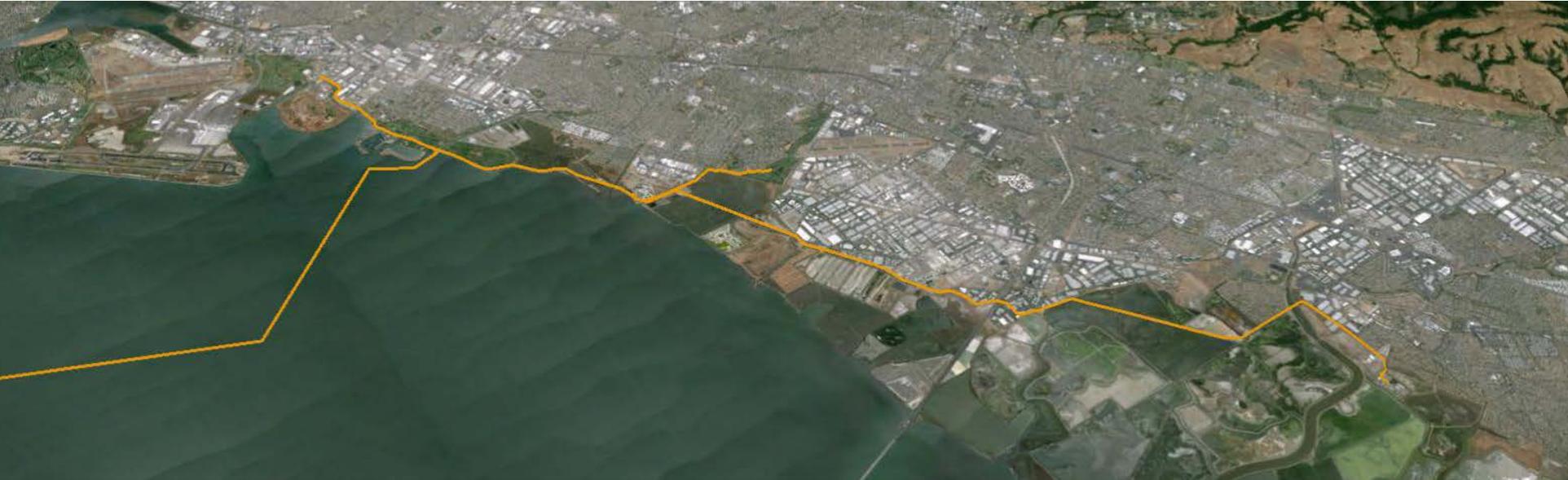


EBDA Climate Ready Grant Project Implications for Bay Fill Policies



Mike Connor, EBDA with support from Marc Beyler
and
Jeremy Lowe, Carolyn Doehring, Robin Grossinger, SFEI



SFEI
AOSOC

CURRENT BAYLANDS AND FRESHWATER INPUTS
with contemporary infrastructure & land parcels

DRAFT

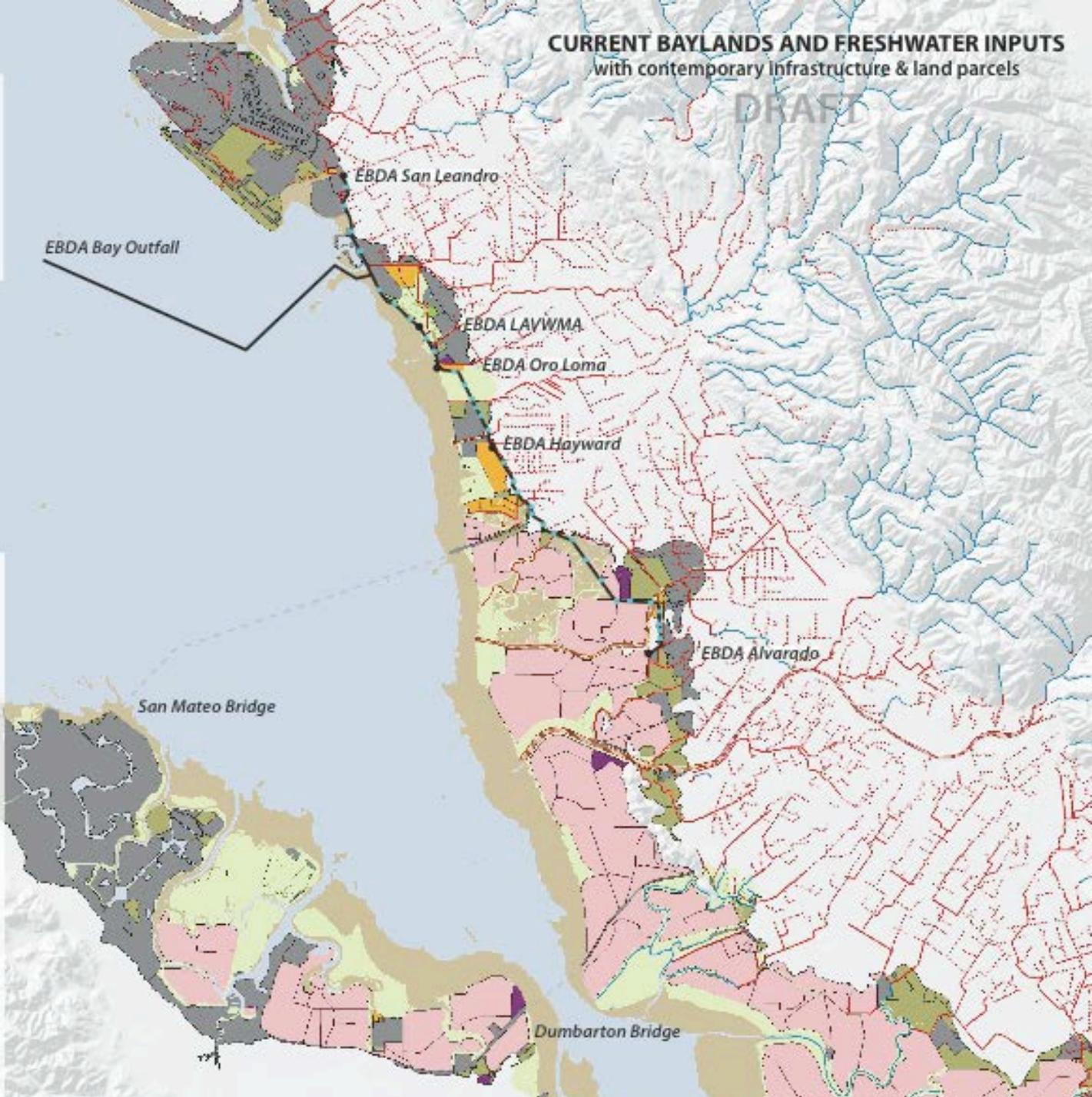
MGD Average Treatment Discharges

San Leandro	4.9
LAVWMA	17.5
Oro Loma	12.6
Hayward	12.2
Alvarado	25.1

Contemporary Landscape Features

- Infrastructure**
 - Existing pipeline
 - Existing treatment plants
 - Possible new outfall locations
 - Engineered channel
 - Underground storm drain
- Landscape Typologies**
 - Tidal flat
 - Tidal marsh
 - Muted tidal marsh
 - Managed marsh
 - Salt pond
 - Storage or treatment basin
 - Diked former bayland
 - Artificial fill

1 mile N ↑



EBDA Vulnerabilities



Diffuser section being lowered into water, 1978 (Grace 2009)

Sea level rise and storm events will exacerbate lack of capacity to discharge extreme wet weather flows from EBDA's members and LAVWMA.

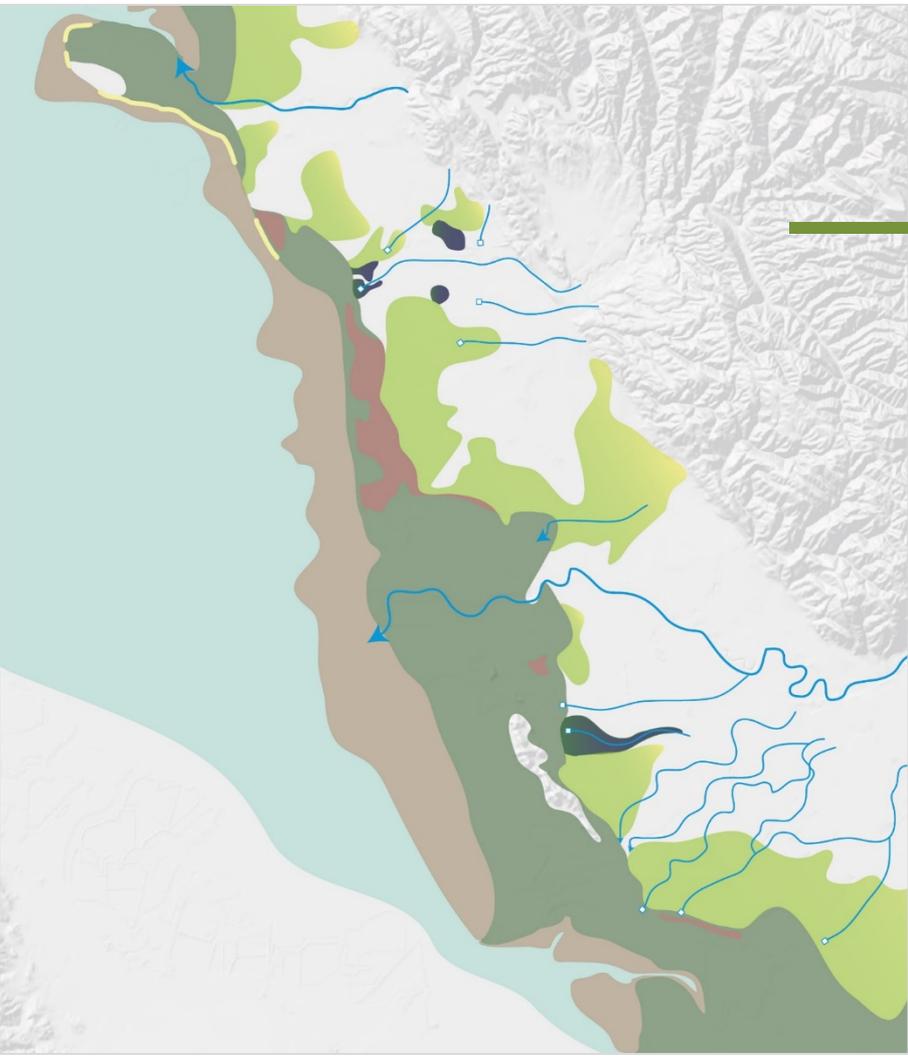
Decentralized wastewater treatment and discharge will require extensive coordination with member agencies, neighboring landowners, and regulatory agencies.

Overview

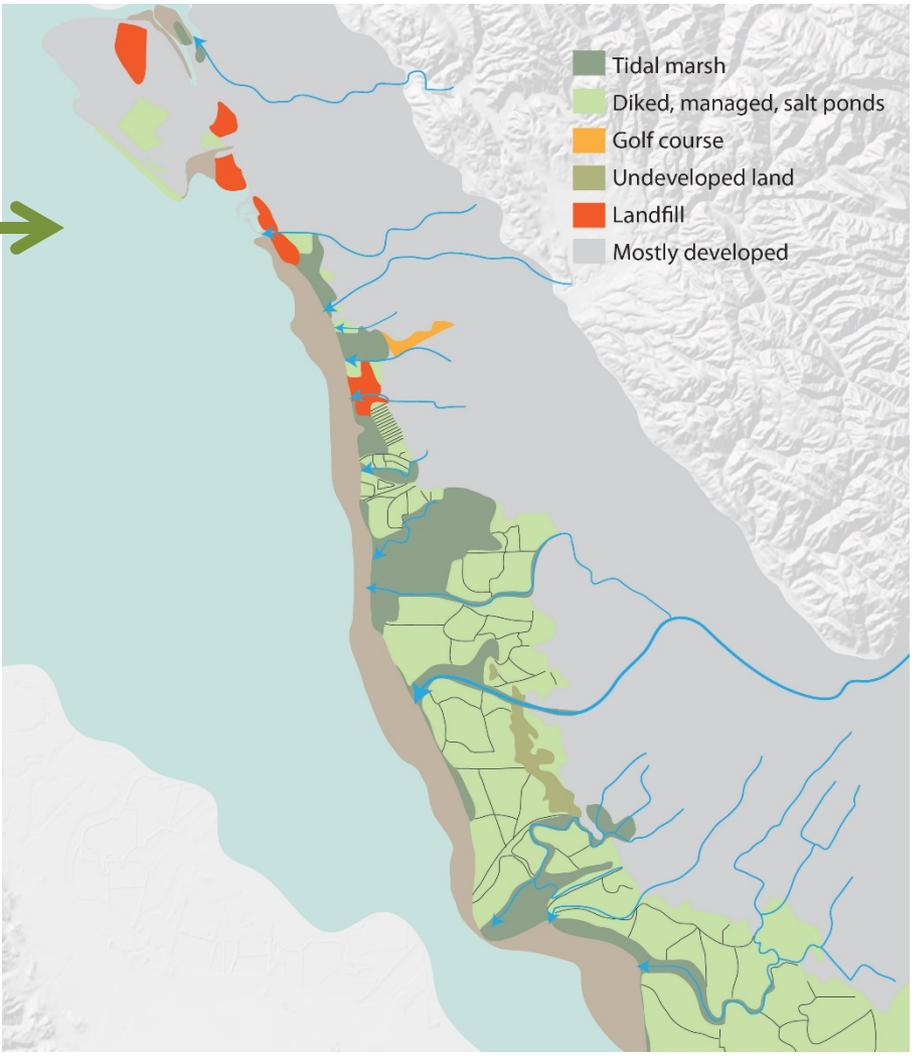
- Physical Landscape
- Freshwater Connections
- Nutrients
- Wetland Opportunities
- Landscape Vision

Physical Landscape

HISTORICAL



MODERN



Freshwater Flows

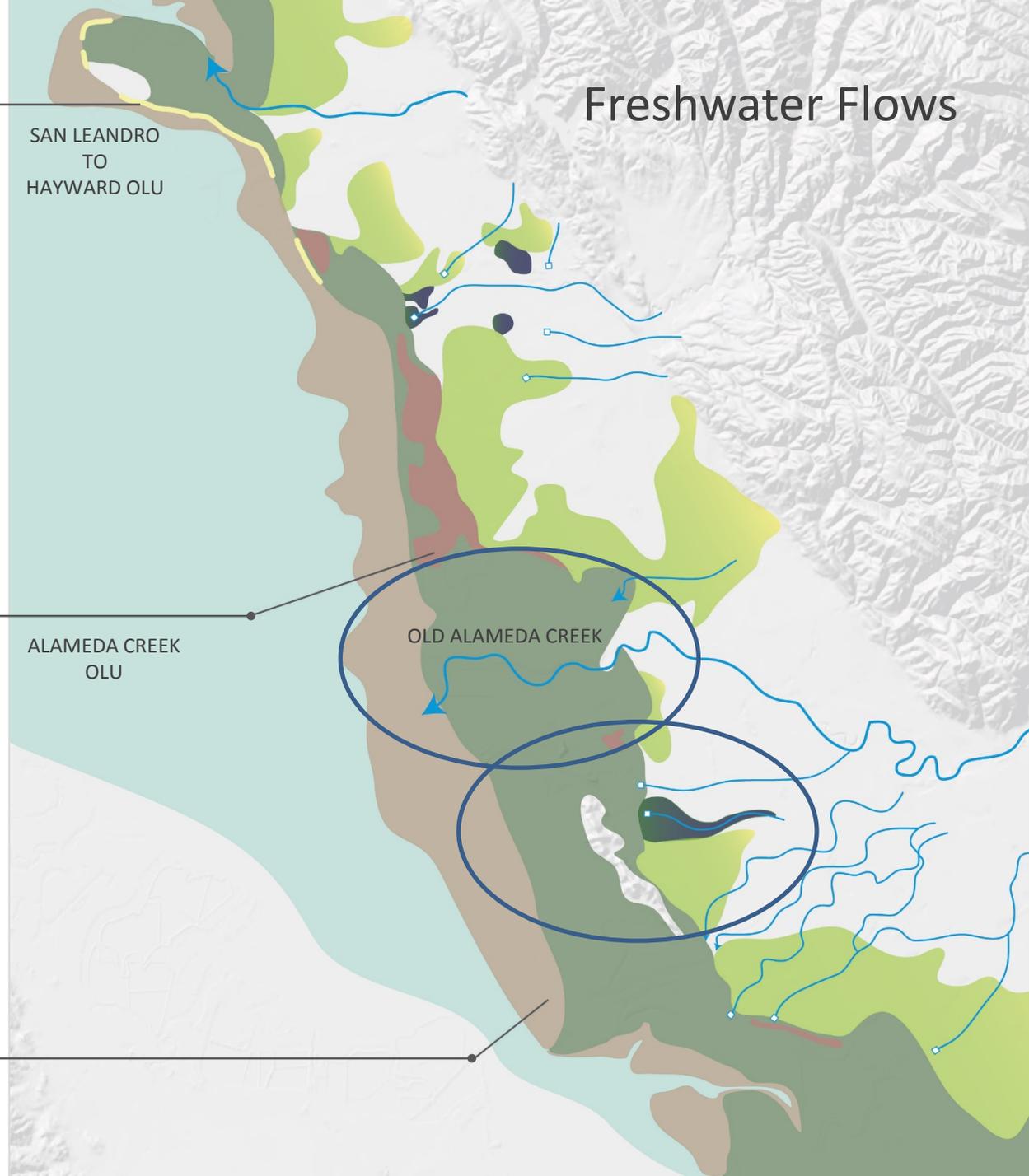
SAN LEANDRO
TO
HAYWARD OLU

Smaller disconnected
channels

ALAMEDA CREEK
OLU

OLD ALAMEDA CREEK

Larger watersheds
bring freshwater
into baylands
through tidal channels



Freshwater Flows

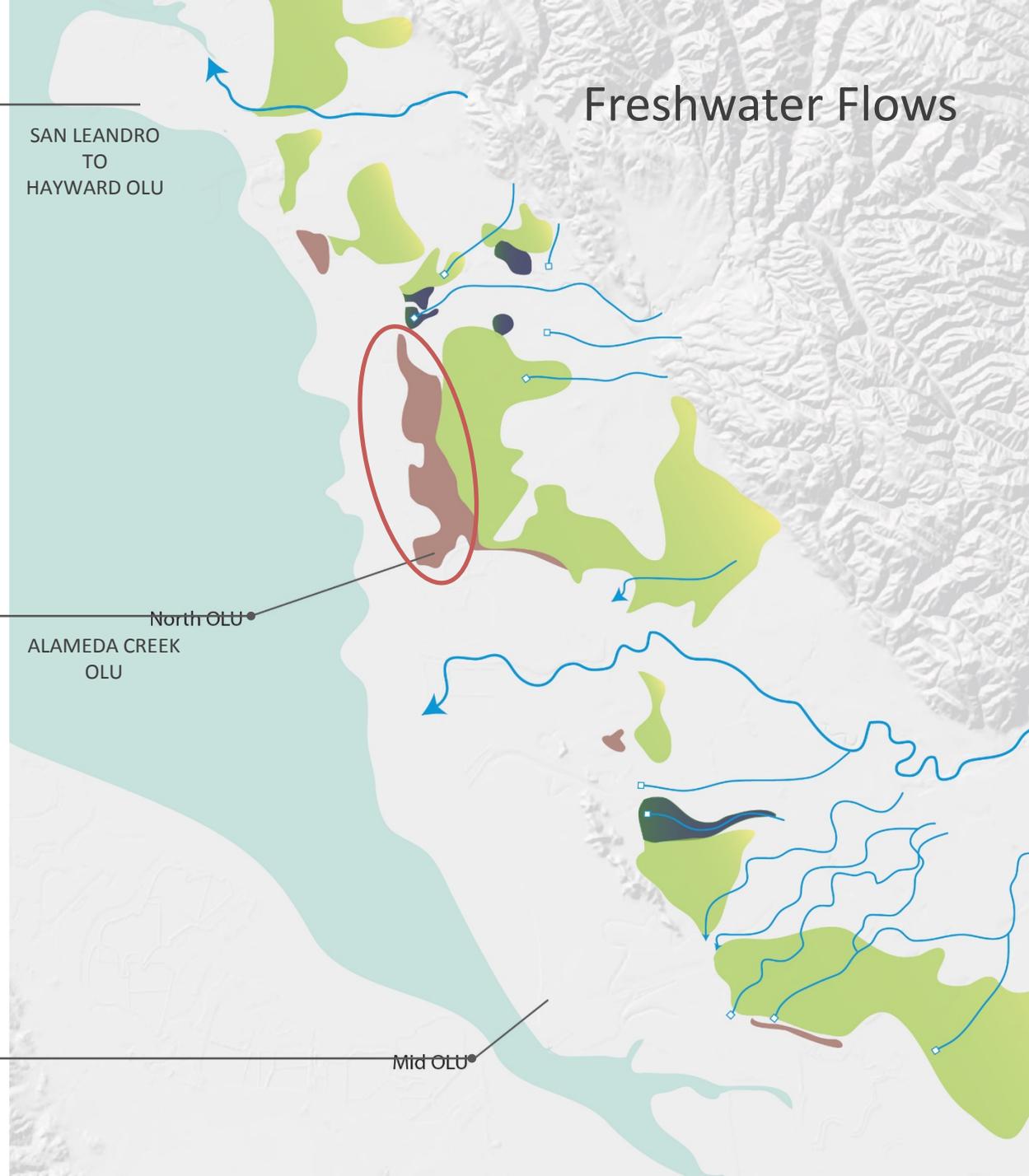
SAN LEANDRO
TO
HAYWARD OLU

More extensive natural
salt ponds with less
freshwater flow;
barrier beach/berm

North OLU
ALAMEDA CREEK
OLU

Few salt pannes
with greater
freshwater flow

Mid OLU



Freshwater Flows

SAN LEANDRO
TO
HAYWARD OLU

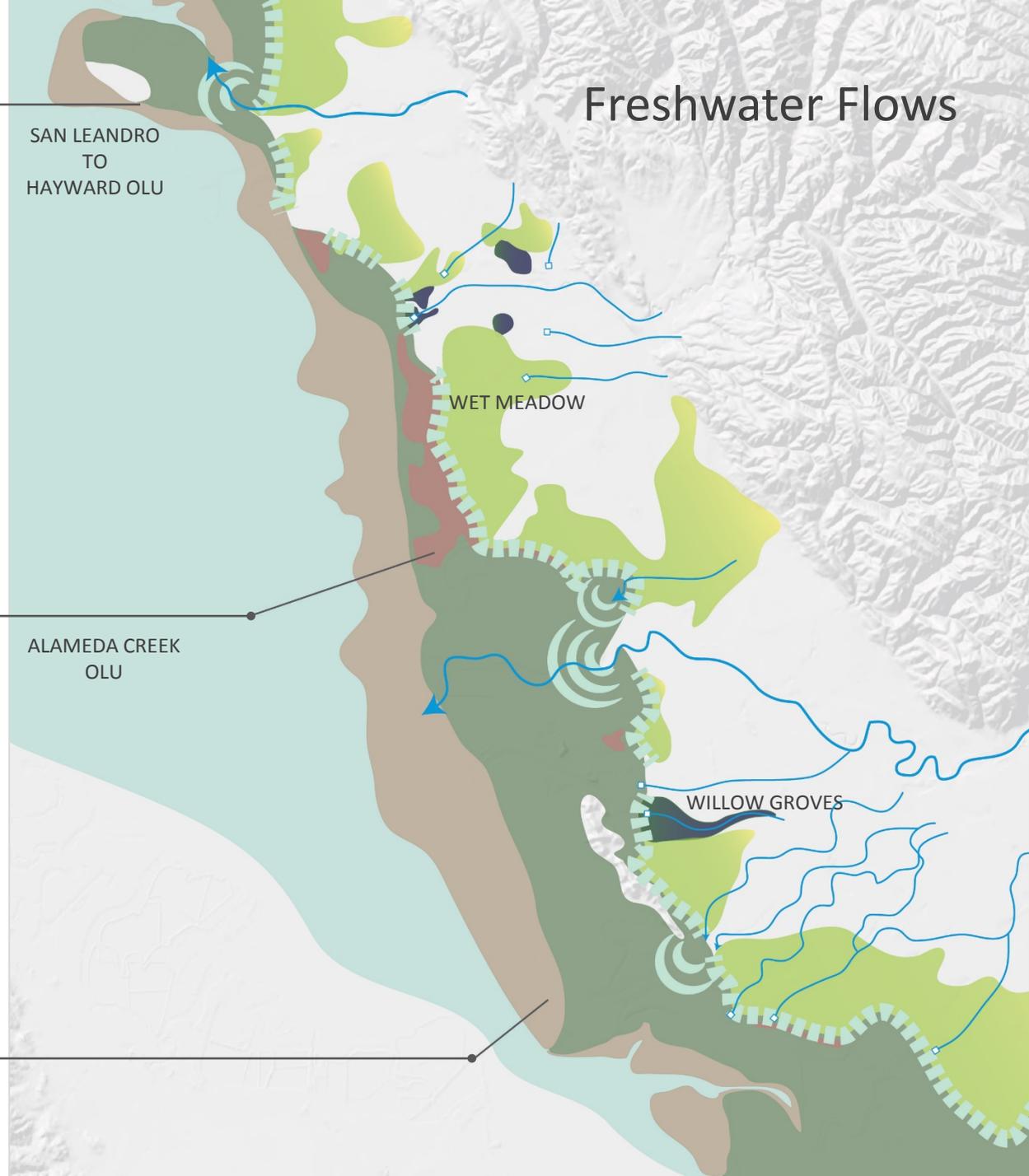
Brackish zone from
diffuse flow
along wet meadow &
willow transition

WET MEADOW

ALAMEDA CREEK
OLU

Brackish zones from
direct creek inputs &
diffuse flow

WILLOW GROVES



HISTORICAL FRESHWATER INPUTS TO THE BAYLANDS, ca 1850

Freshwater Inputs at Tidal Marsh Interface

Creek/Channel 

Diffuse intermittent flow 

Diffuse perennial flow 

Freshwater Input Magnitude (estimate)

>150 cfs / 100 MGD 

50-150 cfs / 32-100 MGD 

<50 cfs / 32 MGD 

<10 cfs / 6.5 MGD 

Freshwater Input Timing

Peak flow 

Mean annual flow 

Dry season baseflow 

Historical Landscape Features

Bay 

Tidal Flat 

Tidal Marsh 

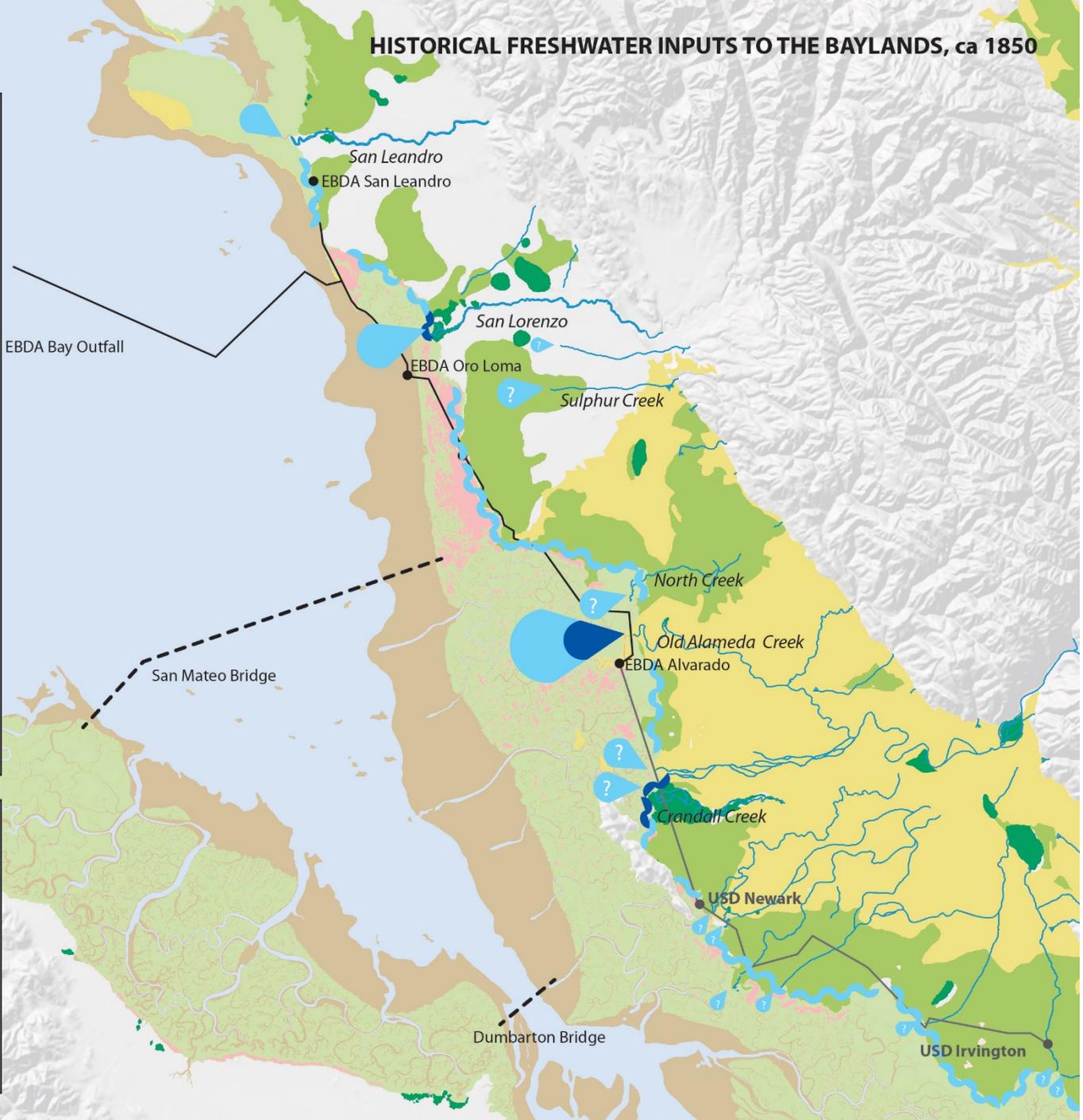
Salt Pond 

Seasonal Wetland 

Willow Grove 

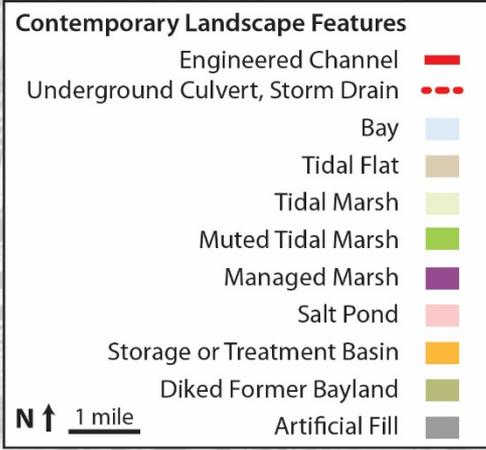
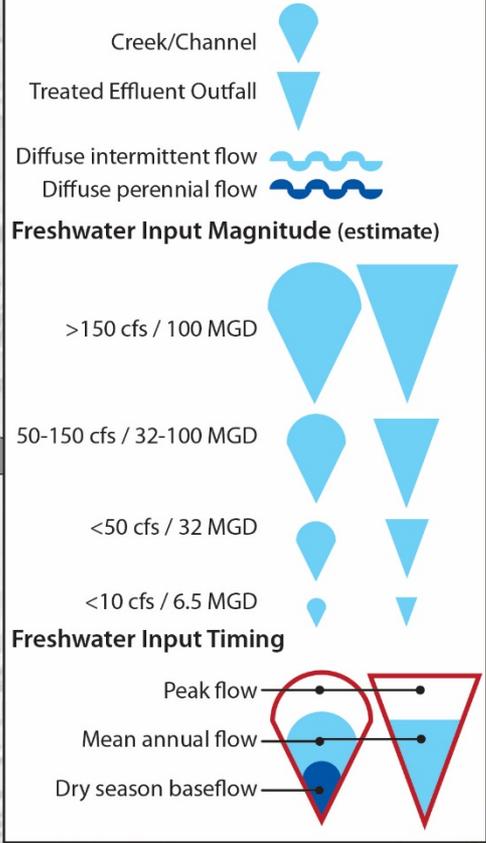
Grassland 

N ↑ 1 mile



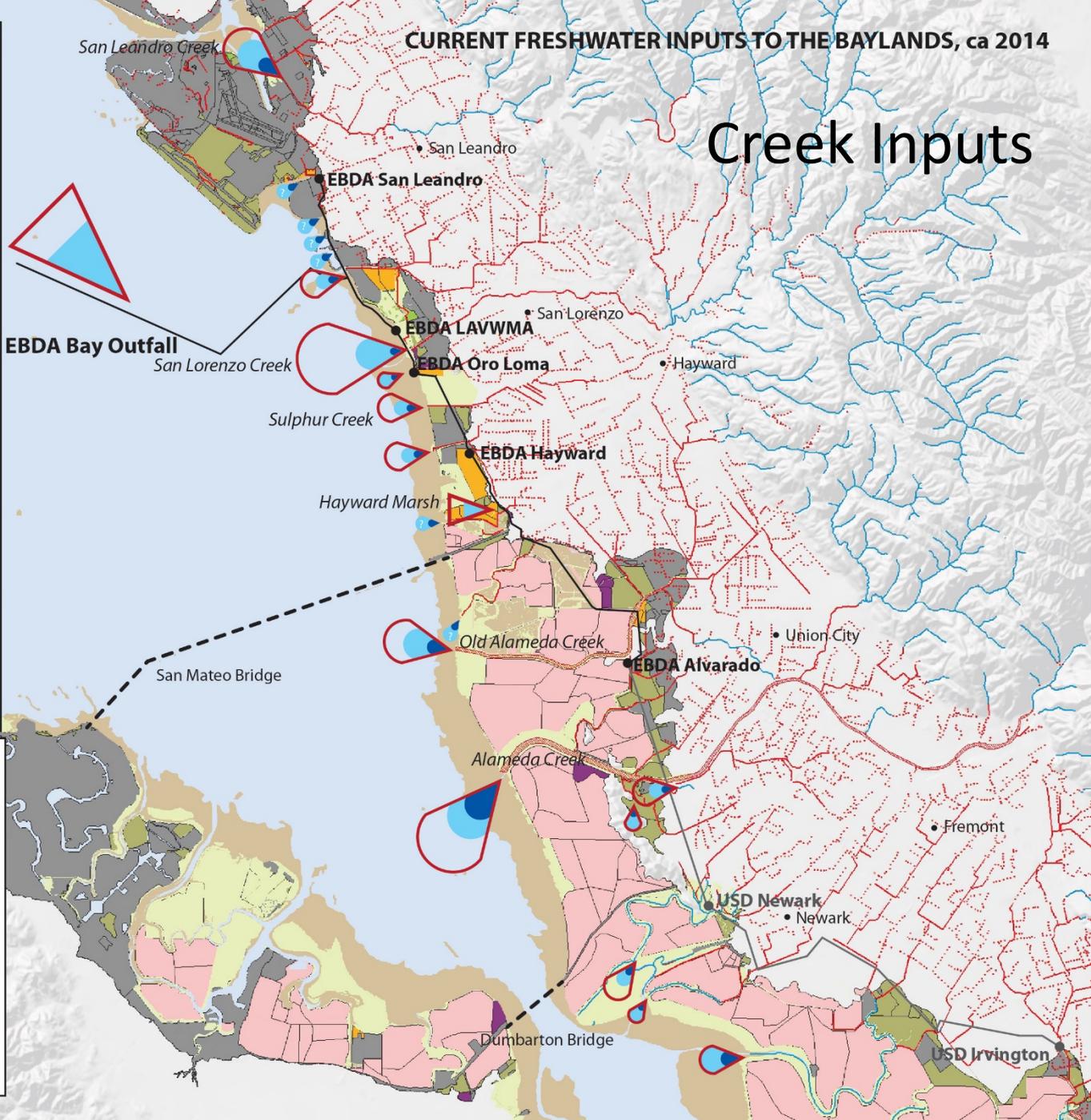
Question marks (?)= No data, estimate shown

Freshwater Inputs at Tidal Marsh Interface



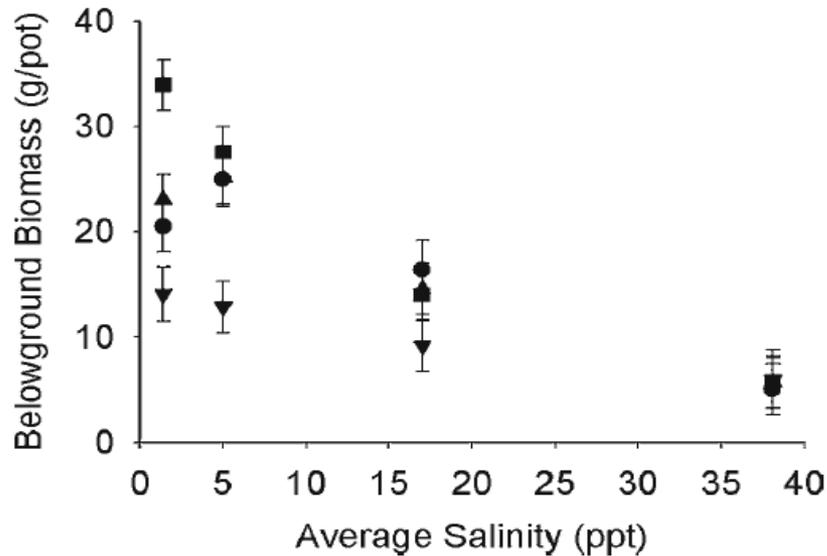
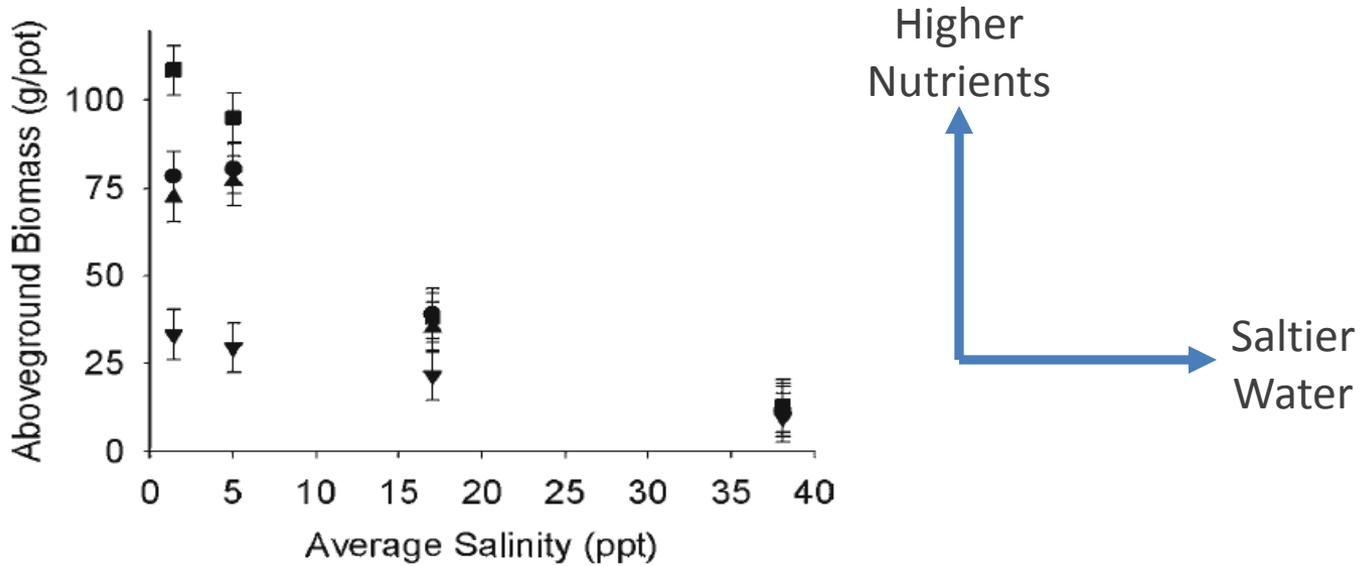
CURRENT FRESHWATER INPUTS TO THE BAYLANDS, ca 2014

Creek Inputs



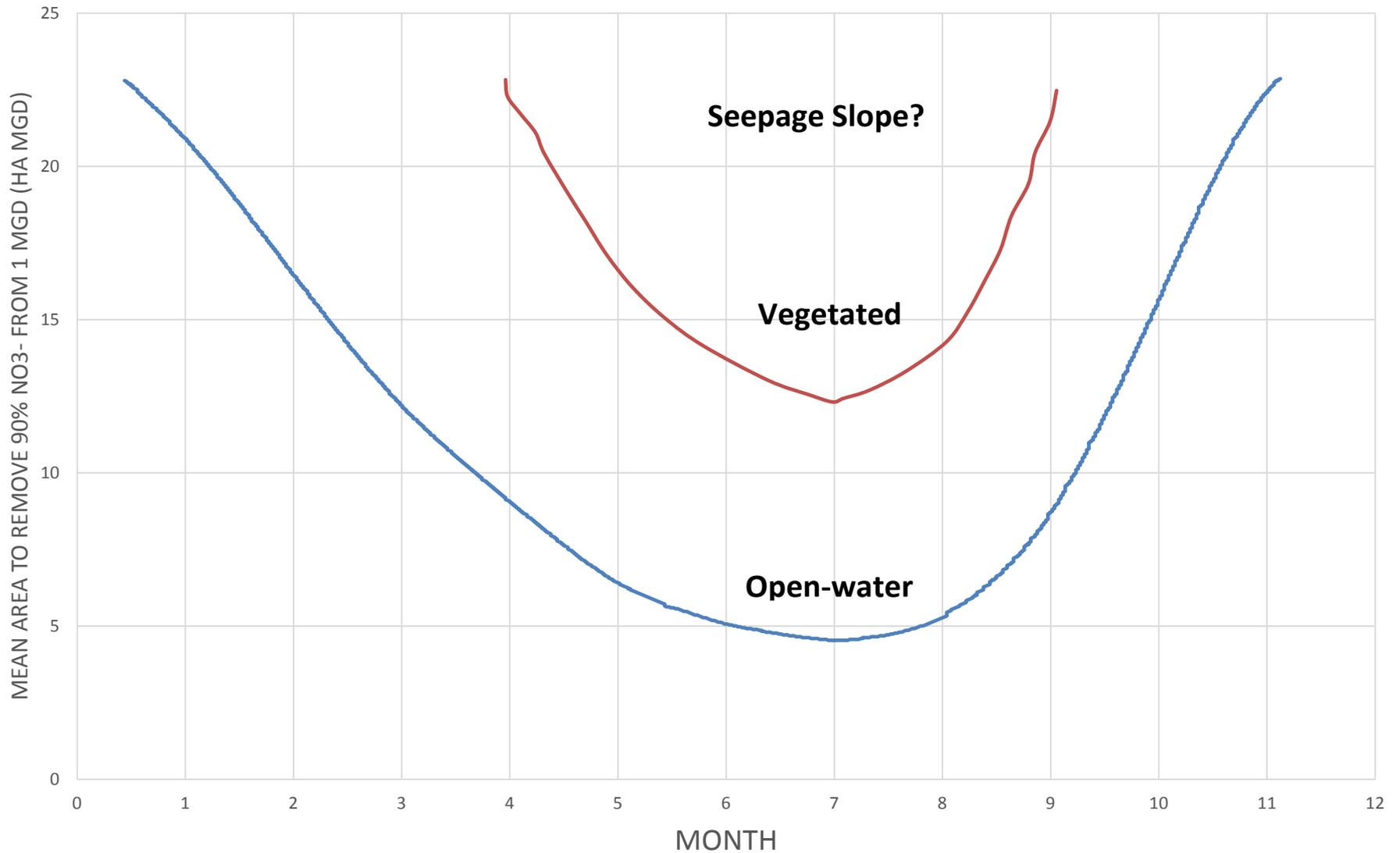
Question marks (?)= No data, estimate shown

Marsh Growth (*S. patens*) Greater at Lower Salinities and Higher Nutrients



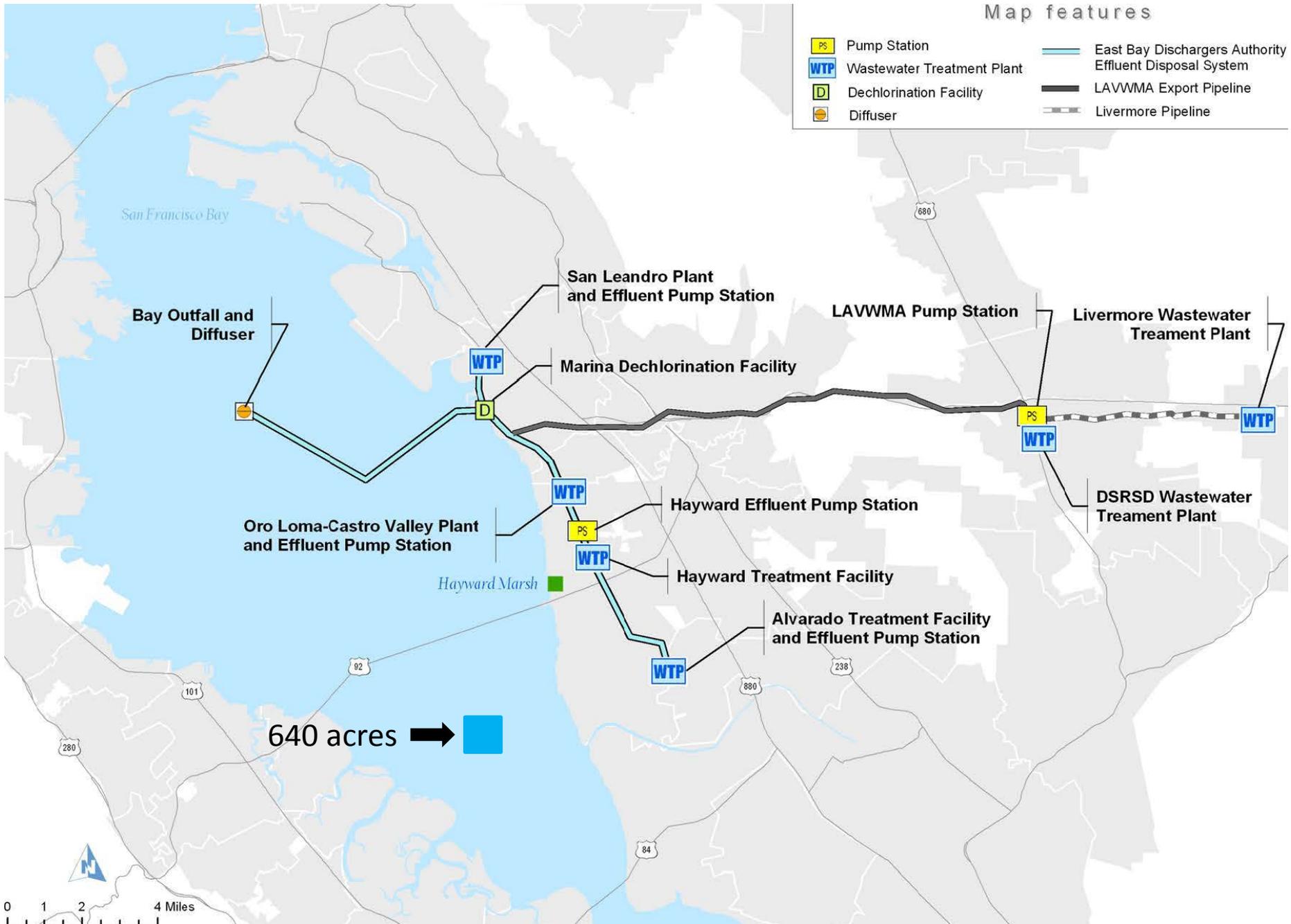
Morris, 2012;
Marino, 2010

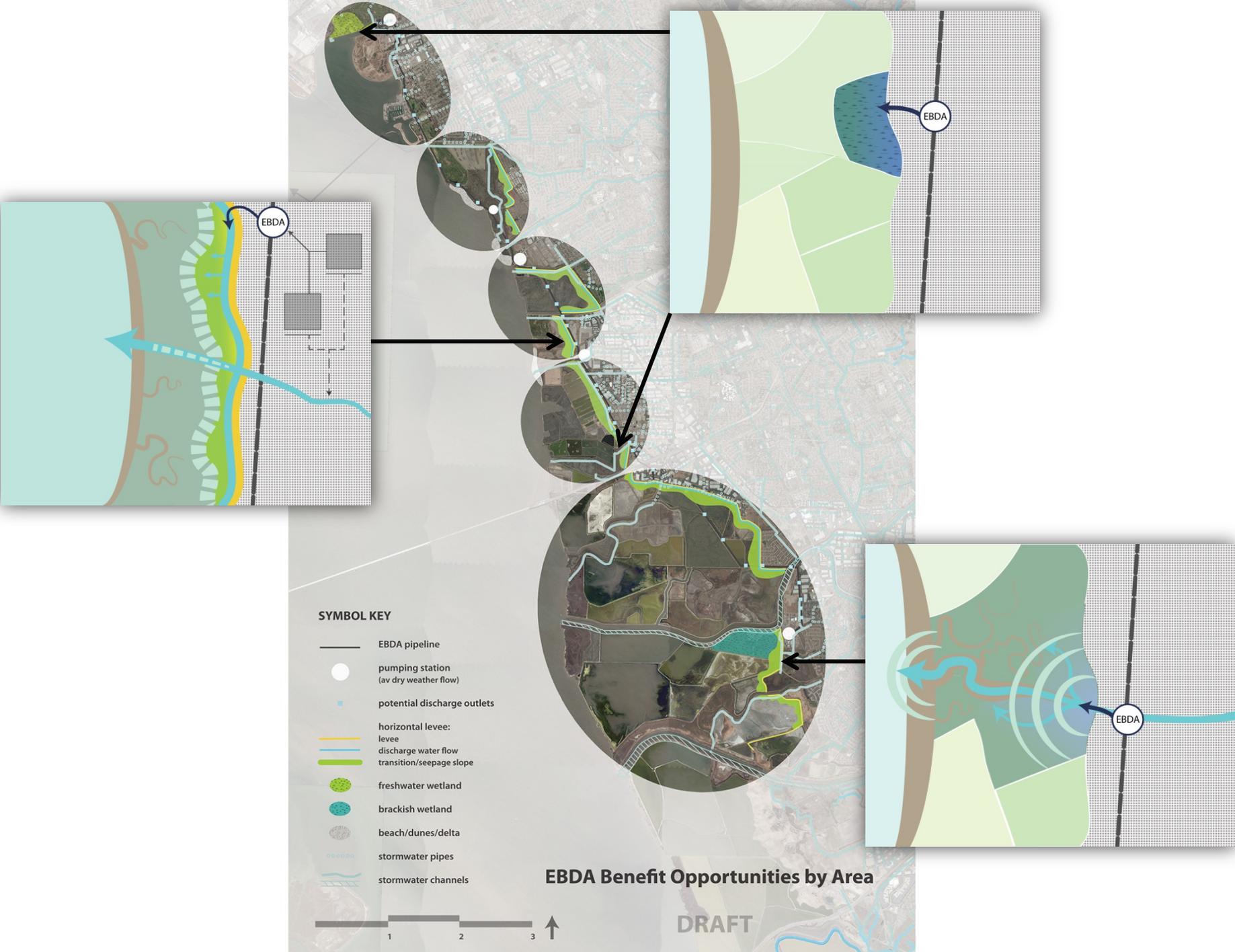
MEAN AREA TO REMOVE 90% NO₃⁻ FROM 1 MGD OF WASTEWATER EFFLUENT



Map features

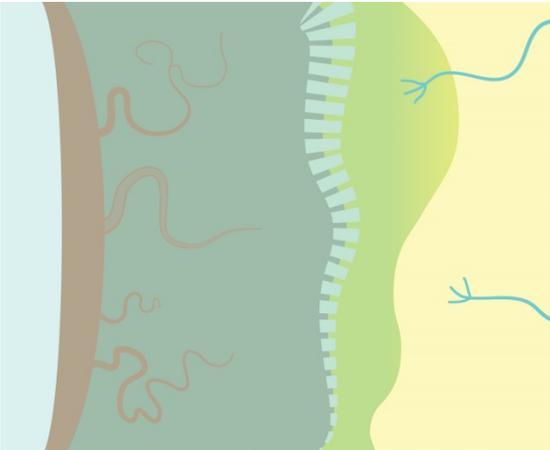
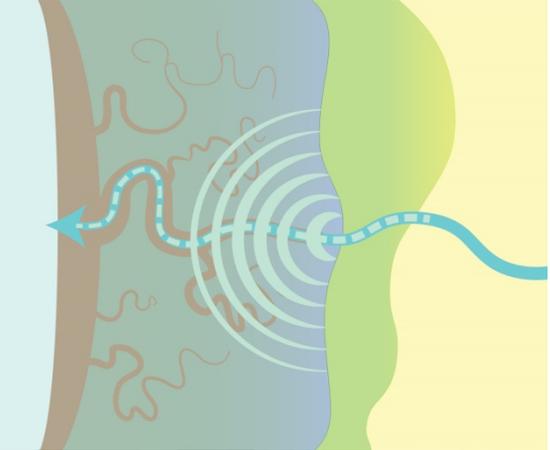
-  Pump Station
-  Wastewater Treatment Plant
-  Dechlorination Facility
-  Diffuser
-  East Bay Dischargers Authority Effluent Disposal System
-  LAVWMA Export Pipeline
-  Livermore Pipeline





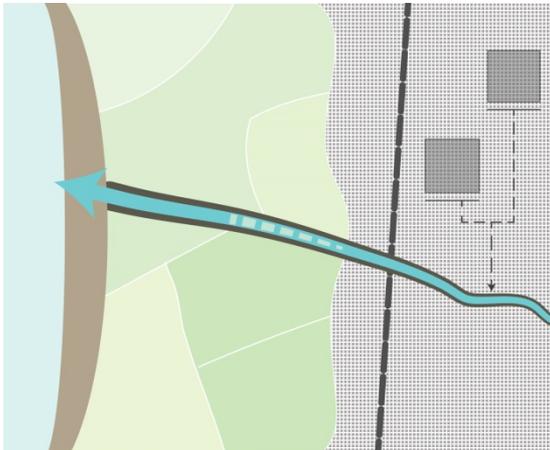
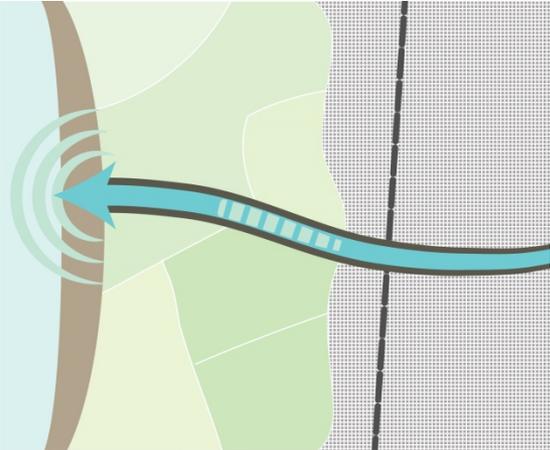
HISTORICAL

HISTORICAL



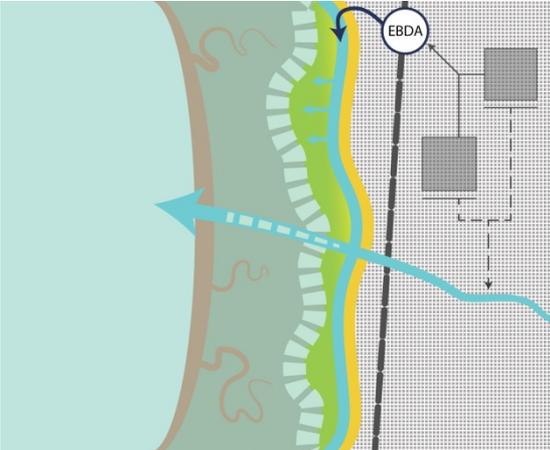
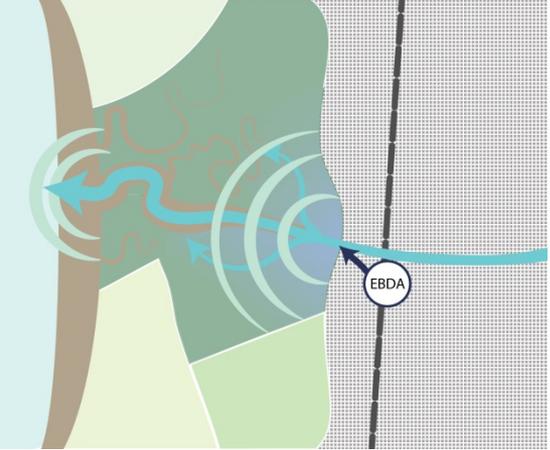
MODERN

MODERN

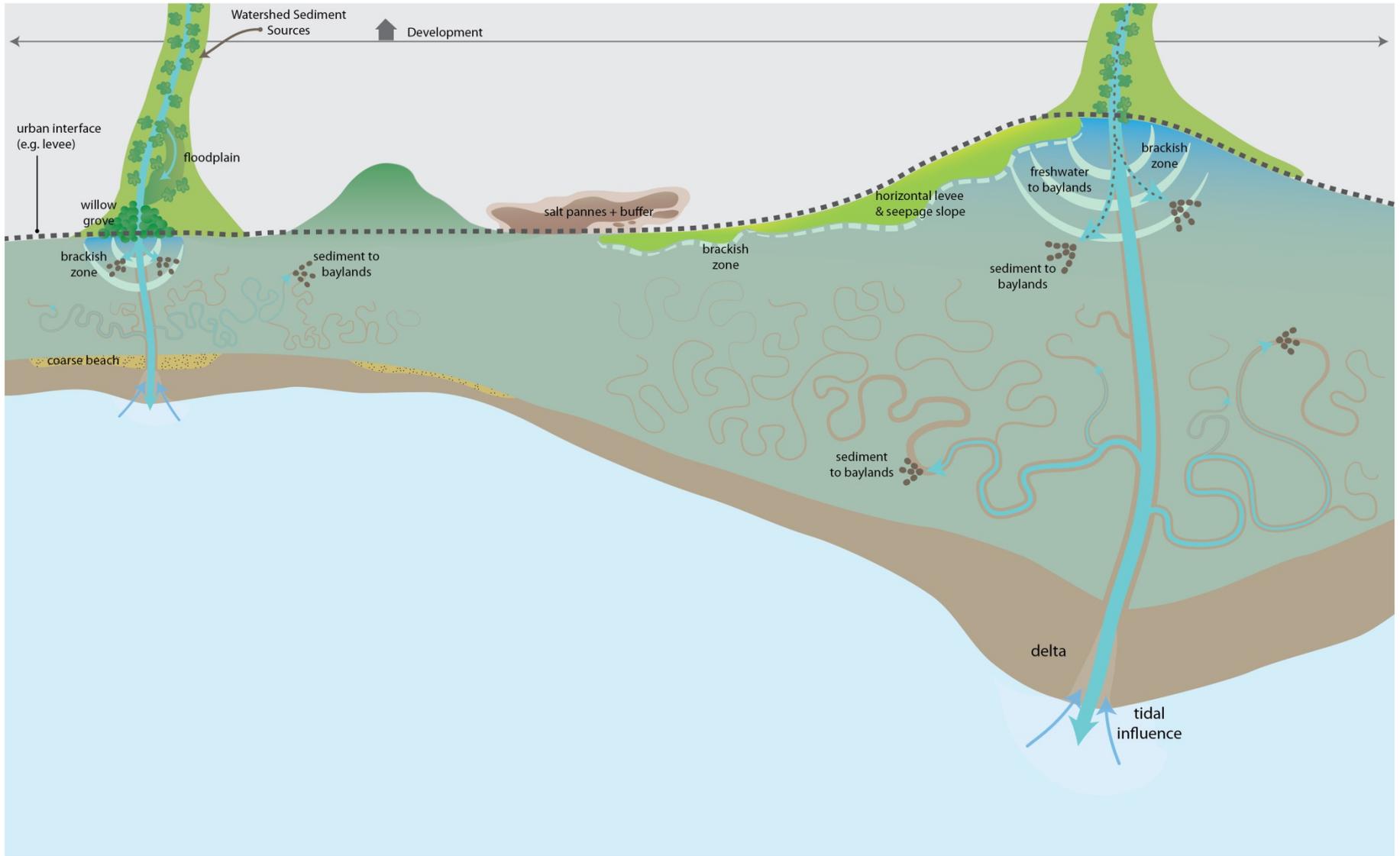


FUTURE

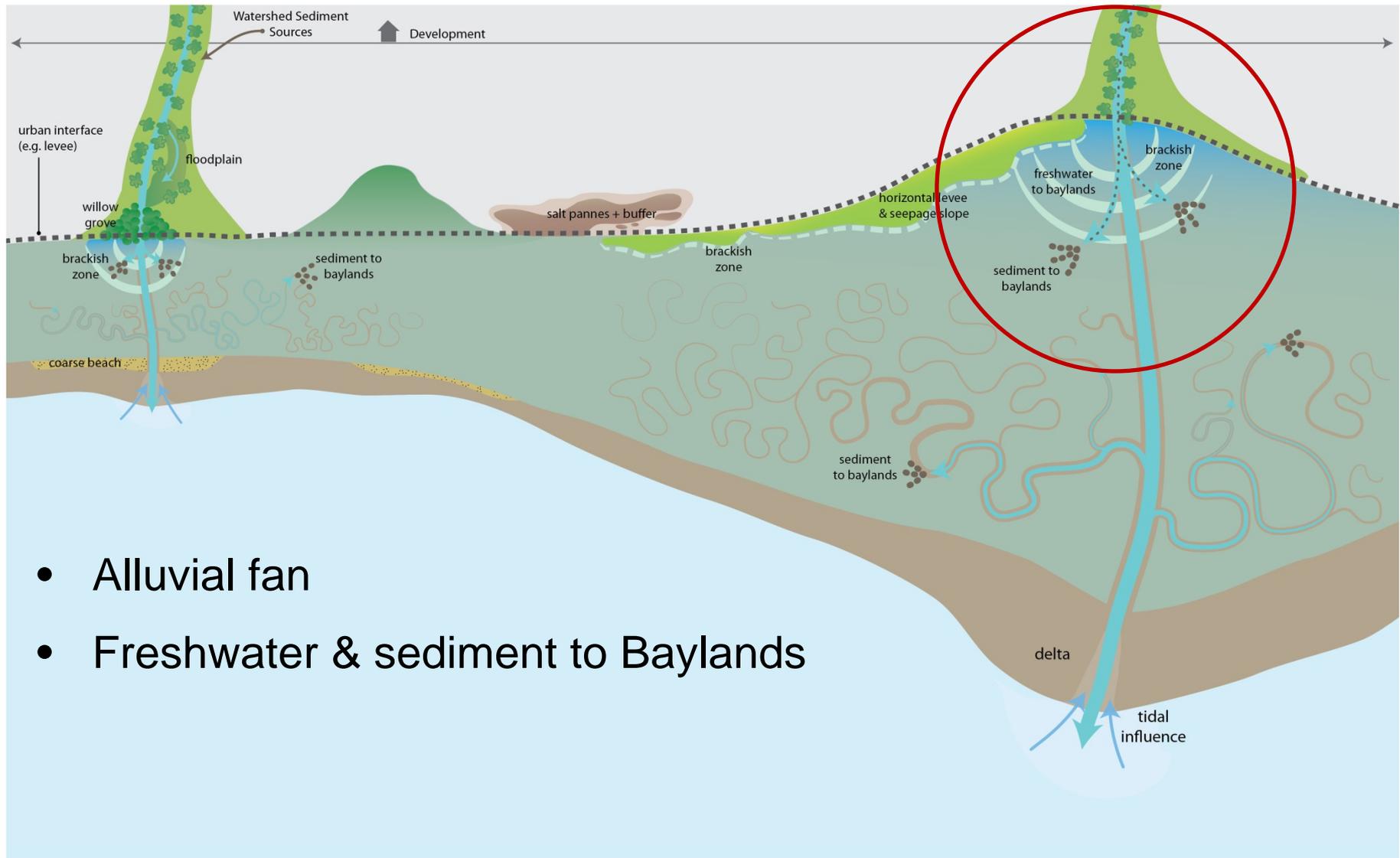
FUTURE



Landscape Vision

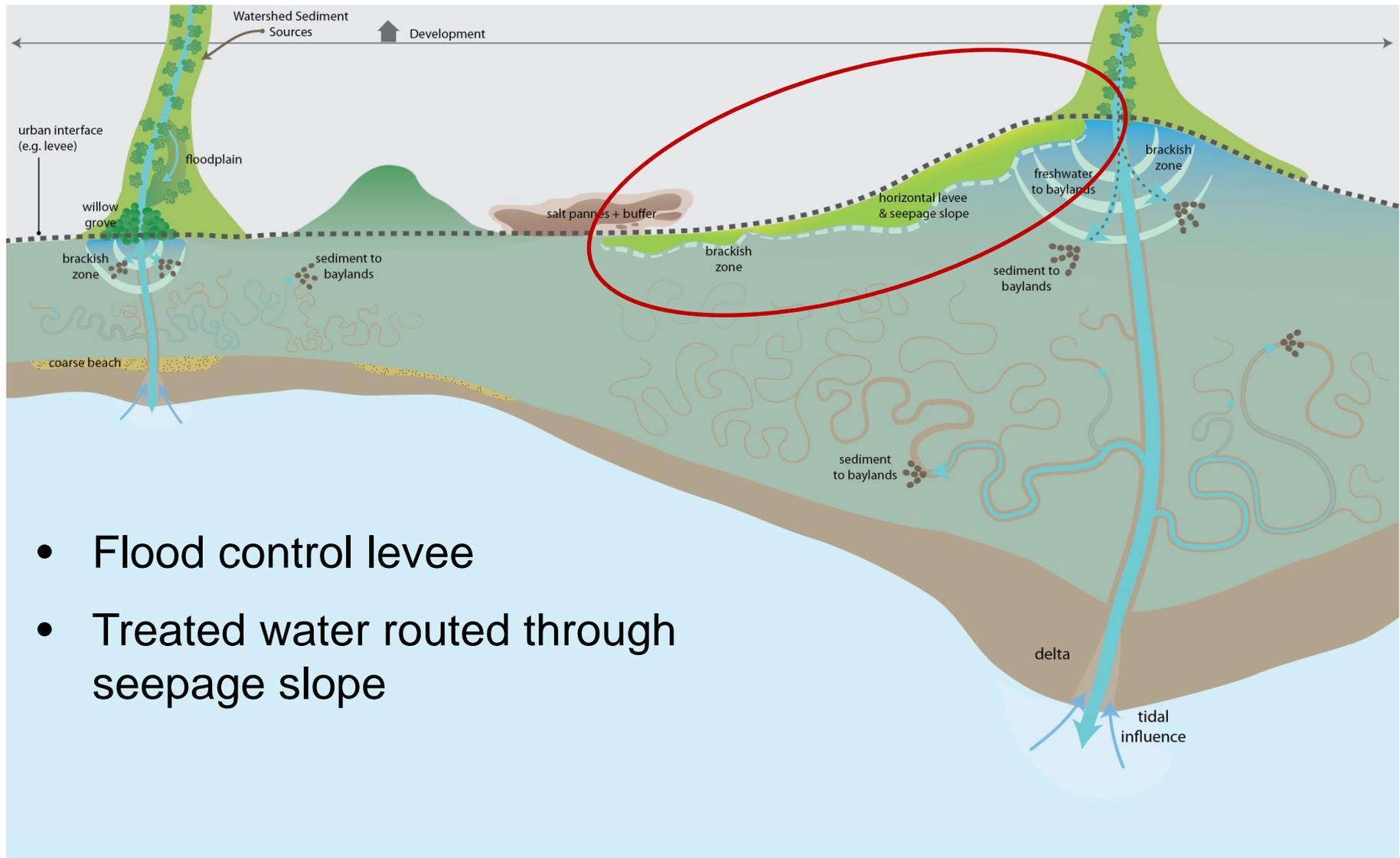


Landscape Vision - Processes



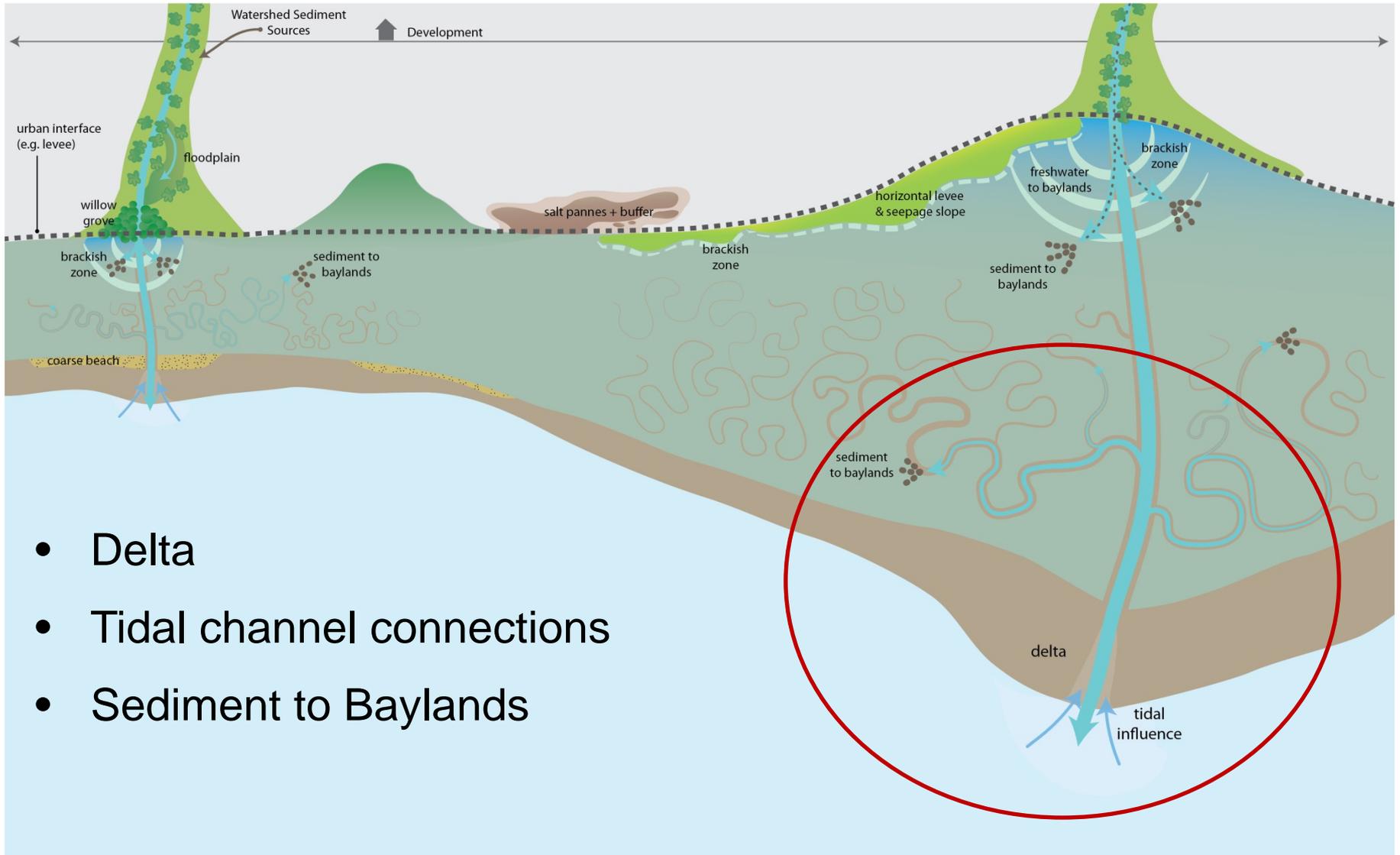
- Alluvial fan
- Freshwater & sediment to Baylands

Landscape Vision - Processes



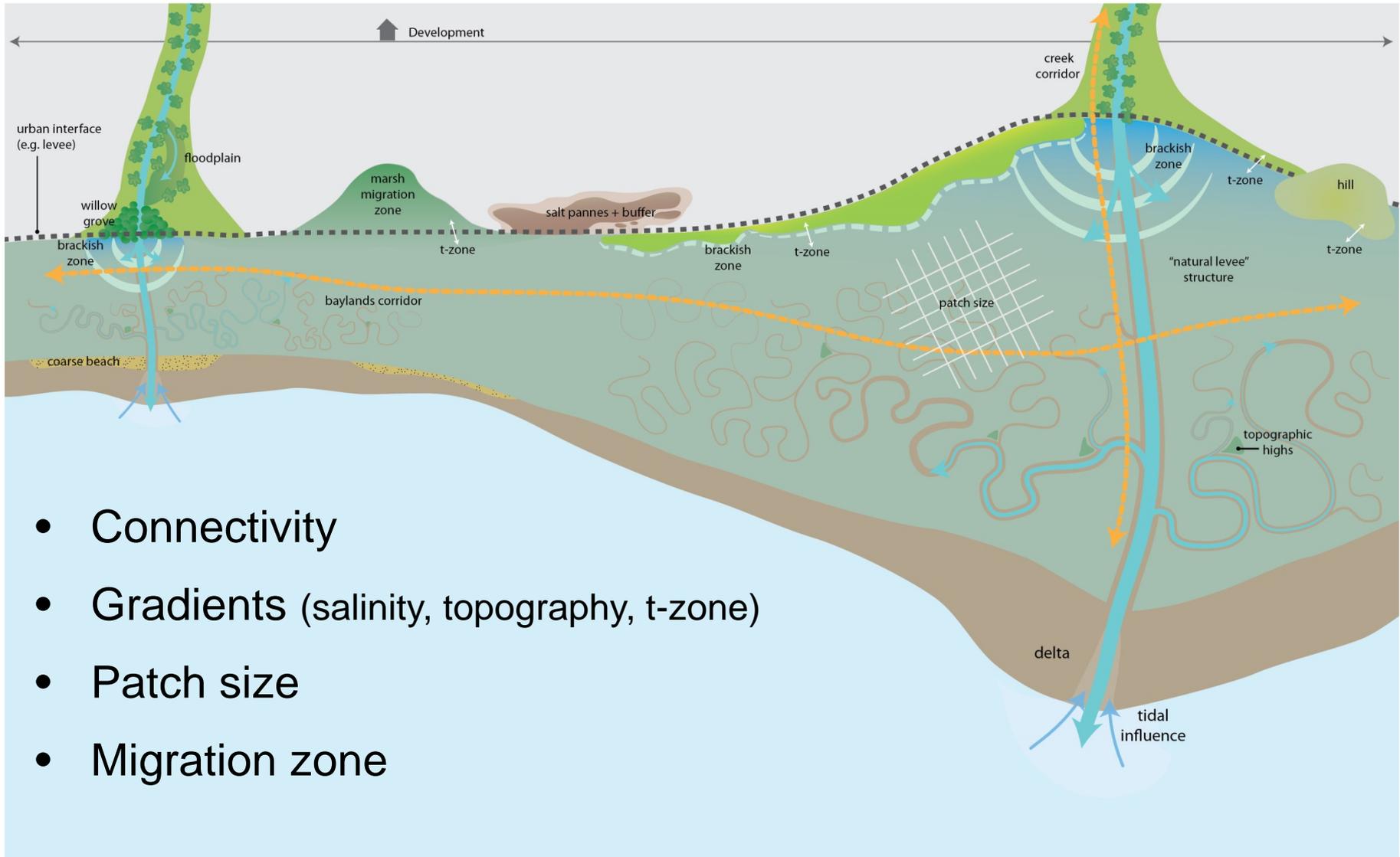
- Flood control levee
- Treated water routed through seepage slope

Landscape Vision - Processes



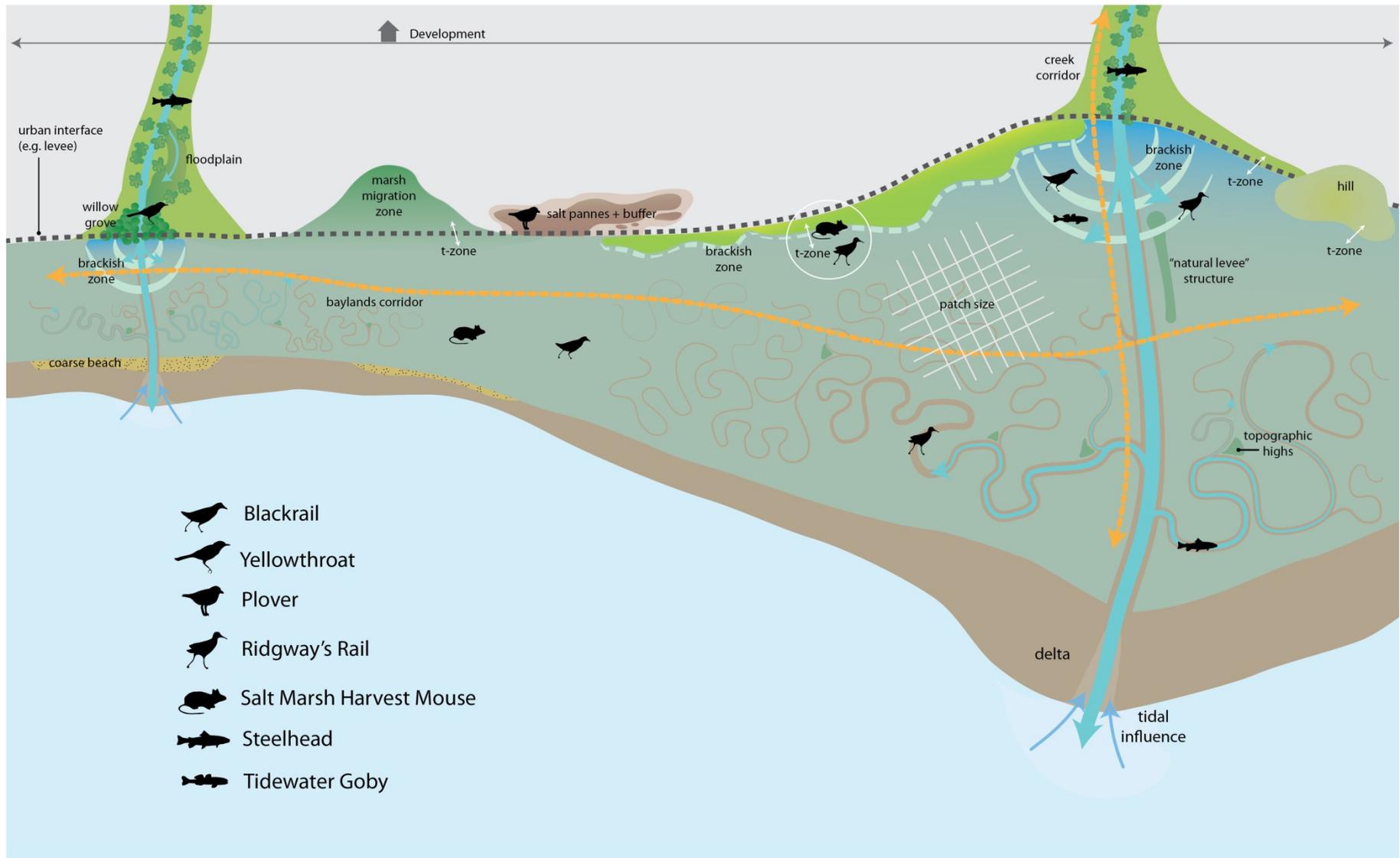
- Delta
- Tidal channel connections
- Sediment to Baylands

Landscape Vision - Coherence



- Connectivity
- Gradients (salinity, topography, t-zone)
- Patch size
- Migration zone

Landscape Vision - Species Use



Landscape Reality



Agencies Have Competing Demands

- 20% of flows by 2020 recycled water use
- Stricter Nutrient Discharge limits
- First flush stormwater flows to POTWs
- Long-term schedules for sewer lateral repairs
- Stricter limits on methane and nitrous oxide emissions as GHG rules

Integrated Regional Mgmt. Needs

- Sub-regional integrated ecological restoration and sea-level rise program
 - New funding collaborations multiple entities
 - Institutional governance structure for multiple benefit, integrated wastewater, infrastructure, natural resources
- Sub-regional shore master plan (e.g. Hayward)

Many Complementary East Bay Shoreline Restoration and Resource Projects Underway

- South Bay Saltponds Restoration
- Eden Landing Ecological Reserve Restoration
- Alameda Creek Fisheries Restoration
- Hayward marshes restoration
- San Lorenzo Creek watershed restoration
- Alameda County Flood Control Planning

BCDC Bay Fill Opportunities

- ART Lessons Learned Workshop
 - Alameda case studies surfacing complex challenges
 - Regulatory solutions not sufficient
 - Grant solutions not sufficient
- Expanded Scope of LTMS
 - Relate to existing needs but expand beyond dredging
 - Resources Agencies Crucial

Addressing the Bay's Need for Sediments

PROJECTED BAY AREA BIOSOLIDS PRODUCTION

