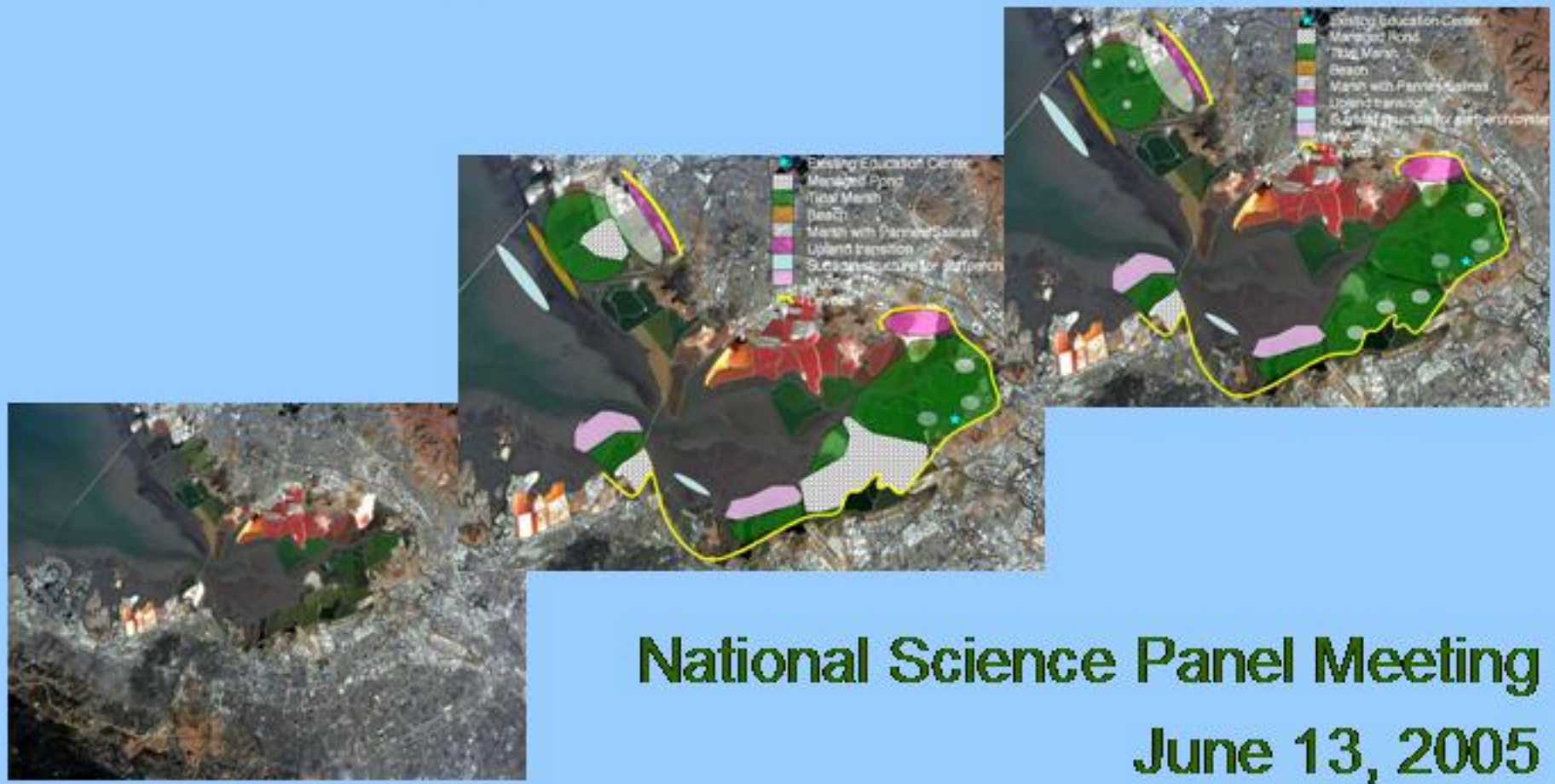
South Bay Salt Pond Restoration Project

CALIFORNIA DEPARTMENT FISH & GAME

Coastal Conservancy

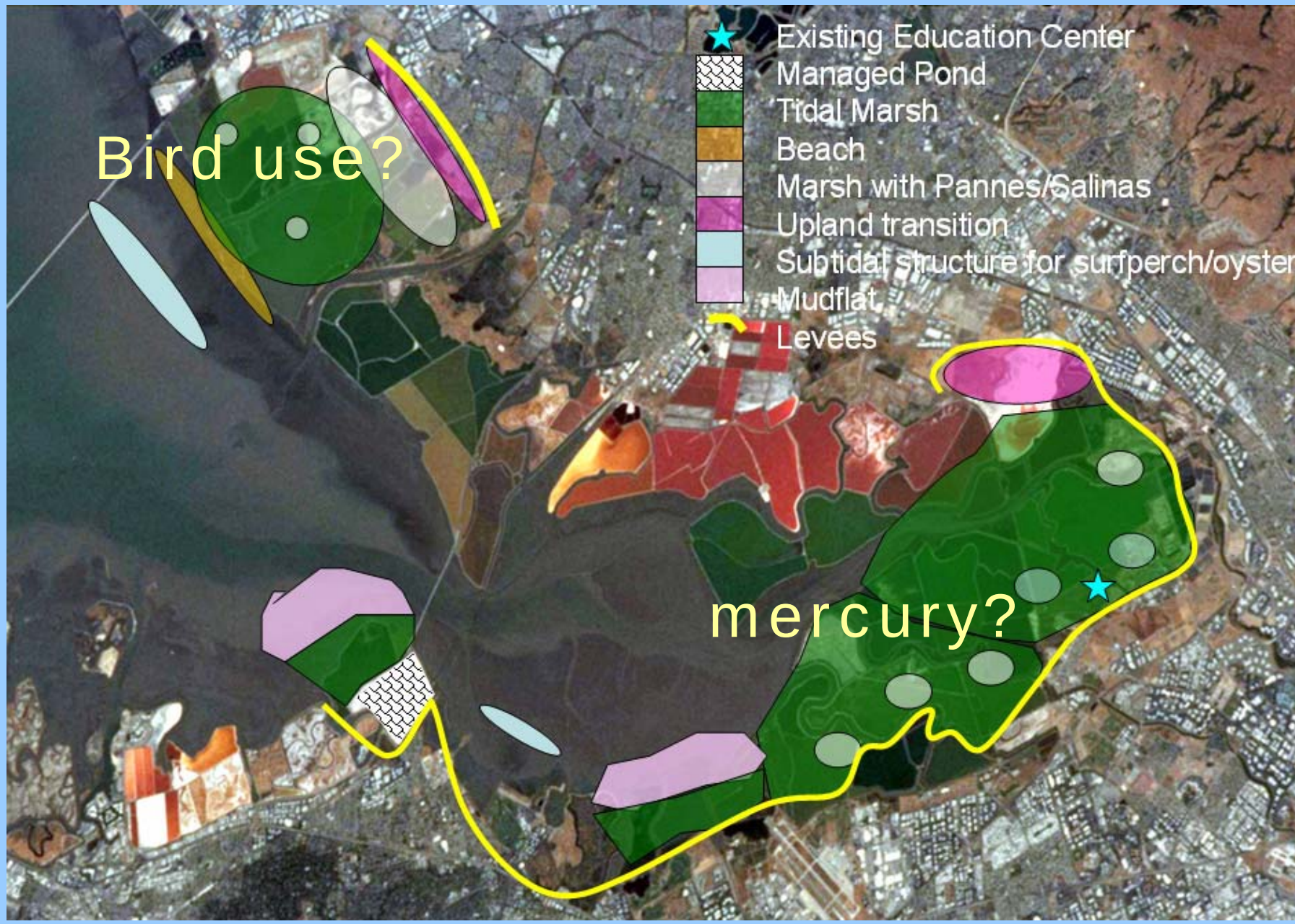
U.S. FISH & WILDLIFE SERVICE

Achieving the Landscape Vision

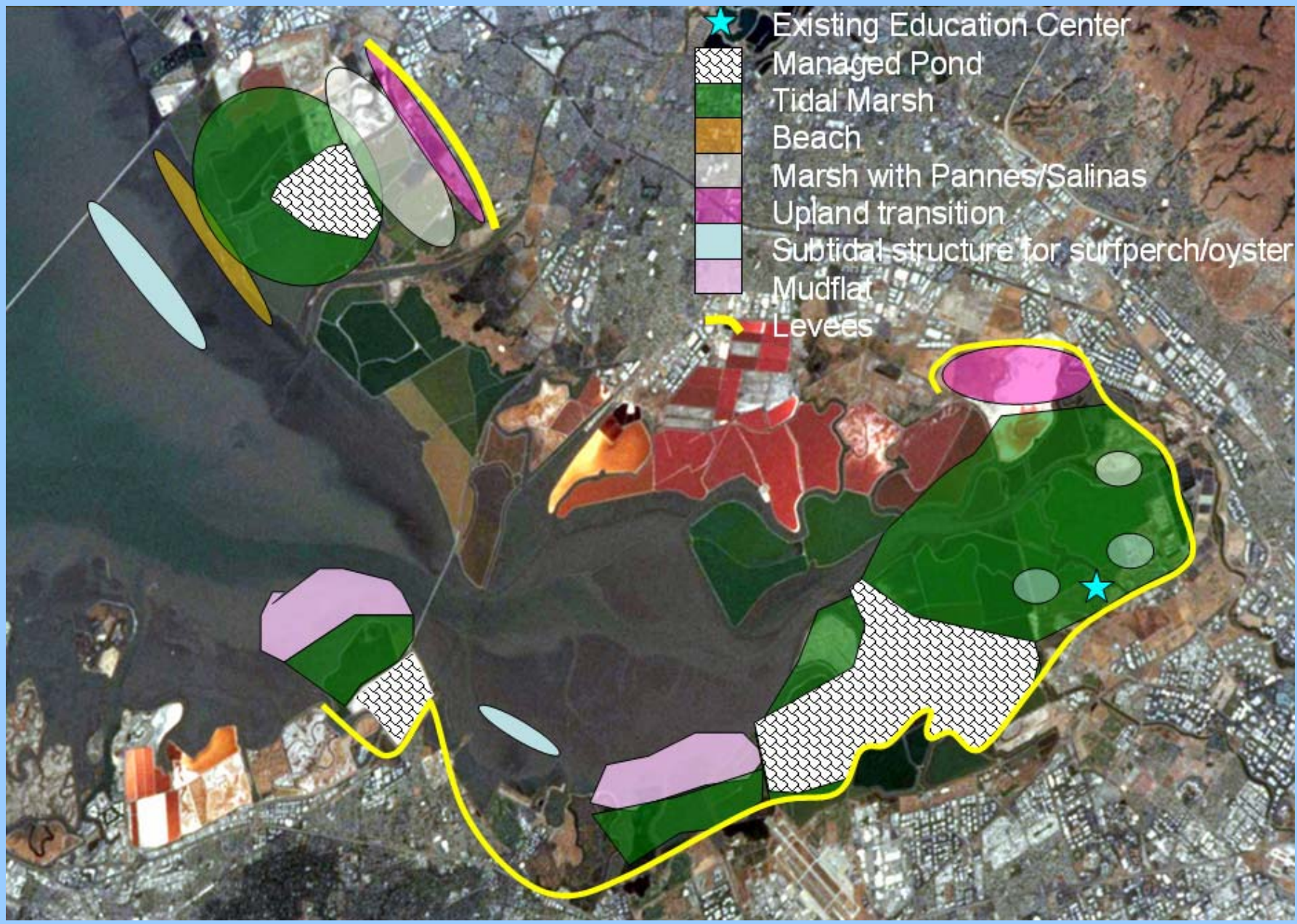


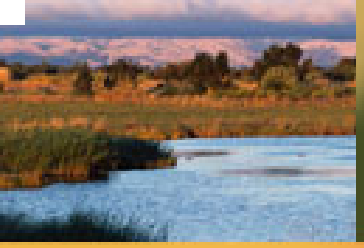
National Science Panel Meeting

June 13, 2005


Existing Education Center
Managed Pond
Tidal Marsh
Beach
Marsh with Pannes/Salinas
Upland transition
Subtidal structure for surfperch/oyster
Mudflat
Levees
Bird use?
mercury?

Charette Vision #2 for 2050

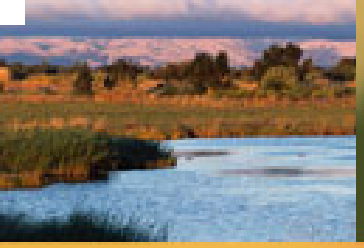




South Bay Salt Pond Restoration Project

Important Uncertainties

- Mercury
- Sediment Dynamics/Mudflats
- Bird Use of Different Habitats, esp. tidal marsh ponds/pannes
- Non-avian benefits
- Socio-economic dynamics
- Very large scale issues



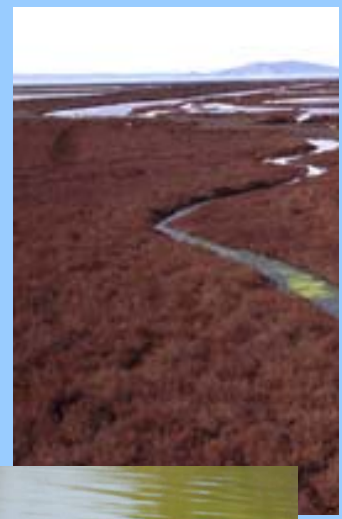
South Bay Salt Pond Restoration Project

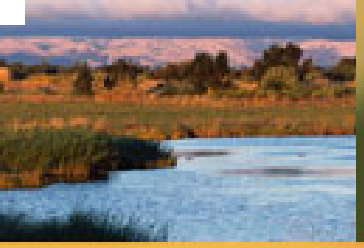
Topics

- Landscape Scale Assessment
- How the Landscape Scale Assessment is used in alternatives evaluation
- How the charette results are being used in development of the Adaptive Management Plan

What does the Landscape Assessment tell us?

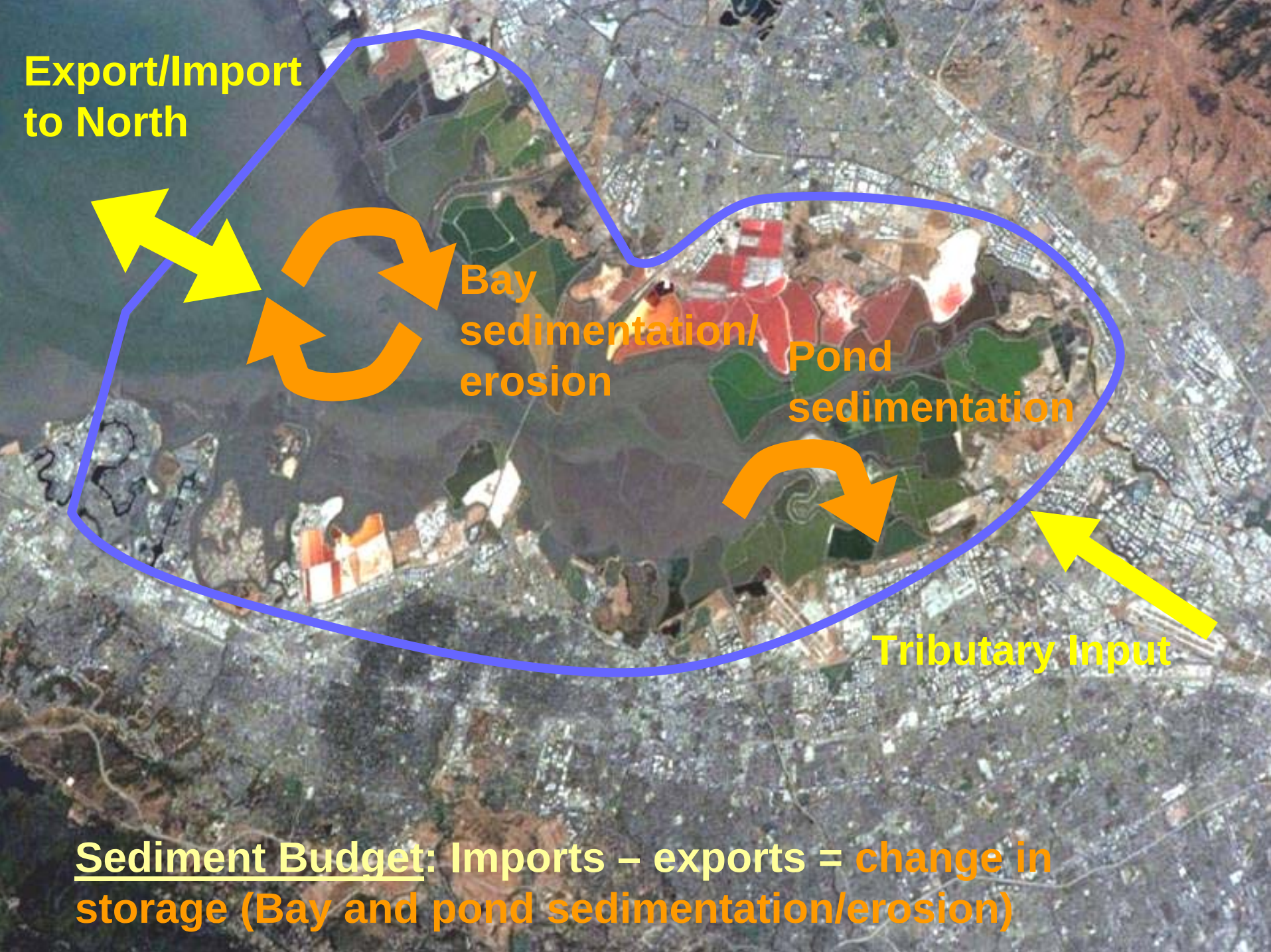
- Habitat Assessment
  - Habitat evolution
  - No Action and With Project alternatives
- Bird Use Assessment
  - How do birds respond to habitat changes?
- Collaborative: PWA, USGS, HTH, PRBO



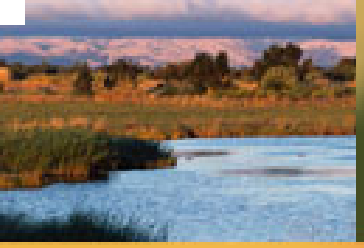


Landscape Assessment as a tool

- Not “The” Answer
- Help us understand the limits of the system
- Provides regional characterizations, not detailed spatial resolution
- Based on assumptions about the alternatives that will be detailed later in planning
- Assumes all tidal ponds are breached on Day 1

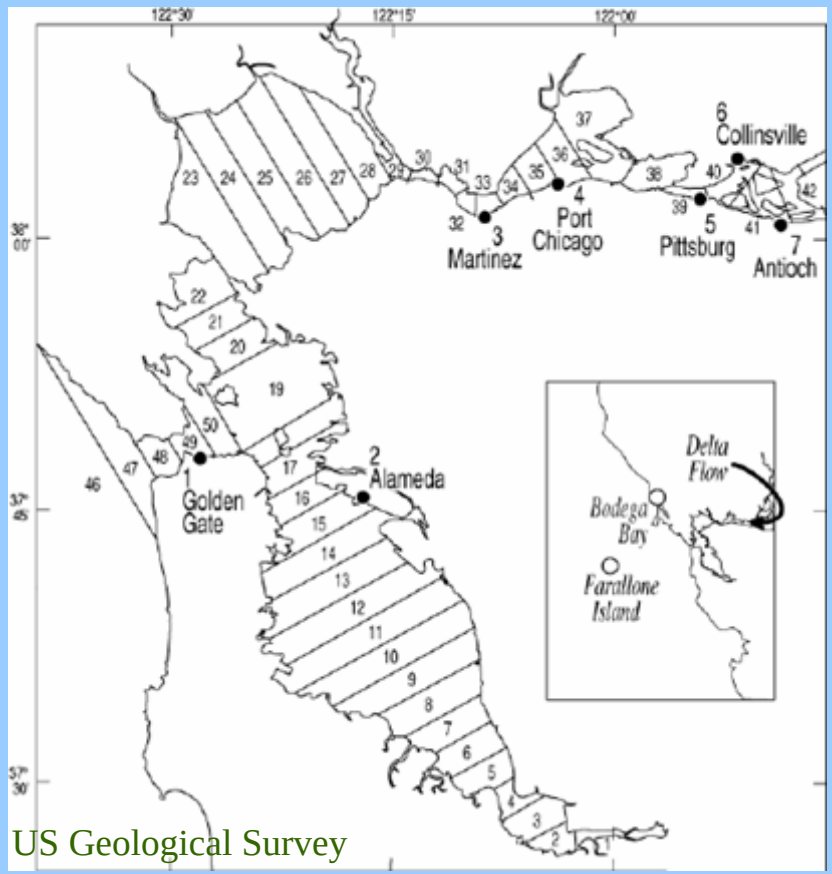


Sediment Budget: Imports – exports = change in storage (Bay and pond sedimentation/erosion)

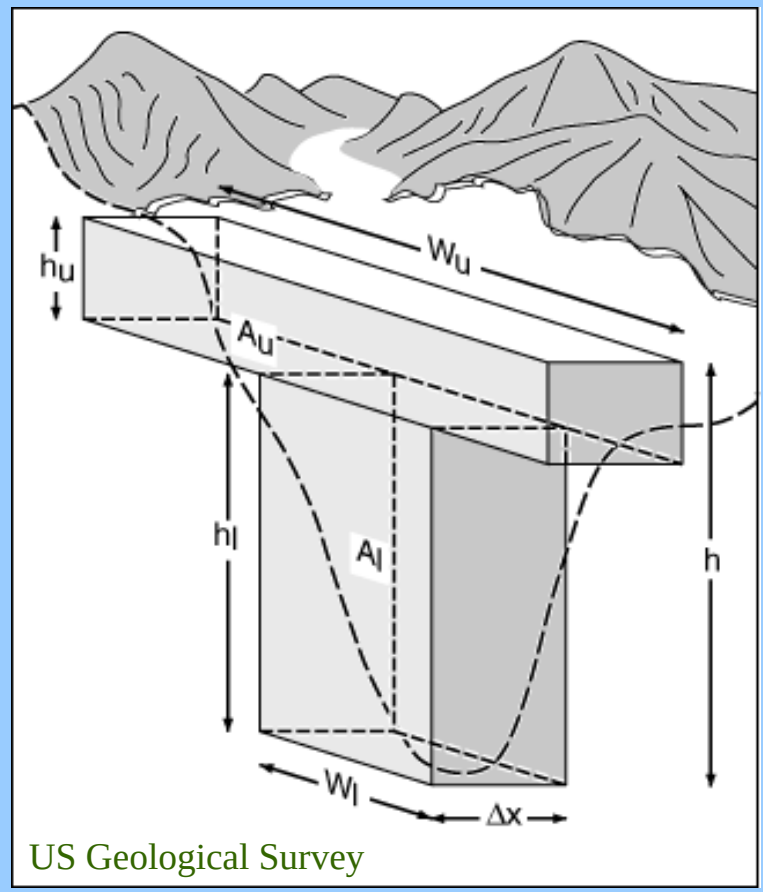


South Bay Salt Pond Restoration Project

Long-term simulation of hydraulics/sediment dynamics (Uncles-Peterson Model)

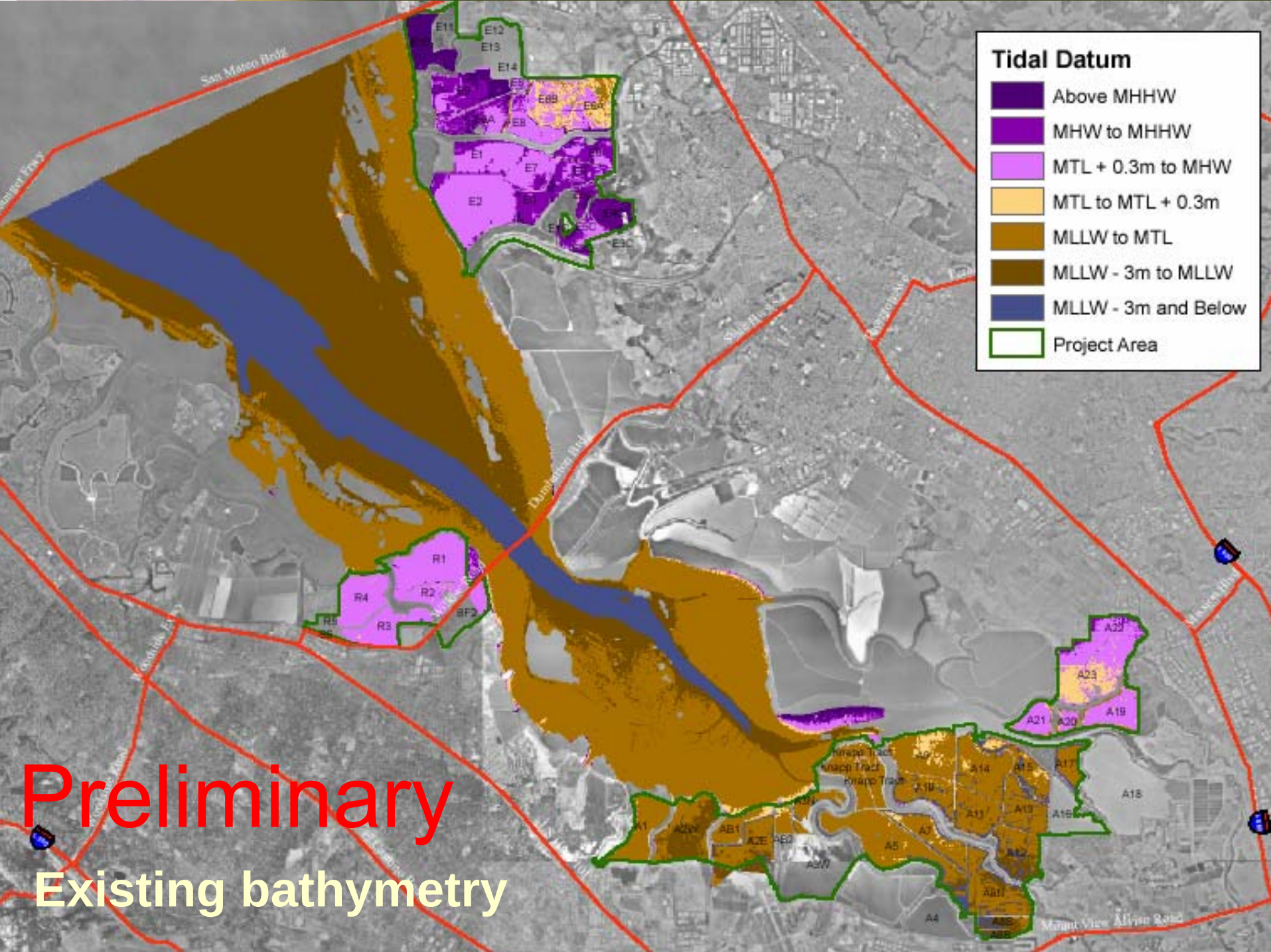


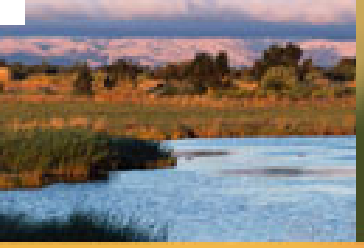
US Geological Survey



US Geological Survey

Schoellhamer and Lionberger, 2003


Tidal Datum
Above MHHW
MHW to MHHW
MTL + 0.3m to MHW
MTL to MTL + 0.3m
MLLW to MTL
MLLW - 3m to MLLW
MLLW - 3m and Below
Project Area
Preliminary
Existing bathymetry



South Bay Salt Pond Restoration Project

Outputs from the Uncles-Peterson Model

- Suspended sediment concentrations (by region)
- Volume of sediments accreted in the ponds (by group of ponds)
- Net deposition/erosion in the upper and lower layers in the South Bay

Marsh sedimentation in the ponds

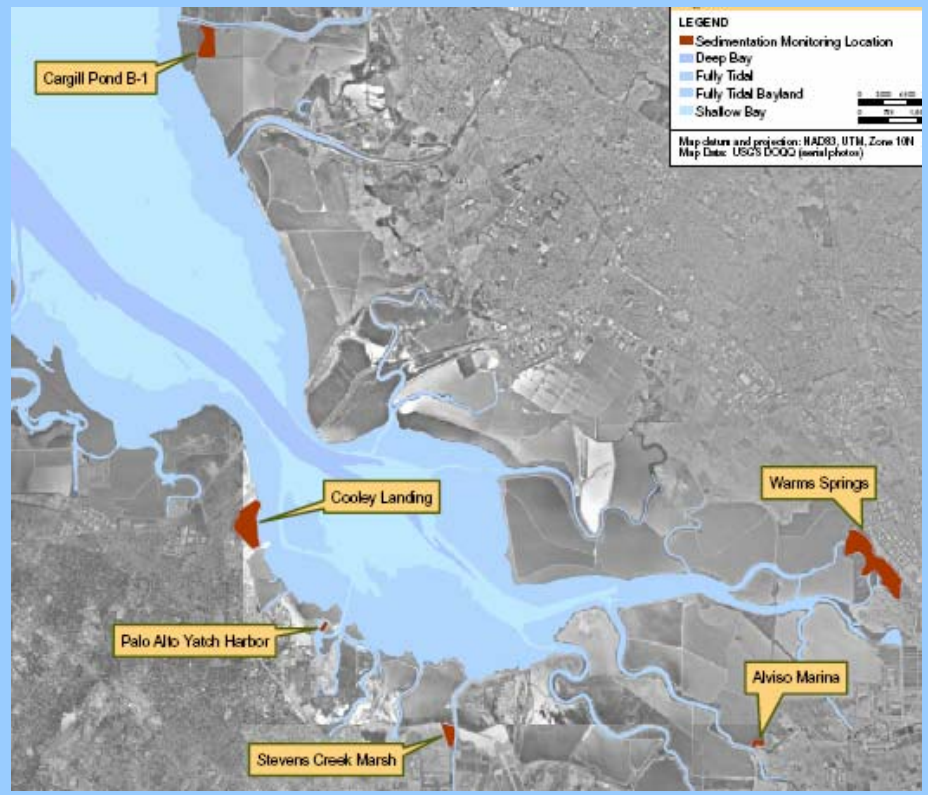
Mudflat Evolution

Long-term simulation of marsh sedimentation (MARSH98)

- Initial bed elevation
- Tides
- Suspended Sediment Concentration
- Sea Level Rise
- Density of Deposited Material
- Wind-wave resuspension / hindered settling

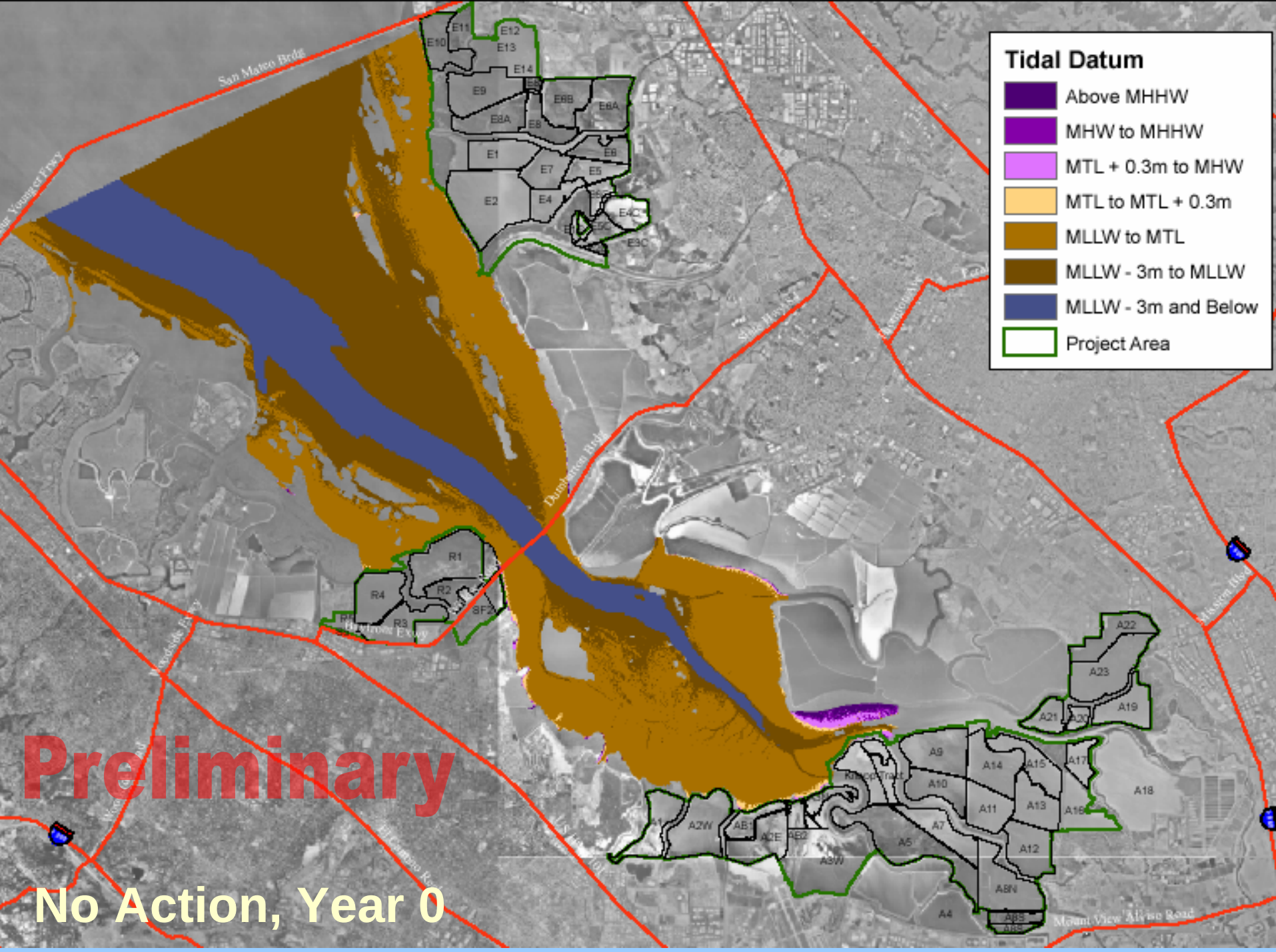
Long-term simulation of marsh sedimentation (MARSH98)

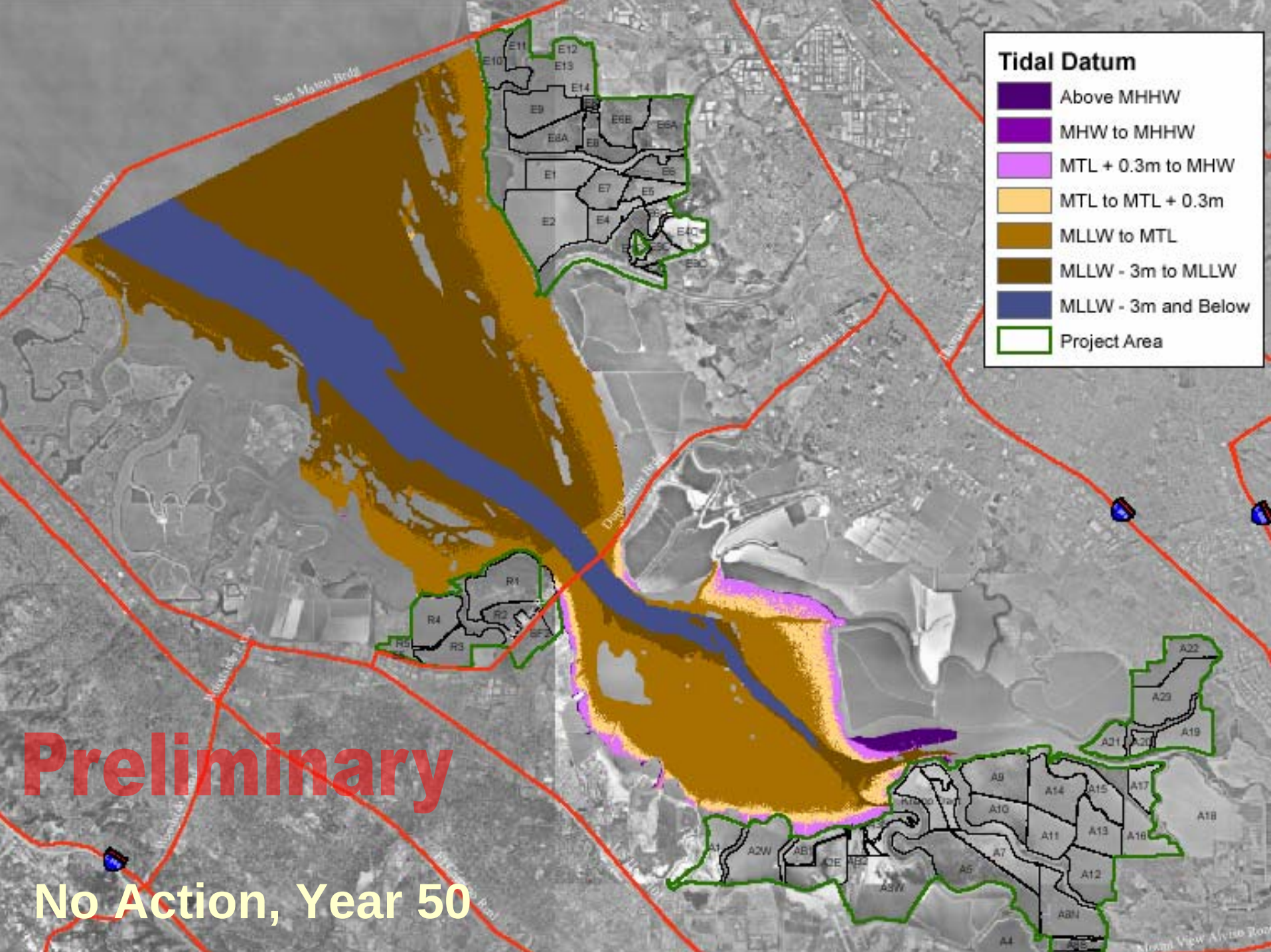
- Suspended sediment concentration Index from Uncles-Peterson model
- Index scaled based on empirical data from existing restoration sites

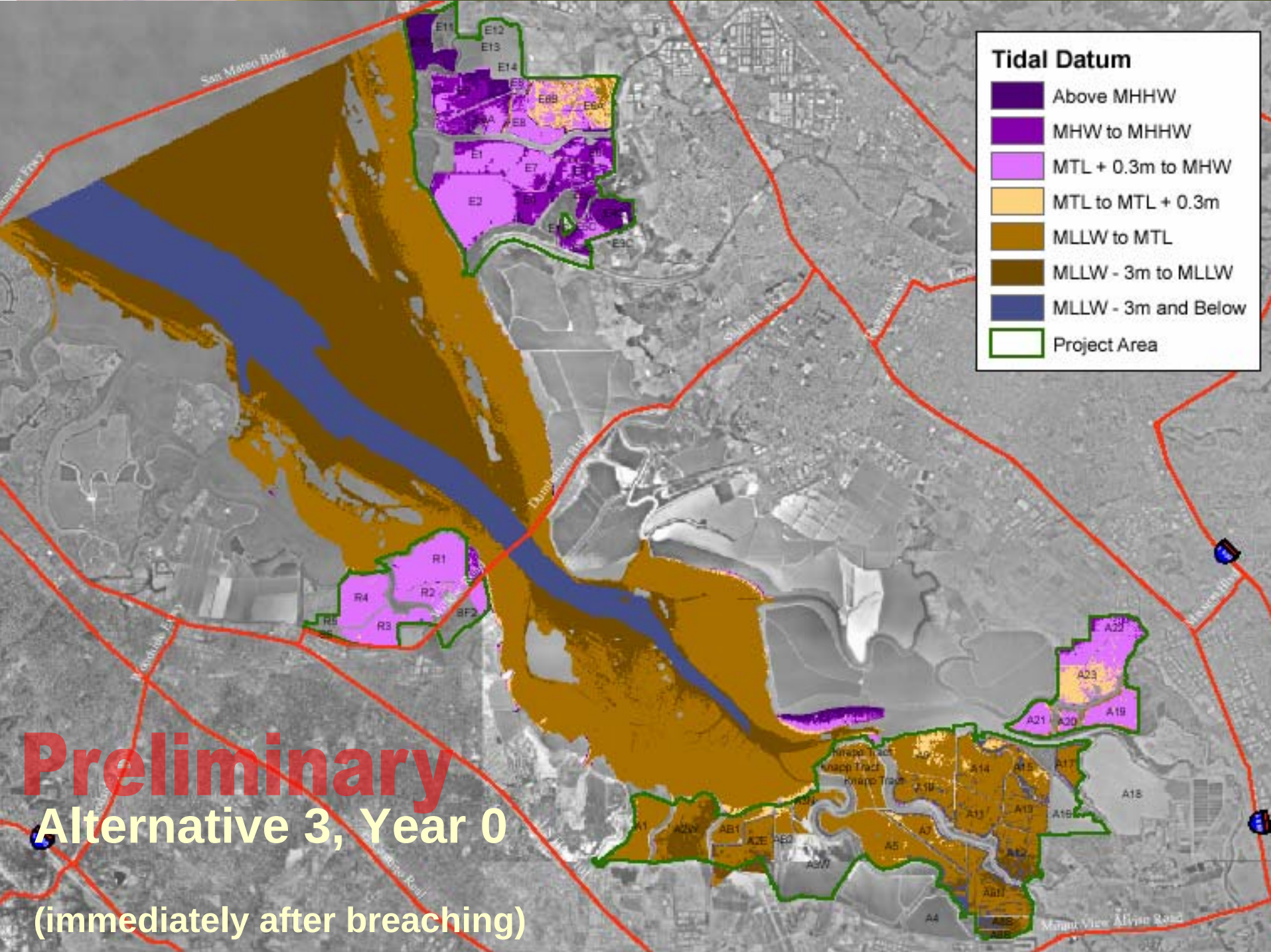


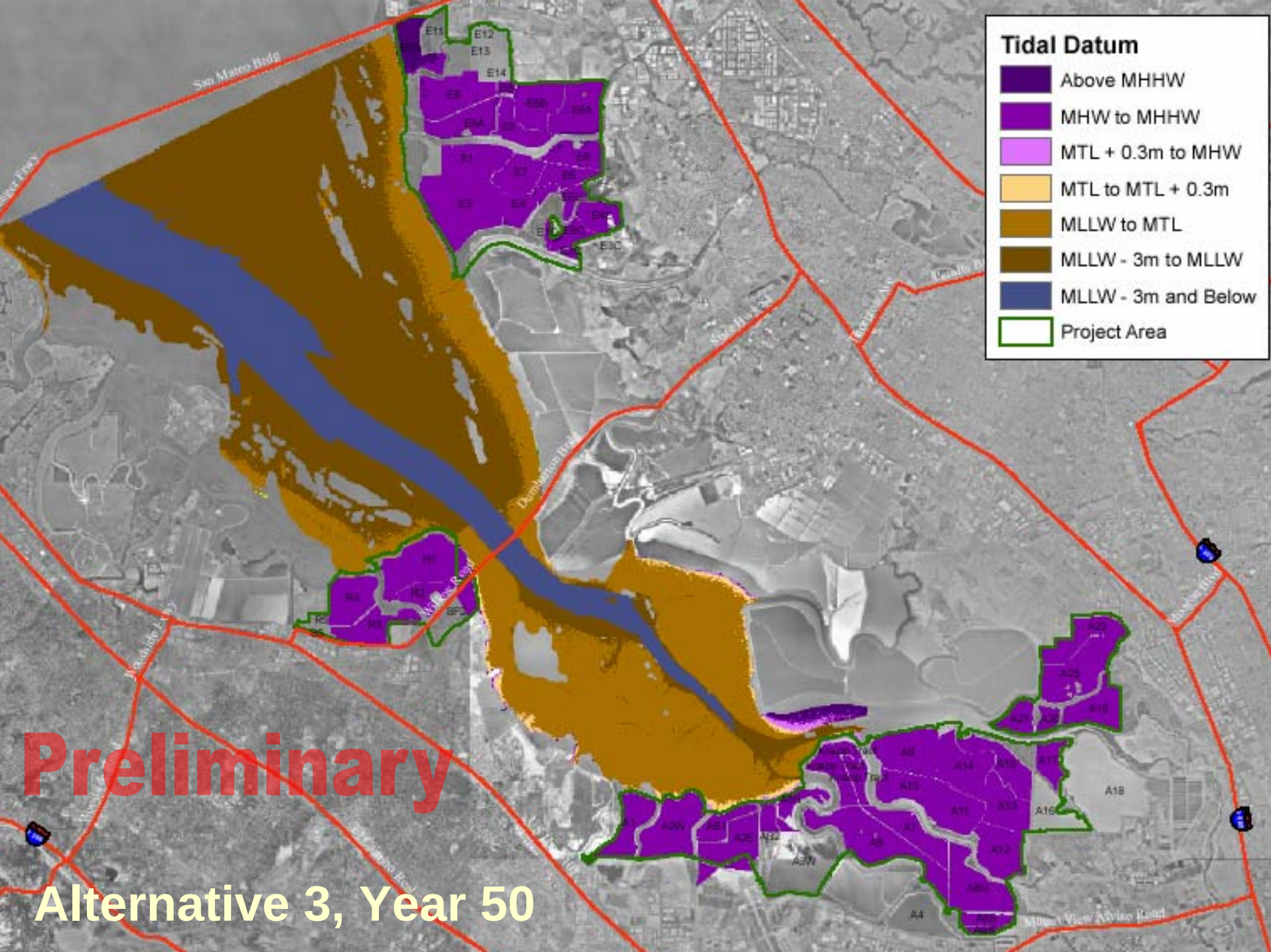
Bay Mudflat Evolution

- Initial conditions
  - Mudflats: 2004 LiDAR
  - Shallow and deep subtidal: 1983 bathymetry
- Evolution
  - By region based on erosion / deposition from the sediment budget
  - By sub-region based on observed rates of change between 1983 and 2004


Tidal Datum
Above MHHW
MHW to MHHW
MTL + 0.3m to MHW
MTL to MTL + 0.3m
MLLW to MTL
MLLW - 3m to MLLW
MLLW - 3m and Below
Project Area
Preliminary
No Action, Year 0

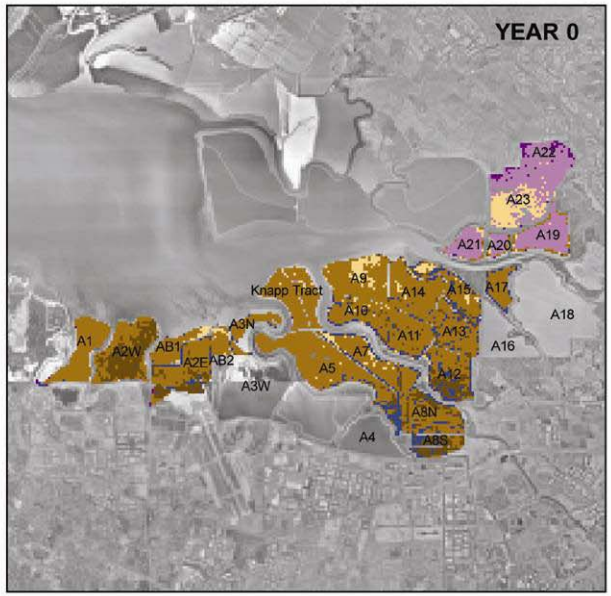

Tidal Datum
Above MHHW
MHW to MHHW
MTL + 0.3m to MHW
MTL to MTL + 0.3m
MLLW to MTL
MLLW - 3m to MLLW
MLLW - 3m and Below
Project Area
Preliminary
No Action, Year 50

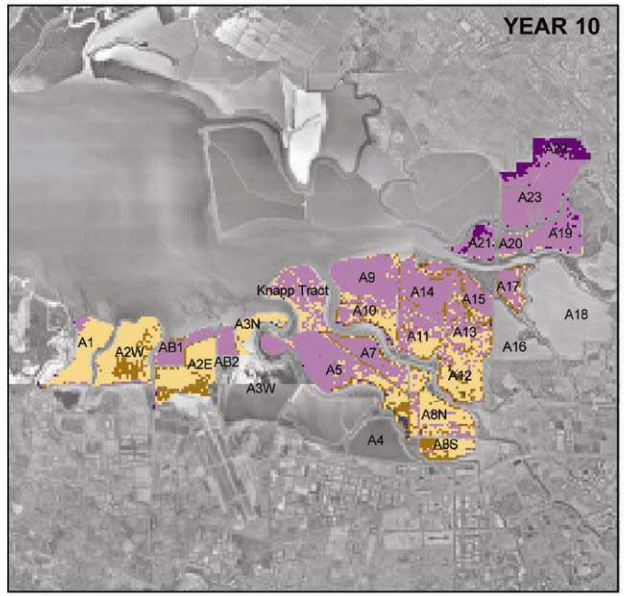

Tidal Datum
Above MHHW
MHW to MHHW
MTL + 0.3m to MHW
MTL to MTL + 0.3m
MLLW to MTL
MLLW - 3m to MLLW
MLLW - 3m and Below
Project Area
Preliminary
Alternative 3, Year 0
(immediately after breaching)

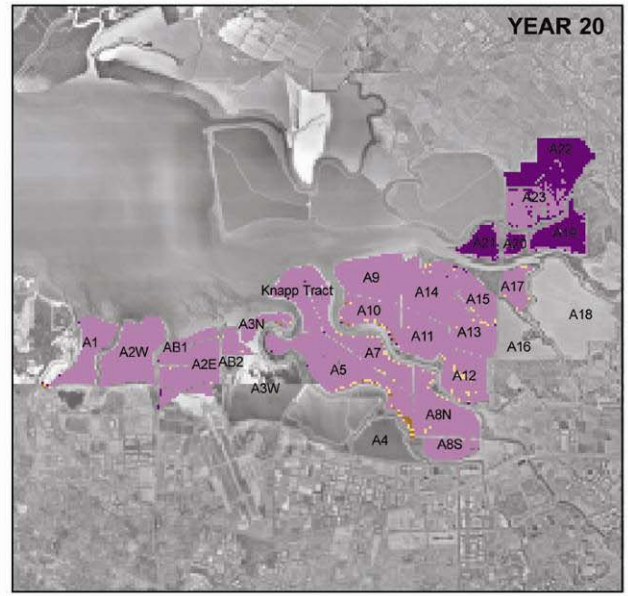

Tidal Datum
Above MHHW
MHW to MHHW
MTL + 0.3m to MHW
MTL to MTL + 0.3m
MLLW to MTL
MLLW - 3m to MLLW
MLLW - 3m and Below
Project Area
Preliminary
Alternative 3, Year 50

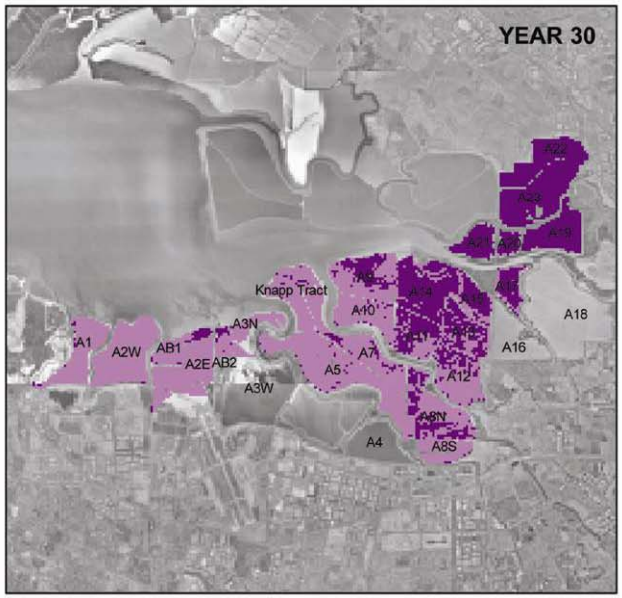
Alviso Complex Alternative 3

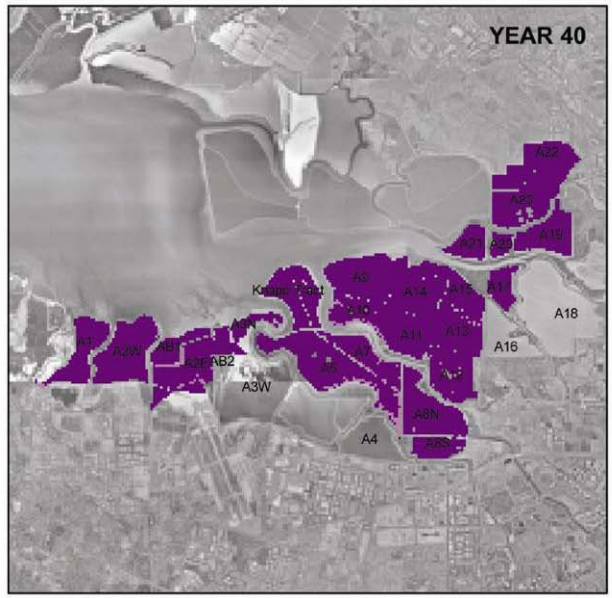
Preliminary

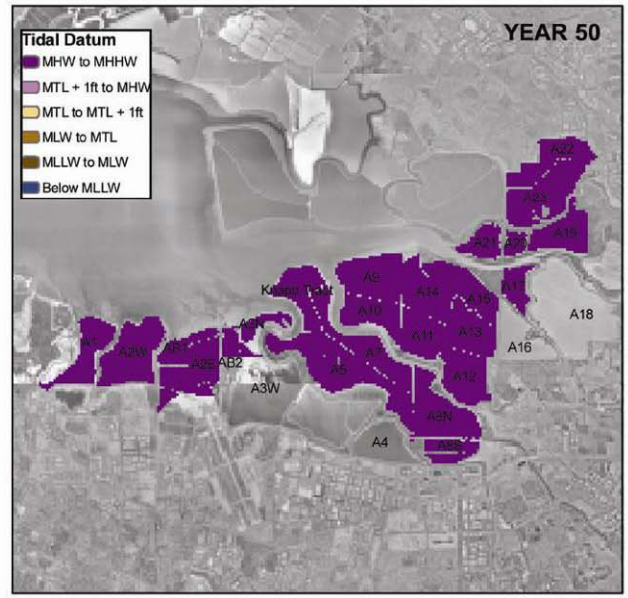






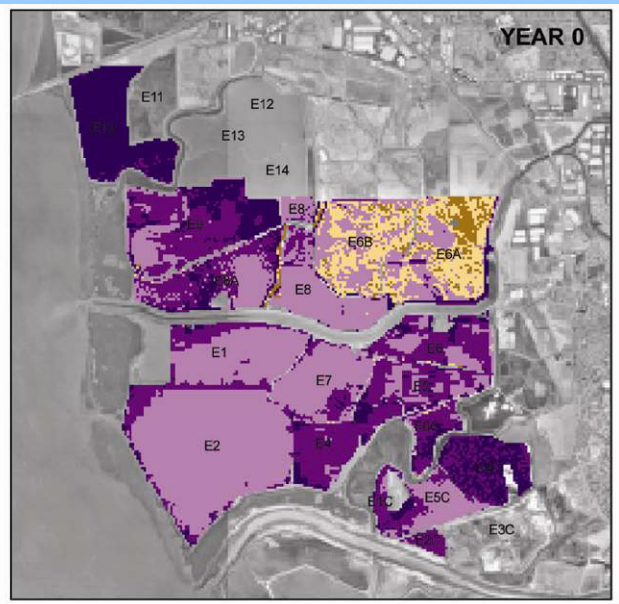


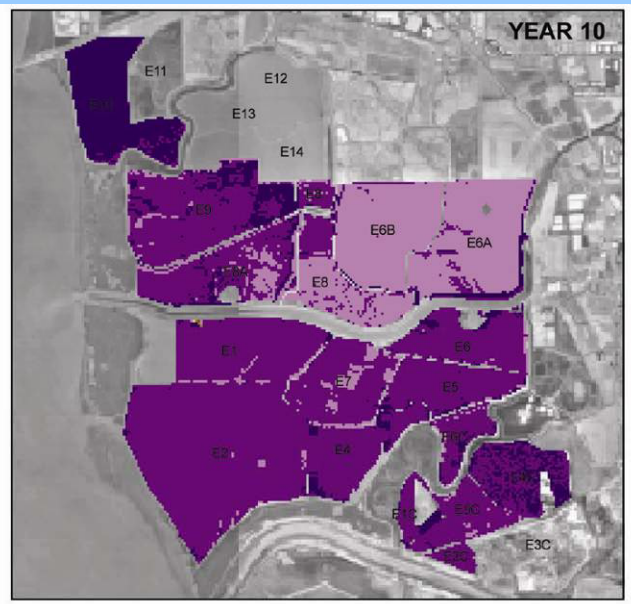


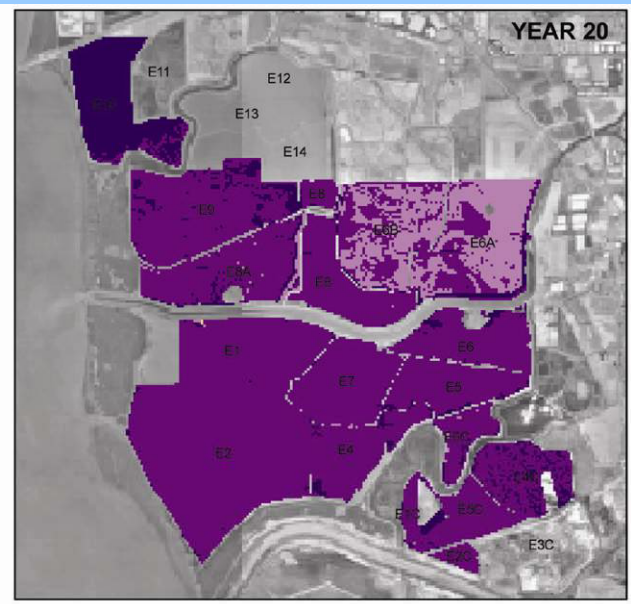


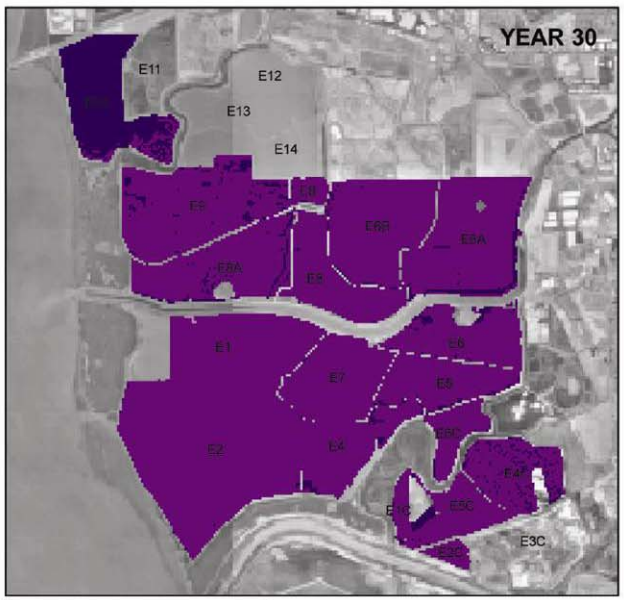
Eden Landing Complex Alternative 3

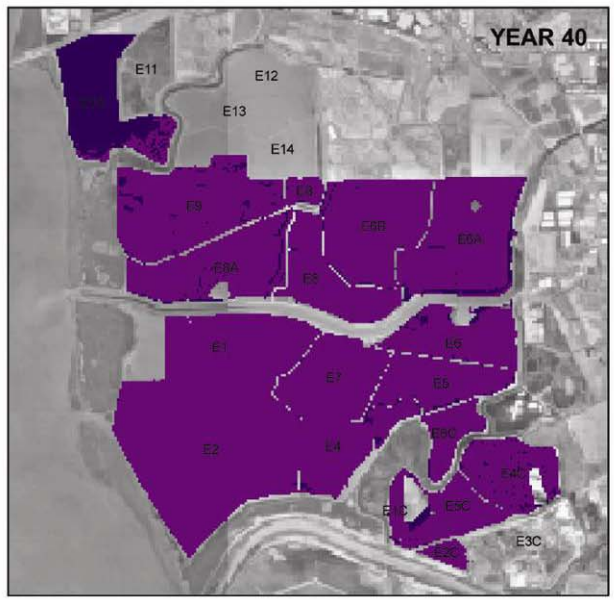
Preliminary

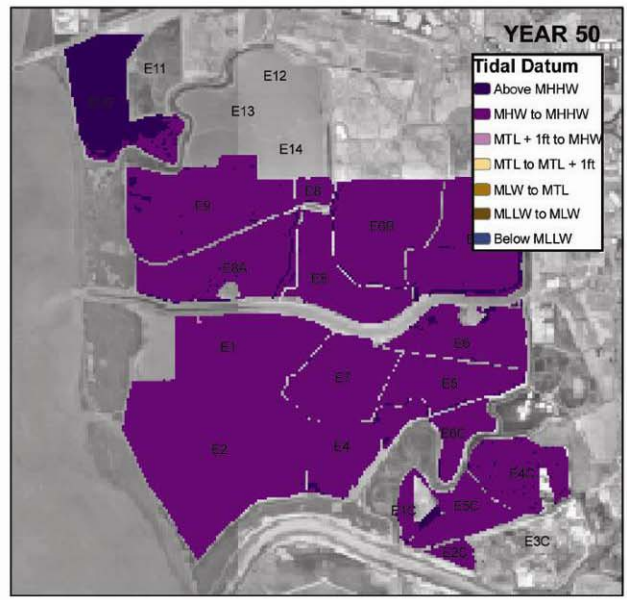






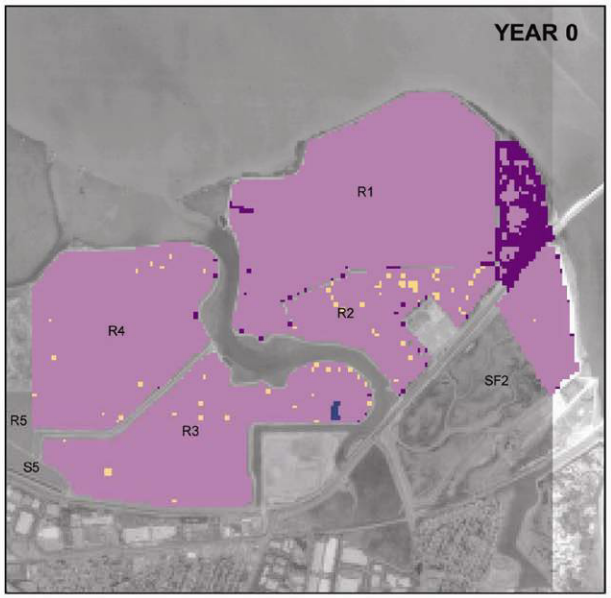


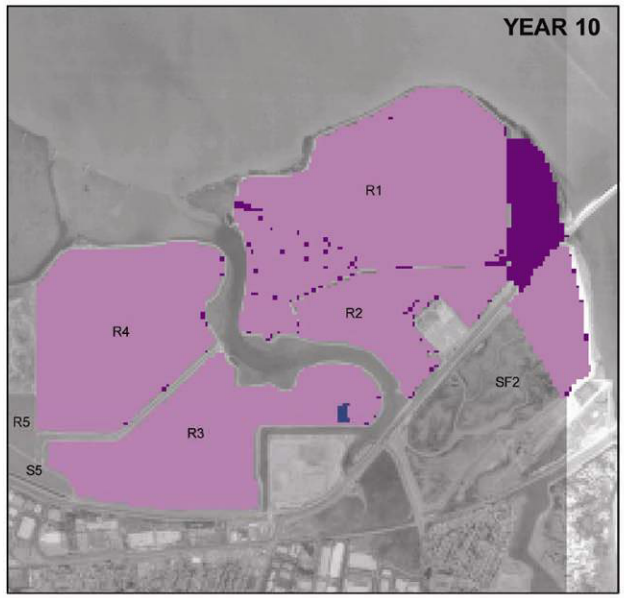


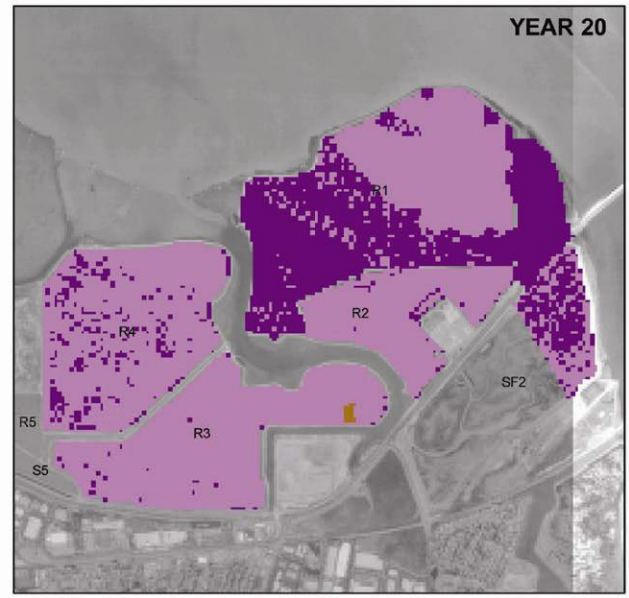


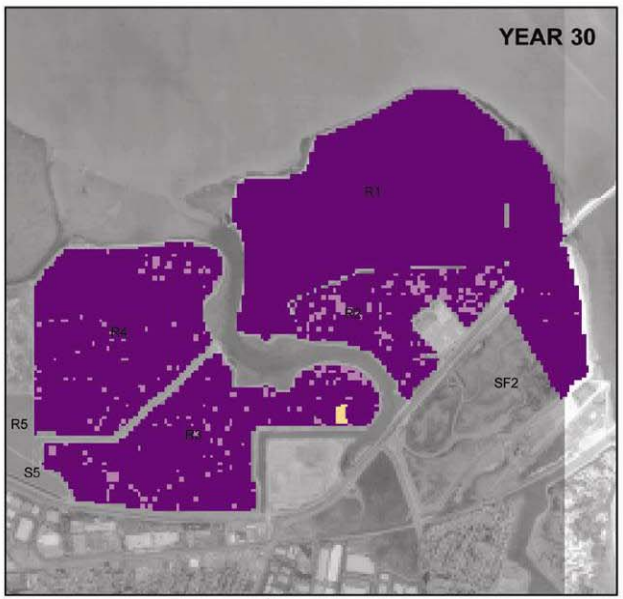
Ravenswood Complex Alternative 3

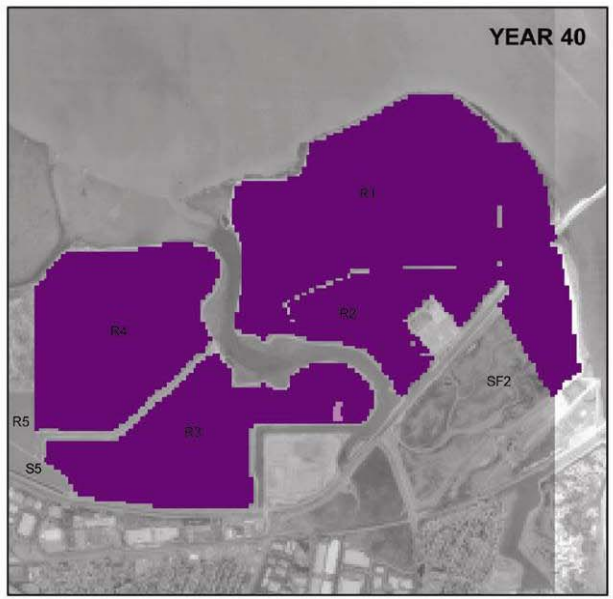
Preliminary

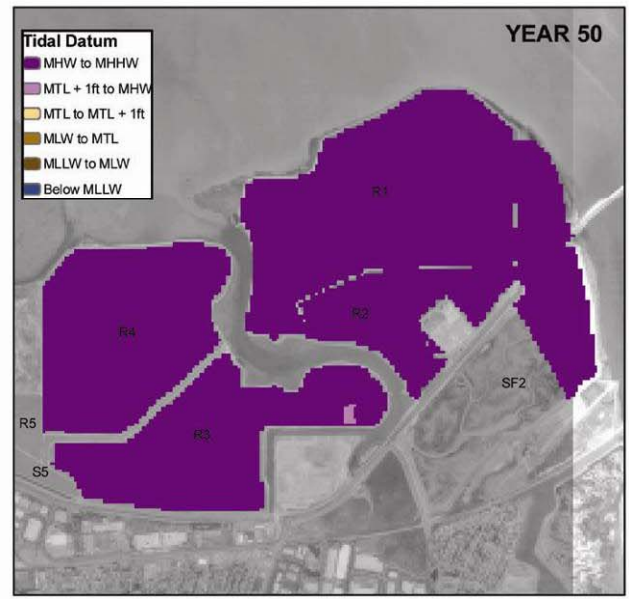




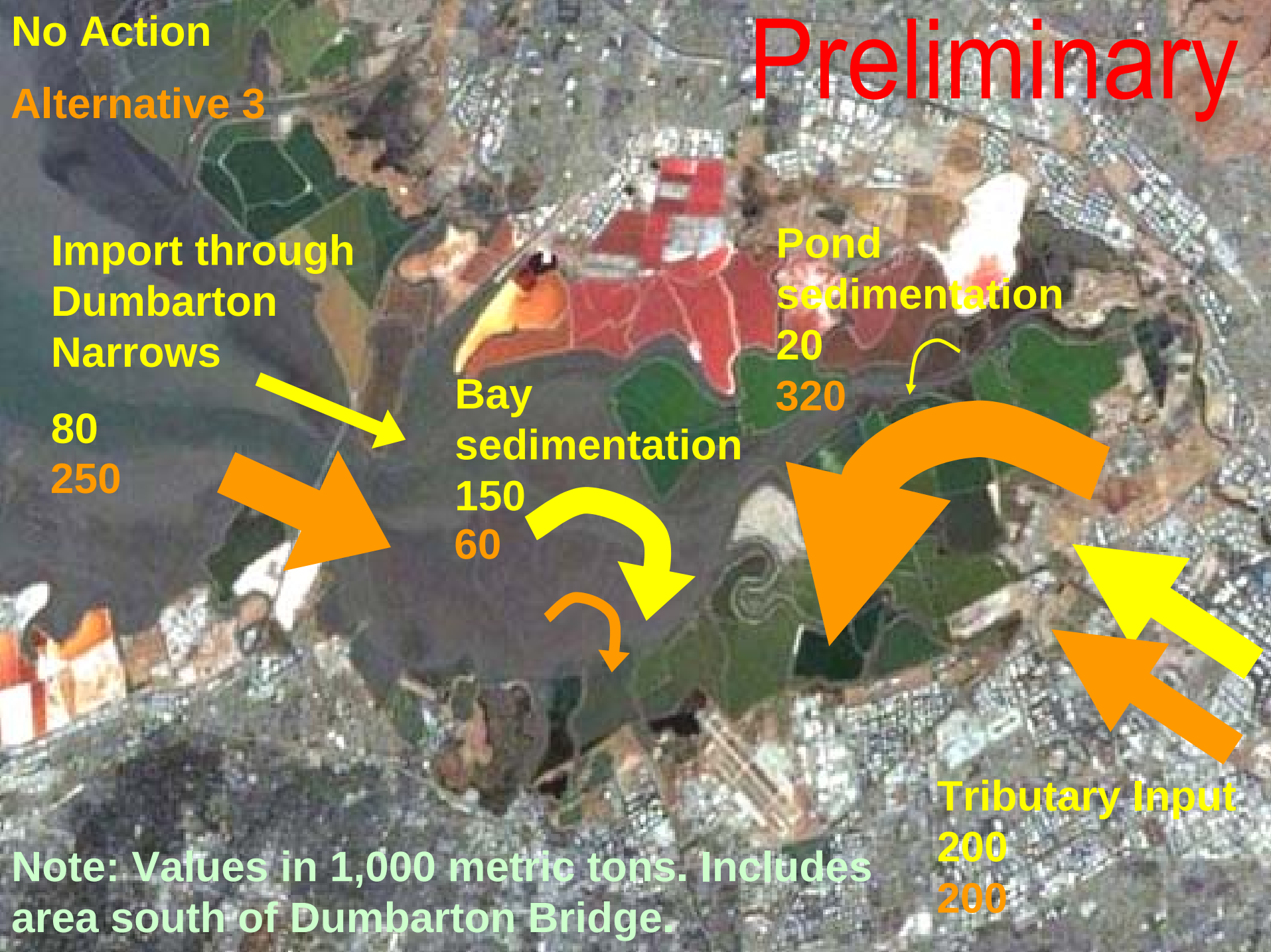






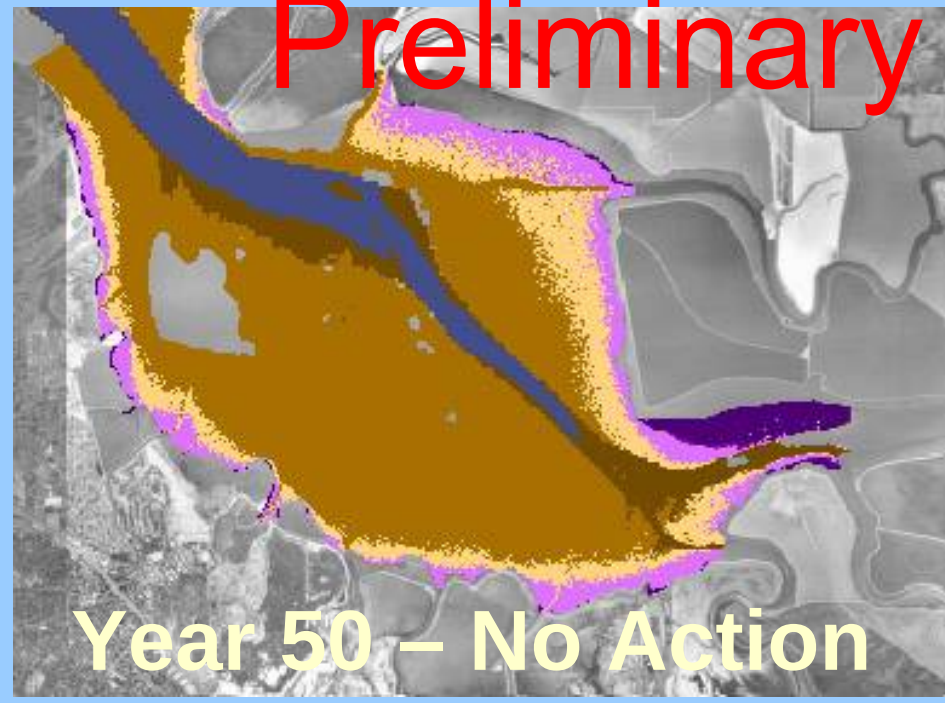



No Action
Alternative 3
Export north
to Bay
1830
1820
Bay erosion
1580
1990
Pond
sedimentation
20
500
Tributary Input
290
290
Note: Values in 1,000 metric tons.
Includes area South of San Mateo
Bridge.
Preliminary


No Action
Alternative 3
Preliminary
Import through Dumbarton Narrows
80
250
Bay sedimentation
150
60
Pond sedimentation
20
320
Tributary Input
200
200
Note: Values in 1,000 metric tons. Includes area south of Dumbarton Bridge.

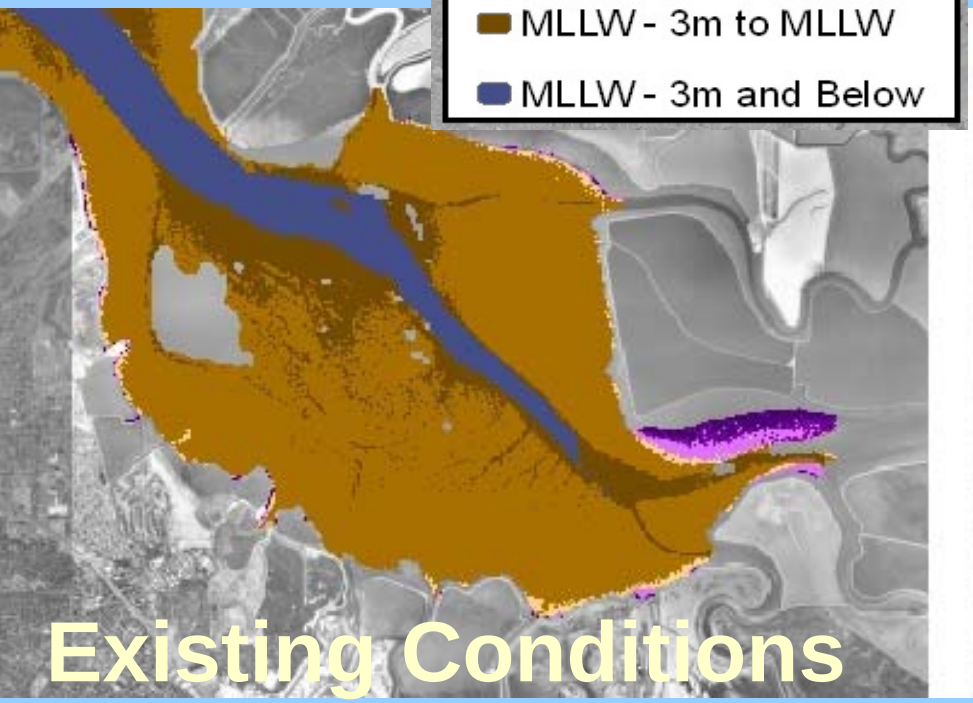
Mudflat Evolution in the far South Bay

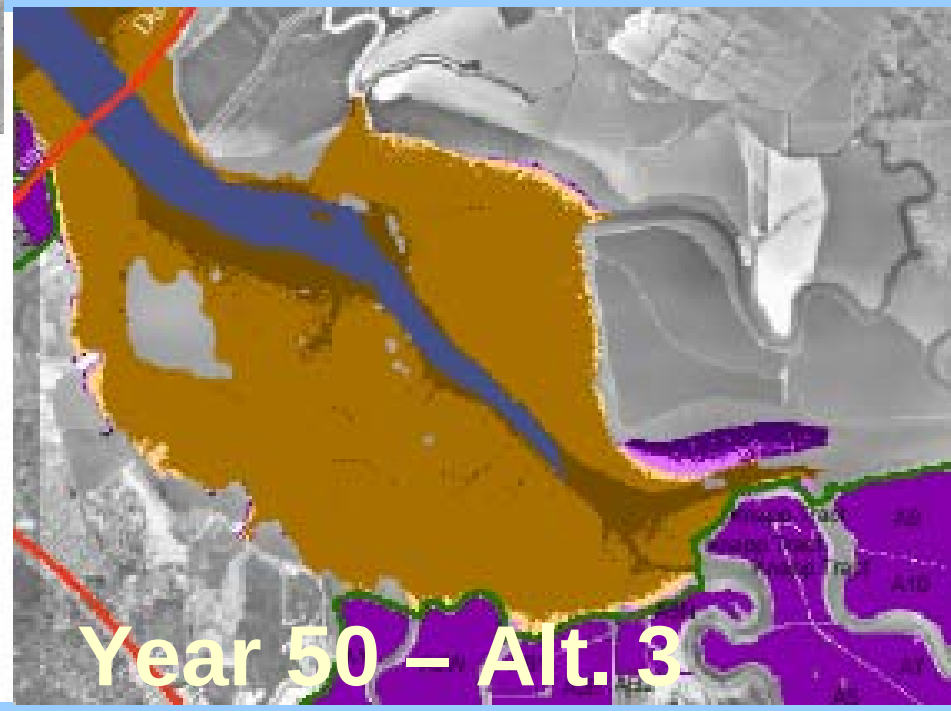
Preliminary

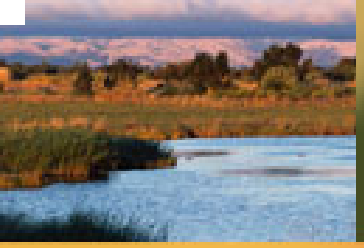


Tidal Datum

- Above MHHW
- MHW to MHHW
- MTL + 0.3m to MHW
- MTL to MTL + 0.3m
- MLLW to MTL
- MLLW - 3m to MLLW
- MLLW - 3m and Below







South Bay Salt Pond Restoration Project

California Department of Fish & Game

Coastal Conservancy

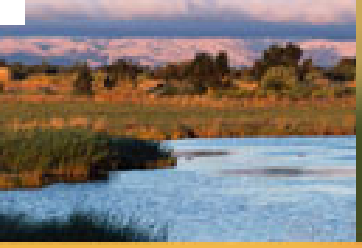
U.S. Fish & Wildlife Service

Preliminary

Habitat Changes South of San Mateo Bridge, Yrs 0 to 50

	No Action		Alternative 3	
	Acres	%	Acres	%
Deep subtidal	0	0%	100	3%
Shallow subtidal	800	6%	2,200	17%
Intertidal mudflat	-1,600	-16%	-2,300*	-18%
Tidal marsh	900	NA	11,400*	NA
Managed pond	0	0%	-11,200	-88%

* Approximately 1,400 acres of tidal channels will be created in the ponds (included in tidal marsh acreage). Much of this will be mudflat.



South Bay Salt Pond Restoration Project

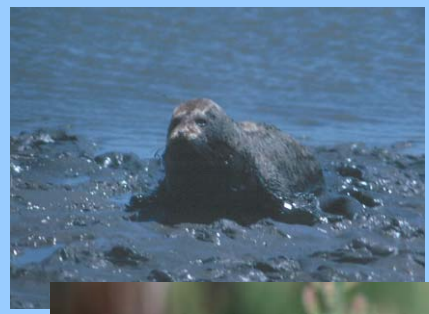
What does this mean for sediments?*

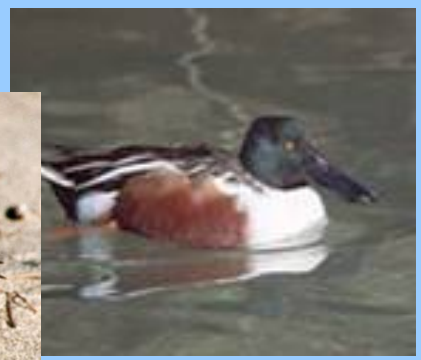
- Sediment availability does not appear to limit tidal marsh restoration in the ponds
  - South of the Dumbarton is an efficient sediment trap
- Sediment availability does appear to have an effect on bay mudflats
  - Some loss of Bay mudflat over 50 years with No Action
  - Somewhat greater loss over 50 years with Alternative 3
- Loss of Bay mudflat partially offset by creation of channel-associated mudflat inside the ponds

* Based on preliminary results

Habitat and Bird Use predictions

- Tidal and managed pond habitat detail
- Input to bird use modeling
- For use in alternatives evaluation

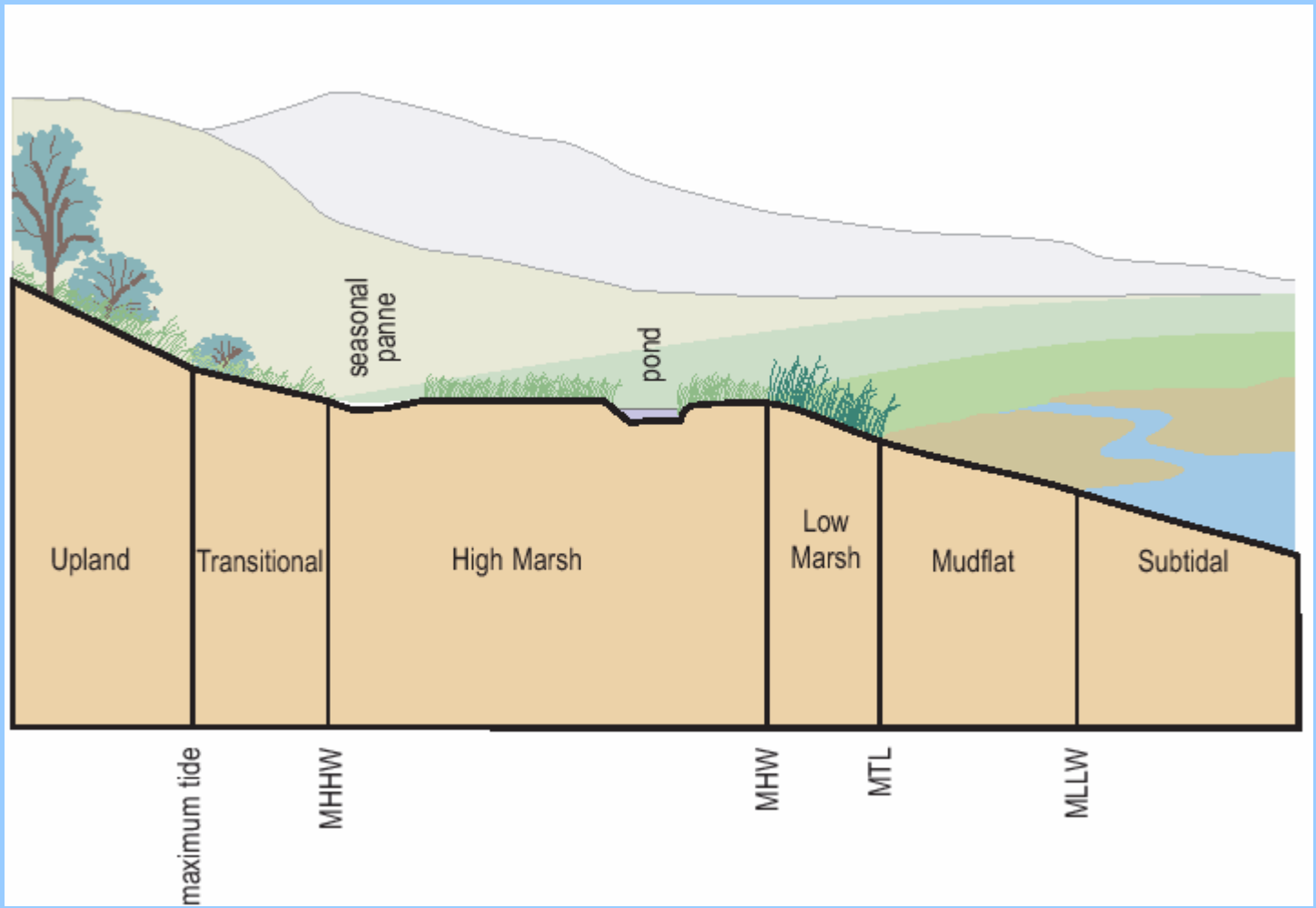




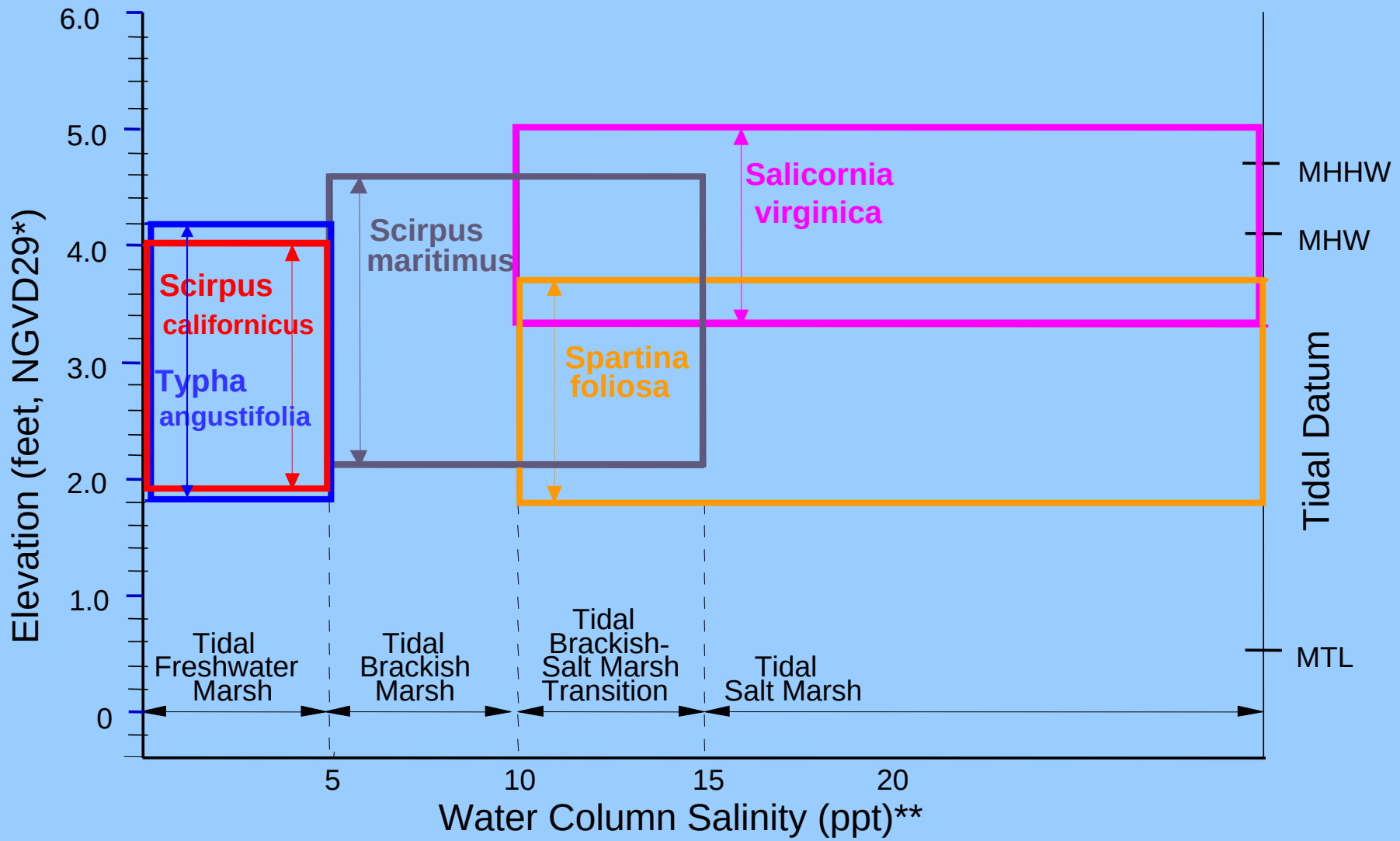
Tidal Habitat Types

- High and low marsh
- Saline and brackish marsh
- Mudflat
- Channels
- Ponds/pans
- Upland transitions

Vegetation Zones

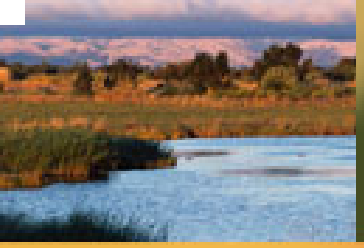


Approximate Elevation and Water Column Salinity Range of Dominant Plant Species in Tidal Marsh Habitats along Coyote Creek and Mud Slough (South Bay).



* Shows means of elevation limits. Elevation ranges of plant species may vary with salinity.

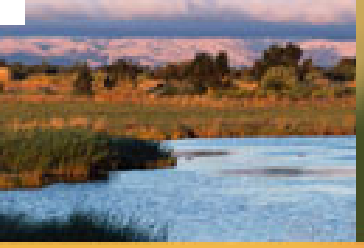
** Salinity data modeled (Gross, 2003). Elevation and habitat data are empirical.



South Bay Salt Pond Restoration Project

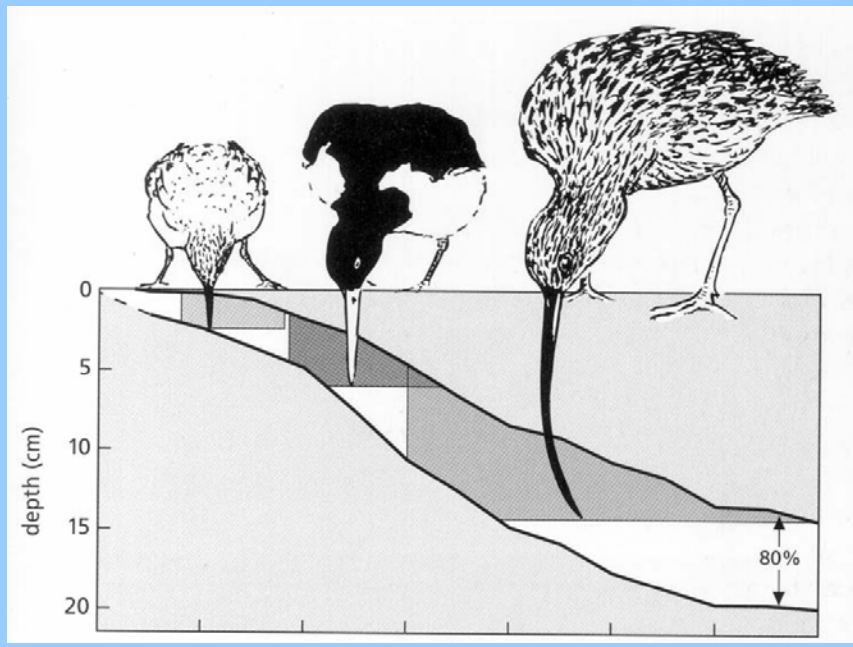
Managed Pond Habitat Types

- System (enhanced)
- System (winter) / High-salinity (summer)
- System (winter) / Seasonal (summer)
- Seasonal ponds
- Seasonal (summer) / High salinity
- High salinity
- Reconfigured (graded) ponds



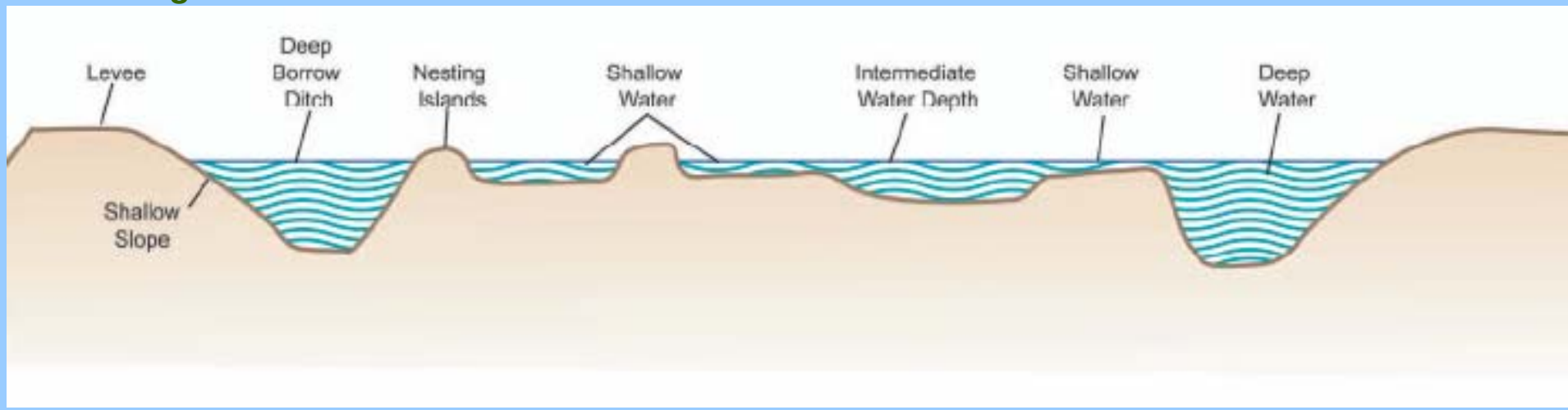
South Bay Salt Pond Restoration Project

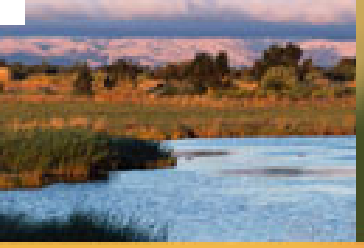
Foraging Depth Varies by Species



Reconfigured Ponds

Reconfigured ponds will be extensively graded, and will be managed to achieve highly productive habitat for foraging, roosting, and breeding waterbirds.

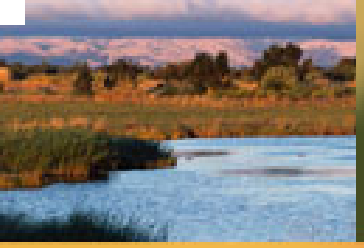




South Bay Salt Pond Restoration Project

Summary of Reconfigured Pond Management Alternatives 1-3 (preliminary)

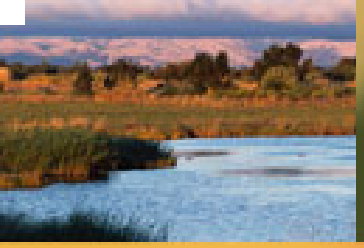
Pond Configuration / Management	Target Species	Acres
Furrowed (extensive, very shallow water with narrow, raised furrows and small irregular islands)	Nesting by Snowy Plovers, Black-necked Stilts, and American Avocets; foraging by other shorebirds	230
High Salinity (mostly shallow, with 30% nesting islands)	Nesting by Snowy Plovers, Black-necked Stilts, and American Avocets; foraging by other shorebirds (including phalaropes)	450
Low Salinity (mostly shallow, with 30% nesting islands)	Nesting by Snowy Plovers, Black-necked Stilts, and American Avocets; foraging by other shorebirds and dabbling ducks	610
Deep Water (with 5% nesting islands)	Nesting by terns, foraging by diving ducks and piscivores	290
TOTAL		**1,600**



Subset of Habitat Attributes in Managed Ponds by Alternative (in acres)

	Restoration Alternative			
	No Action	**1**	**2**	**3**
<15 cm water (shorebirds), summer	1300	1100	840	810
<15 cm water (shorebirds), winter	2000	1500	910	810
>1 m water (diving ducks), summer	1300	1000	470	150
>1 m water (diving ducks), winter	1700	1300	630	250
Nesting/roosting islands	30*	390	390	390

* Value given is for Year 0; presumed to be near zero at Year 50.



South Bay Salt Pond Restoration Project

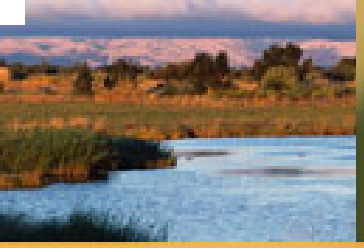
Use of the Landscape Scale Assessment in Alternatives Evaluation

BIOHABITAT	
Objective 1: Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to: **1A. Promote restoration of native special-status plants and animals that depend on South San Francisco Bay habitat for all or part of their life cycles**	
Evaluation Criteria	**Metrics**
Recover the south bay subspecies of the salt marsh harvest mouse	Area of complete salt marshes, with broad marshplain (*i.e.*, pickleweed) habitat and broad upland/peripheral halophyte transitional zones, and interconnected restored marsh areas
Meet the South Bay portions of the recovery plan for the California Clapper Rail	Area of broad tidal marshes with extensive, dendritic channel systems and appropriate vegetation structure
Re-establish populations of *Cordylanthus maritimus* ssp. *palustris* and *Sueda californica*	Area of high marsh/upland transitional zones
Meet recovery goals for Snowy Plovers	Area of suitable breeding habitat

Quantifiable Metrics

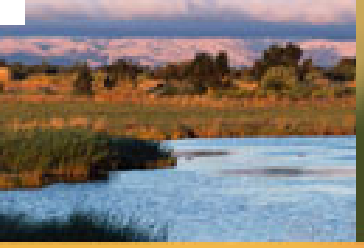
Preliminary

Biological Habitat	No Action	Alt 1	Alt 2	Alt 3
Deep subtidal (acres)	3,800	3,900	3,900	3,900
Shallow subtidal (acres)	13,800	15,100	15,200	15,200
Intertidal mudflat (acres)	11,200	10,600	10,500	10,500
Length of marsh channels (miles)		340	460	550
Salt marsh (acres)	490	4,900	7,500	8,100
Brackish marsh (acres)		5	200	200
Area of upland transitional habitat (acres)		62	160	190
Managed pond area (acres – total)	13,000	6,100	3,300	1,600
System (enhanced)	7,700	2,000	750	0
System (winter) / High Salinity (summer)	360	0	0	0
System (winter) / Seasonal (summer)	1,500	750	310	0
Seasonal Ponds	1,600	860	170	0
Seasonal (summer) / High Salinity (winter)	790	410	0	0
High Salinity Ponds	830	520	520	0
Reconfigured Ponds	0	1,600	1,600	1,600



South Bay Salt Pond Restoration Project

PRBO presentation



Back-up

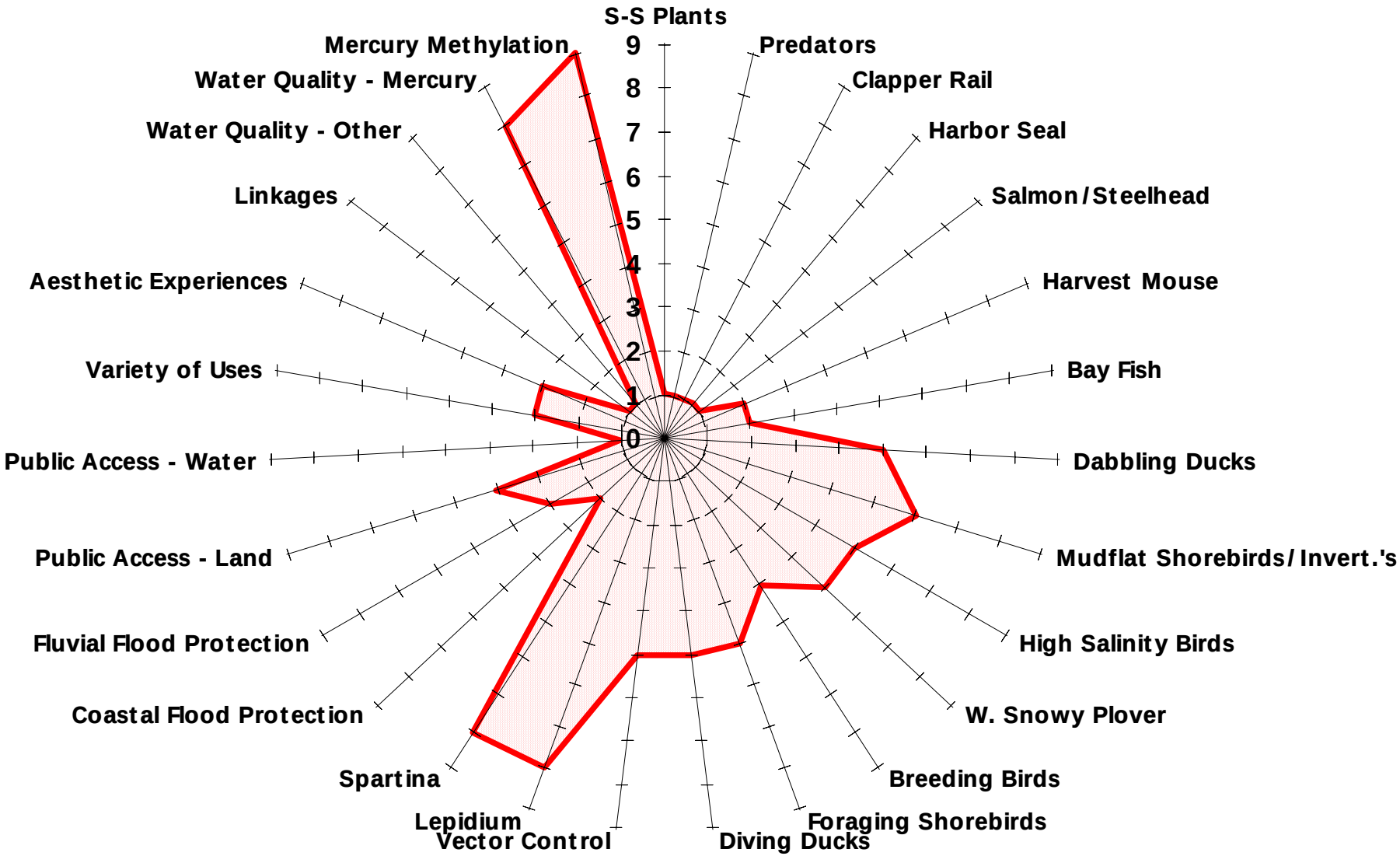

Export/Import
to North
Bay
sedimentation/
erosion
Pond
sedimentation
Sediment Budget
Imports – exports = change in
storage (Bay and pond
sedimentation/erosion)
Tributary Input

Alternative Ratings and Rationale

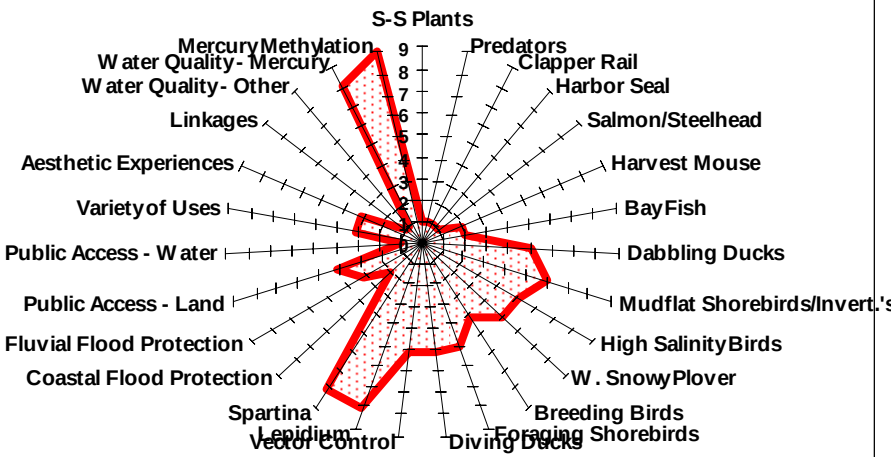
Biological Habitat

Criteria Number	Evaluation Criteria	Response to Criteria				Rationale
		No Action	Alt 1	Alt 2	Alt 3	
1A-1	Harvest Mouse	2	4	6	8	large connected salt marsh, upland escape cover
1A-2	Clapper Rail	1	5	7	8	large contiguous salt marsh areas, dendritic channels
1A-3	S-S Plants	1	4	5	8	upland ecotone, beach habitat
1A-4	W. Snowy Plover	5	7	6	5	new breeding habitat (islands, pans and levees)
1A-5	Salmon/Steelhead	1	5	7	9	tidal restoration along major sloughs with existing or potential spawning
1B-1	Breeding Birds	4	7	6	5	new breeding habitat (islands, pans and levees)
1B-2	High Salinity Birds	5	4	3	2	high salinity ponds (including some marsh ponds)
1B-3	Foraging Shorebirds	5	4	3	3	mudflat, pans and ponds within marshes, and managed pond areas
1C-1, 1C-3	Mudflat Shorebirds, Invertebrates	6	6	6	6	area of intertidal mudflat
1C-2	Bay Fish	2	6	7	8	tidal restoration in ponds, extent of bay mudflats
1C-4A	Diving Ducks	5	4	3	2	open water 3 feet deep or deeper
1C-4B	Dabbling Ducks	5	6	8	9	edge habitat between vegetated marsh and mudflat/open water
1C-5	Harbor Seal	1	5	7	9	new large sloughs adjacent to marsh

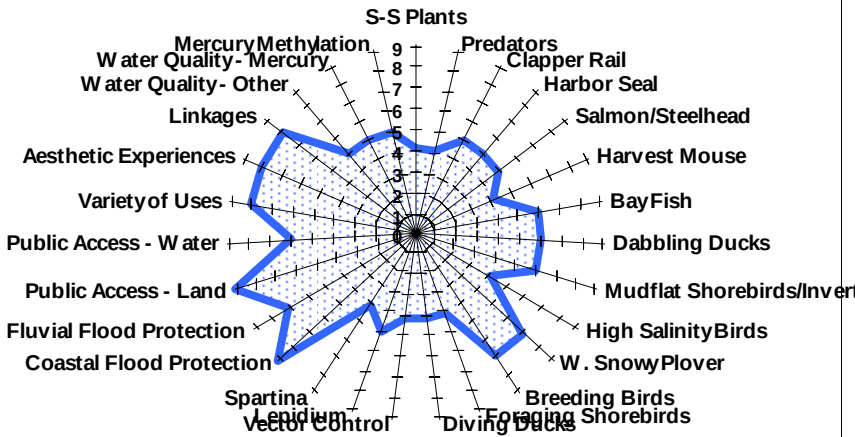
Overall Valuation for No Action Alternative



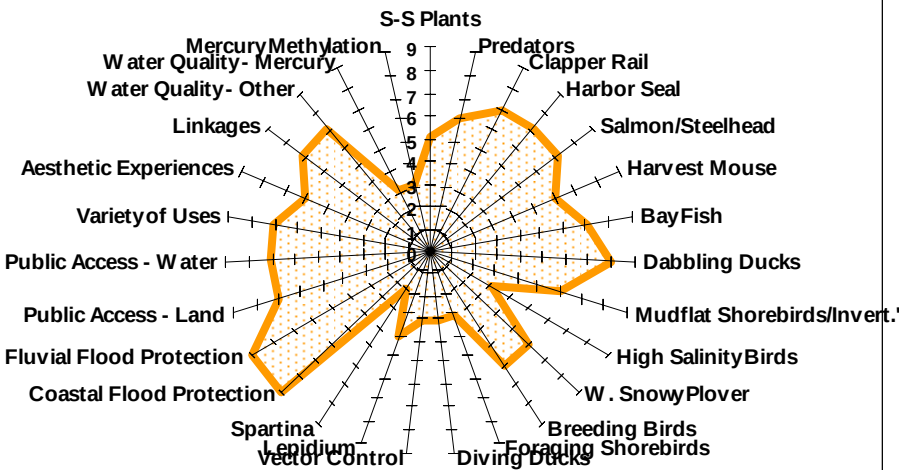
Overall Valuation for No Action Alternative



Overall Valuation for Alternative 1 (Managed Pond Emphasis)



Overall Valuation for Alternative 2 (Mixed)



Overall Valuation for Alternative 3 (Tidal Emphasis)