception Based on Net Environmental Benefits
CA0038881	R2-2022-0006	City of San Leandro	City of San Leandro Water Pollution Control Plant – Treatment Wetland	X	
CA0037770	R2-2021-0026	Mt. View Sanitary District	Mt. View Sanitary District Wastewater Treatment Plant	X	
CA0037810	R2-2021-0008	City of Petaluma	Ellis Creek Water Recycling Facility	X	
CA0110116	R2-2020-0020	U.S. Department of Navy	Treasure Island Wastewater Treatment Plant	X	
CA0037958	R2-2020-0019	Novato Sanitary District	Novato Sanitary District Wastewater Treatment Plant	X	*
CA0037800	R2-2019-0019	Sonoma Valley County Sanitation District	Sonoma Valley County Sanitation District Wastewater Treatment Plant	X	
CA0037834	R2-2019-0015	City of Palo Alto	Palo Alto Regional Water Quality Control Plant	X	
CA0038776	R2-2017-0013	City of Pacifica	Calera Creek Water Recycling Plant	X	X
CA0038768	R2-2017-0008	City of American Canyon	American Canyon Water Reclamation Facility	X	X
CA0038636	R2-2011-0058	East Bay Regional Park District, Union Sanitary District, and East Bay Dischargers Authority	Hayward Marsh		X