



**SAN FRANCISCO ESTUARY PARTNERSHIP**  
**Nature-Based Shoreline Infrastructure**  
**Program**

## OVERVIEW

1. SFEP Estuary Blueprint and Action 14
2. SFEP/Water Board Wetland Protection Policy Update
3. Ongoing Work at Oro Loma and its Outreach component
4. Next Steps – State Revolving Fund Proposal





# Estuary Blueprint – Action 14

Where it all started

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# SFEP ESTUARY BLUEPRINT

We are a National Estuary Program  
Our goal is to implement the Estuary Blueprint (AKA CCMP)



Partnership of local, state, and federal agencies, NGOs, academia and business leaders working to protect and restore the San Francisco Bay-Delta Estuary

“MPREHENSIVE CONSERVATION AND MANAGEMENT PLAN”  
FOR THE SAN FRANCISCO ESTUARY

## ACTION 14



*Promote projects that demonstrate how (...) nature-based features of Estuary shorelines can make the region more resilient to rising sea level, drought, water pollution, and other future stresses. Identify locations where these kinds of features can provide the most benefits, both independently and in hybrid applications with more traditional approaches to managing flood risk, protecting shorelines, and reusing wastewater*



## A MULTI-BENEFIT CONCEPT

- Sea Level Rise Adaptation
- Habitat Creation
- Endangered Species Refugia
- Transitional habitat b/w tidal wetlands and terrestrial uplands
- Water Quality Enhancement
- Flood Protection, Erosion Control





# SFEP/Water Board Wetland Protection Policy Update

Shifting Policies for Climate Adaptation

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## San Francisco Regional Water Quality Control Board

Water quality certification and waste discharge requirements

- To protect beneficial uses
- To avoid wetland disturbance
- To ensure no net loss of acreage and function

*Wetland protection policies can sometimes be in conflict with restoration goals intended to address water quality threats posed by climate change*



# San Francisco Regional Water Quality Control Board

## Policies in need of updating

- Fill for ecosystem restoration and flood protection
- Sediment for baylands and for shoreline resilience
- Use of wastewater / stormwater to feed tidal marshes

*Other issues: shallow water discharge prohibition, minimum treatment standards, fate of contaminants*



## SFEP & the Water Board

### Multi-year EPA grant

- Ecosystem services of existing regional wetland projects
- Design of constructed treatment wetlands and contaminant removal
- Policy change recommendations





Prado Constructed Wetlands:  
nitrate and CEC removal

## Case Studies



Discovery Bay: piloting open-  
water cells for CEC removal

Oro Loma: subsurface treatment of CECs



## SFEP & the Water Board

### Results included

- High levels of contaminant removal in ecotone levees, open water cells, mixed treatment trains optimize results
- Limited land and scalability are challenges
- Need for performance standards
- Need more understanding of contaminant risk



## SFEP & the Water Board

### Take-aways:

- Nutrient and CEC removal in constructed wetlands can be successful
- Lots of research on nutrients, less on CECs
- More modelling and research needed
- Potential policy changes are being worked on – stay tuned!





# SFEP Ongoing Work

Oro Loma Experimental Levee

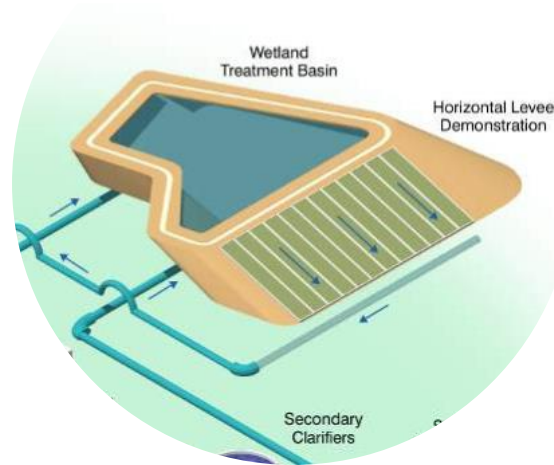
3



Photo Ariel Rubissow Okamoto

# TIMELINE OF THE ORO LOMA EXPERIMENT

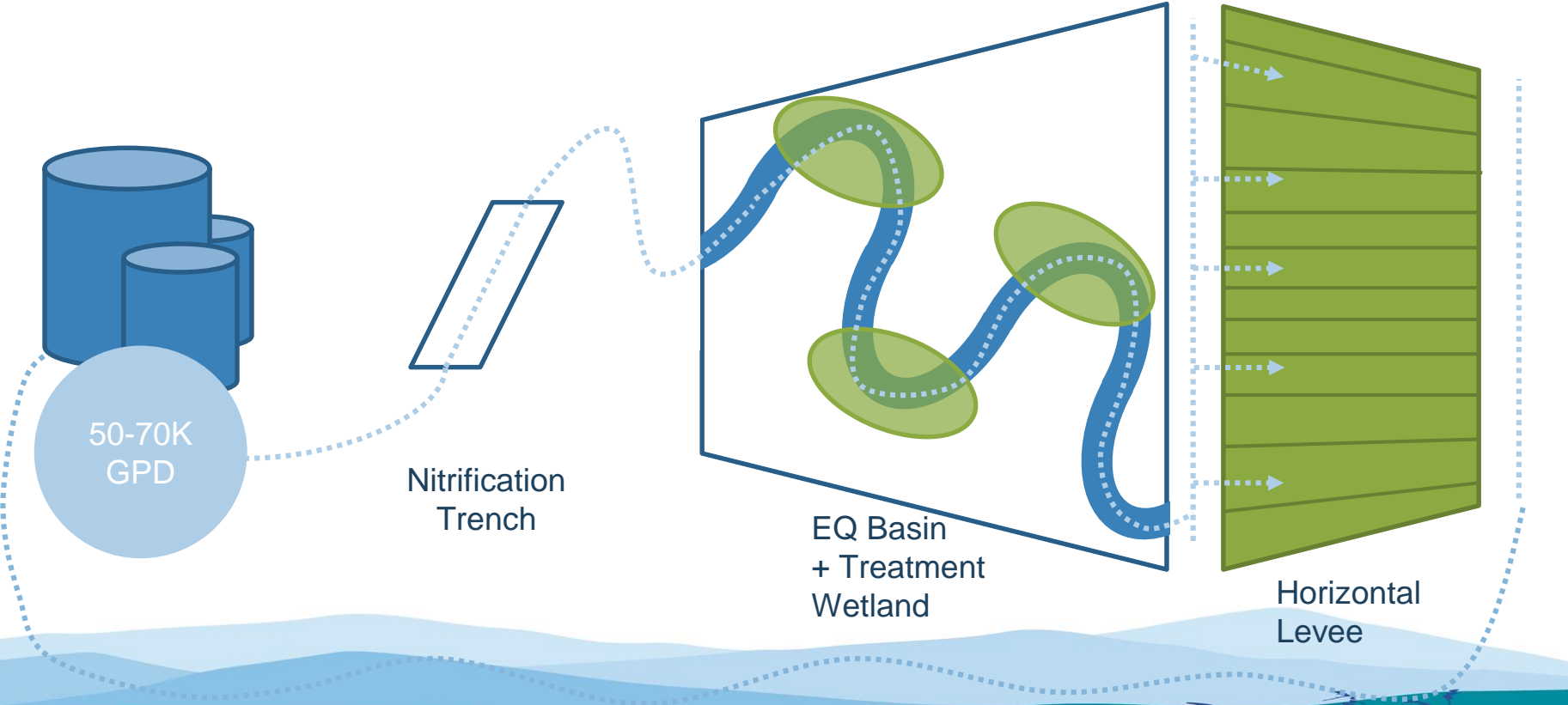
Conceptual Designs by ESA  
in 2012  
IRWM Grant started in 2014



Construction started in  
2015  
Completed in 2017



# MAIN DESIGN ELEMENTS



50-70K  
GPD

Nitrification  
Trench

EQ Basin  
+ Treatment  
Wetland

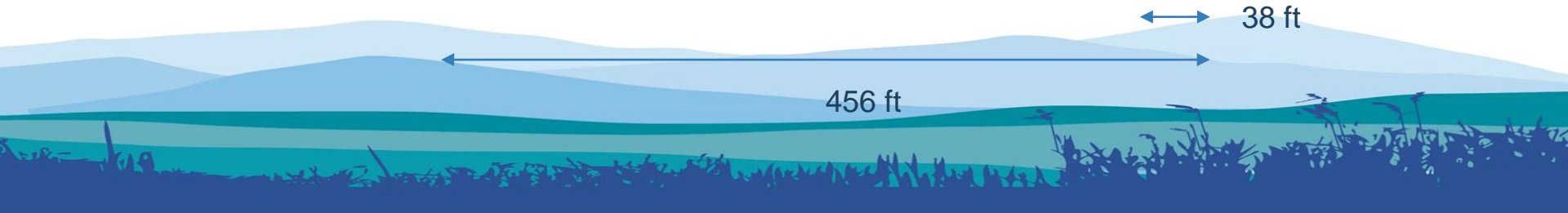
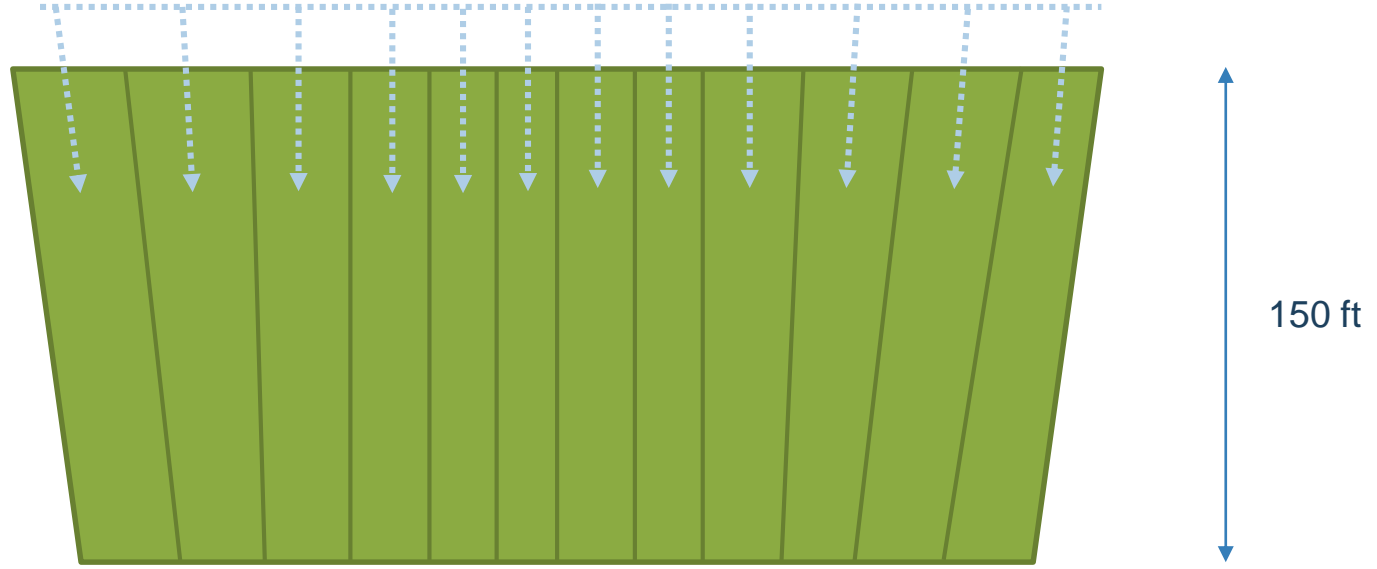
Horizontal  
Levee

# THE EXPERIMENTAL LEVEE

30:1 slope

Vegetation mix

- Native wet meadow
- Riparian scrub
- Freshwater wetland species











## RESULTS

- Removal of nitrate and trace organics occurs primarily within the subsurface.
- Within the first 9-10 feet in the subsurface, nitrate levels are reduced by at least 90% and trace organics are reduced by 40% to greater than 90% depending on the constituent
- Limits of the flow that can run through. Needs larger drain layer



## OUTREACH COMPONENT

- RFP for additional Conceptual Designs to test out further Nature-Based Infrastructure concepts
- Palo Alto Regional Quality Control Plant
- Novato Sanitary District
- Conceptual Designs are being completed
- IRWM ends end of year





# Next Steps

State Revolving Fund Proposal

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## SRF PROPOSAL

### RESEARCH

UCB & Oro Loma  
Additional studies and  
monitoring of NBSI  
concepts

### DESIGN

EBDA  
Palo Alto  
San Leandro

Get closer to “shovel-  
ready”

### CAPACITY BUILDING

Resources for NBSI  
projects in the region:

Implementers workshops  
Best Practices Guidelines  
and Recommendations  
Manual  
Benefit-Cost Assessment  
Tool

# THANK YOU!

**Any questions?**

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