South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

John Bourgeois, Executive Project Manager
South Bay Salt Pond Restoration Project

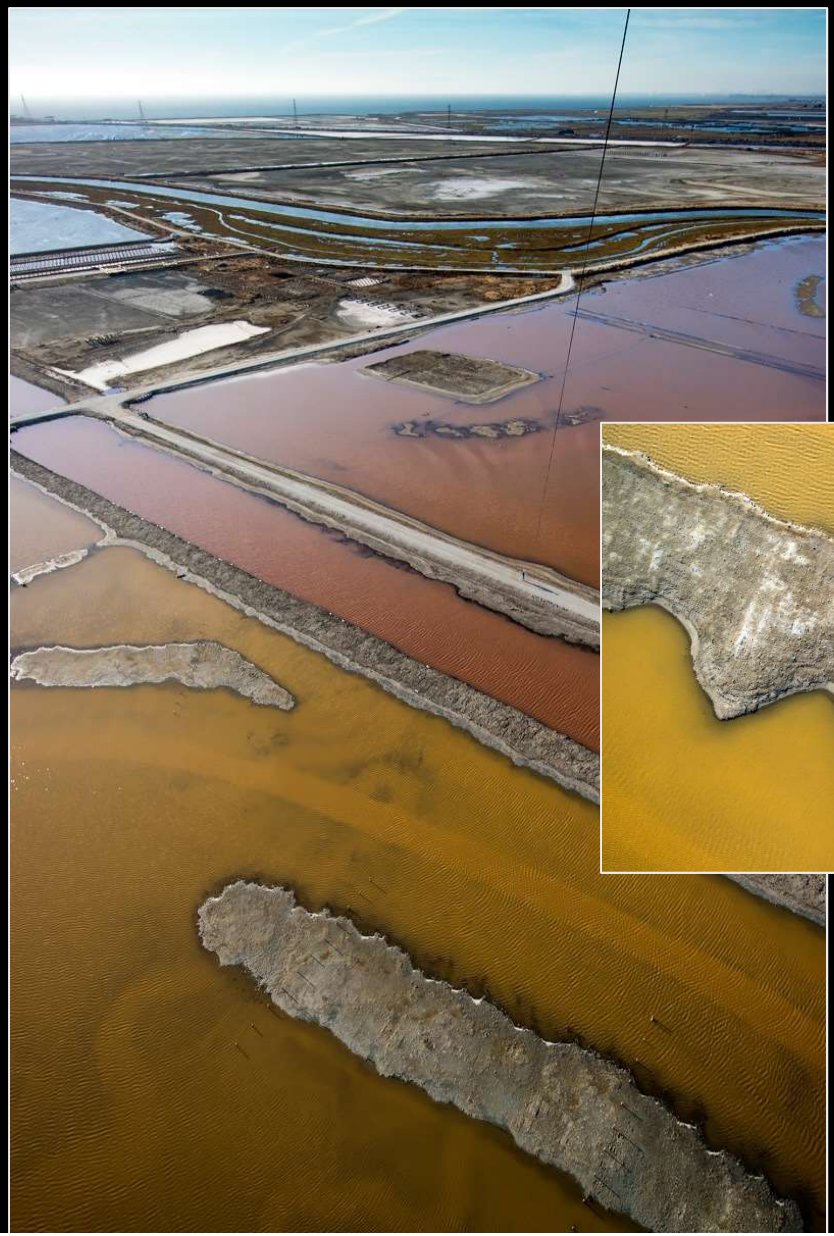
Key uncertainties

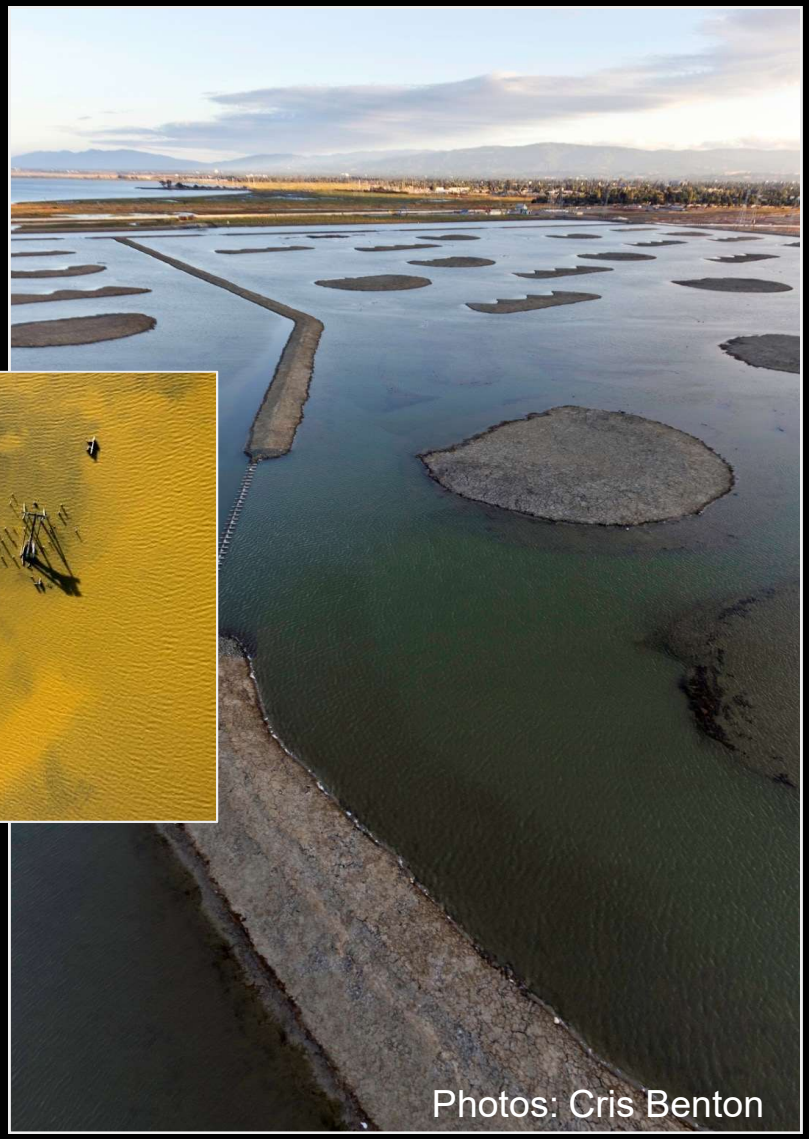
- Wildlife use of changing habitats
- Habitat evolution and sediment dynamics
- Mercury methylation
- Water quality
- Invasive species
- Public access
- Infrastructure support
- Sea level rise and climate change

1,600 acres tidal restoration
1,440 acres muted tidal

Restored ponds are now home to reproducing endangered species, after less than a decade

710 acres reconfigured ponds



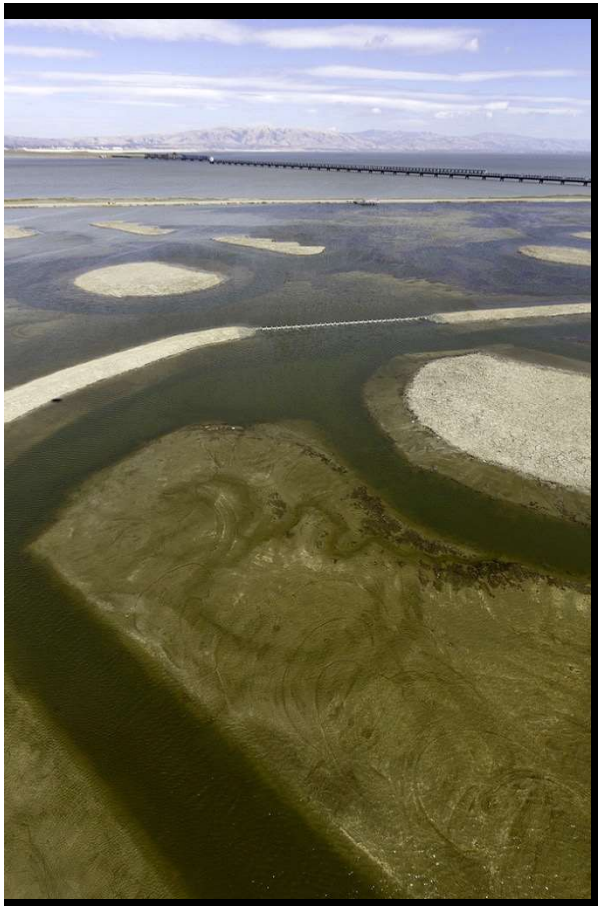


Photos: Cris Benton

7 miles of new trails

Photos: Judy Irving - Pelican Media

Public Access Features:
Kayak Launch & Saltworks Boardwalk

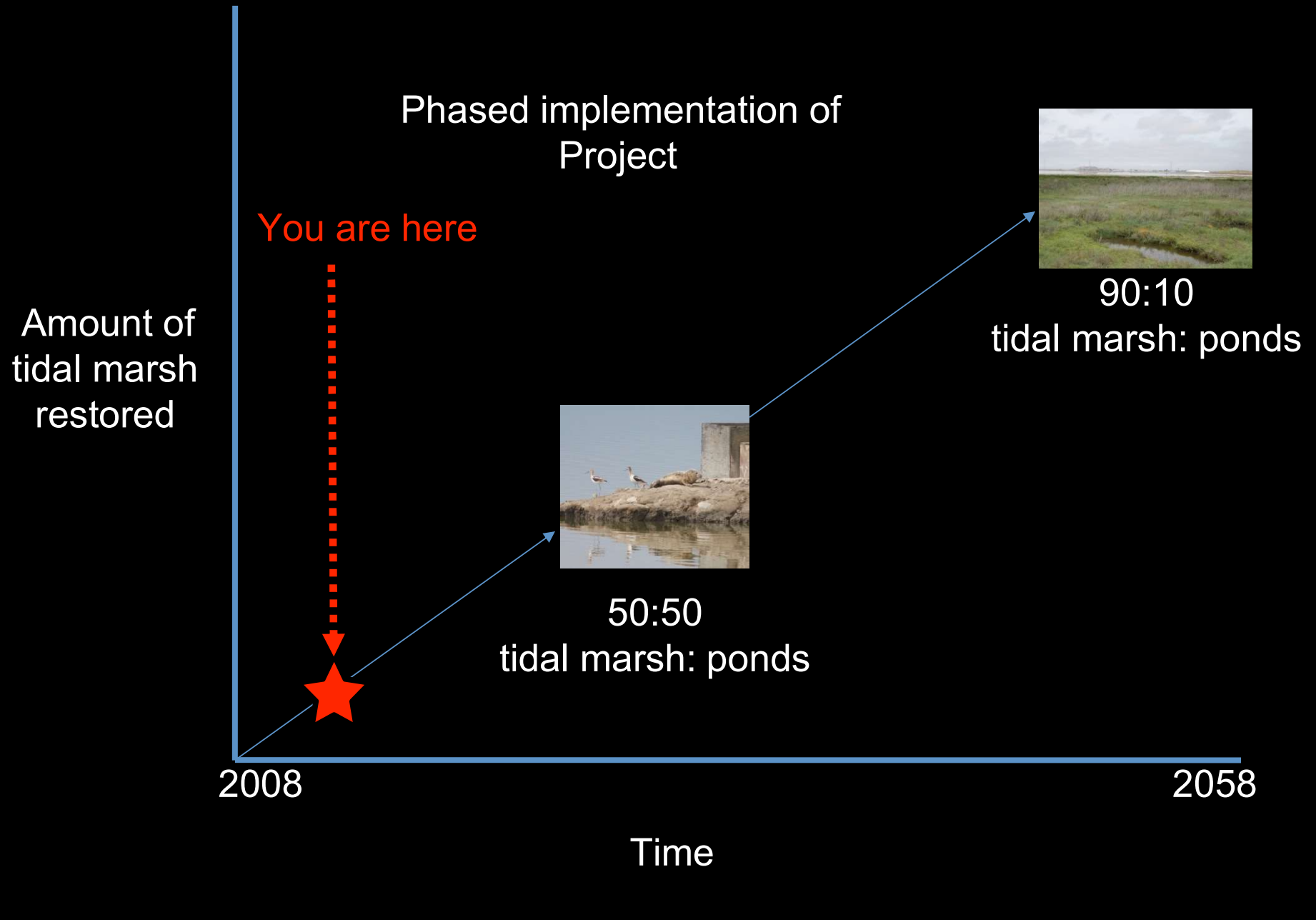


April 2008

September 2009

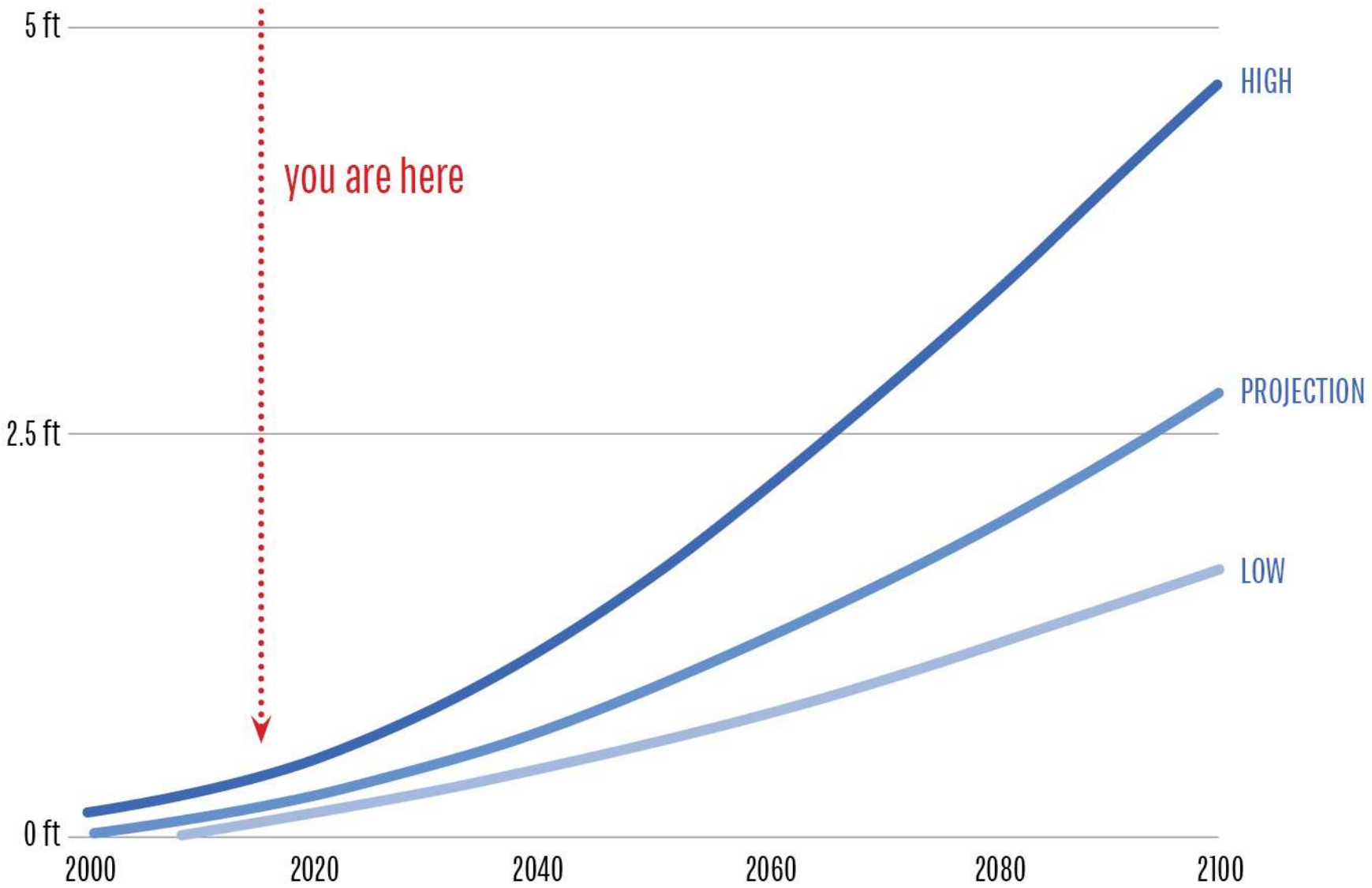
Salt Pond A21

Adaptive Management Restoration

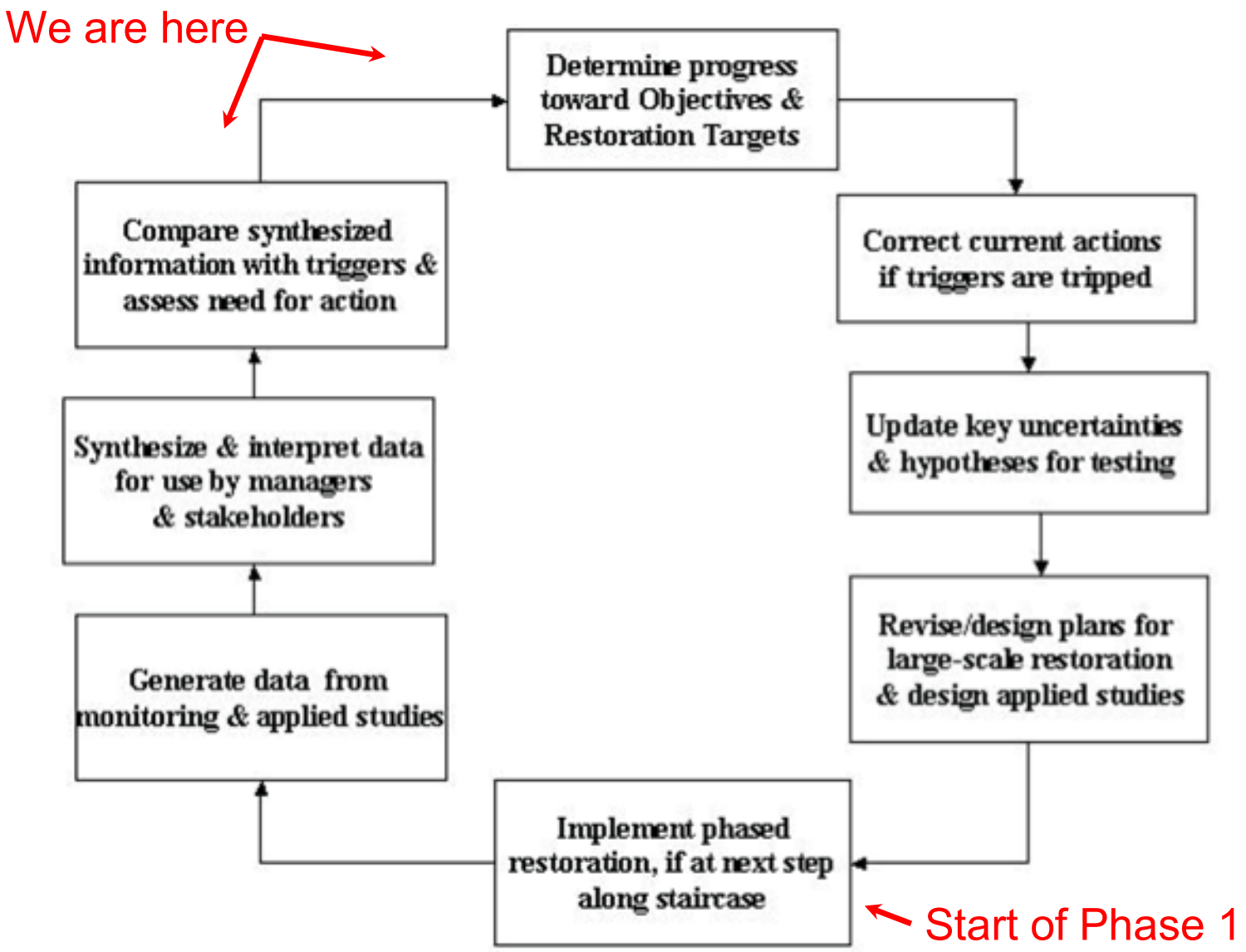


SEA LEVEL *rise* FOR CALIFORNIA

Courtesy NRC 2012



Adaptive Management Restoration



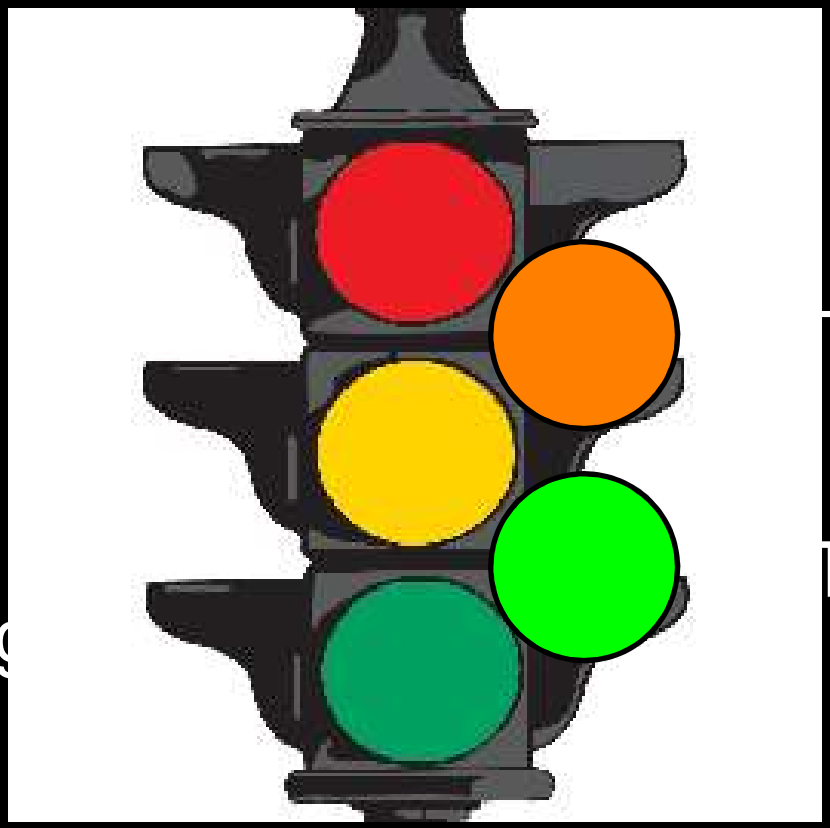
How Are We Doing?

“Expanded” Stoplight

Not Meeting Expectations

Uncertain

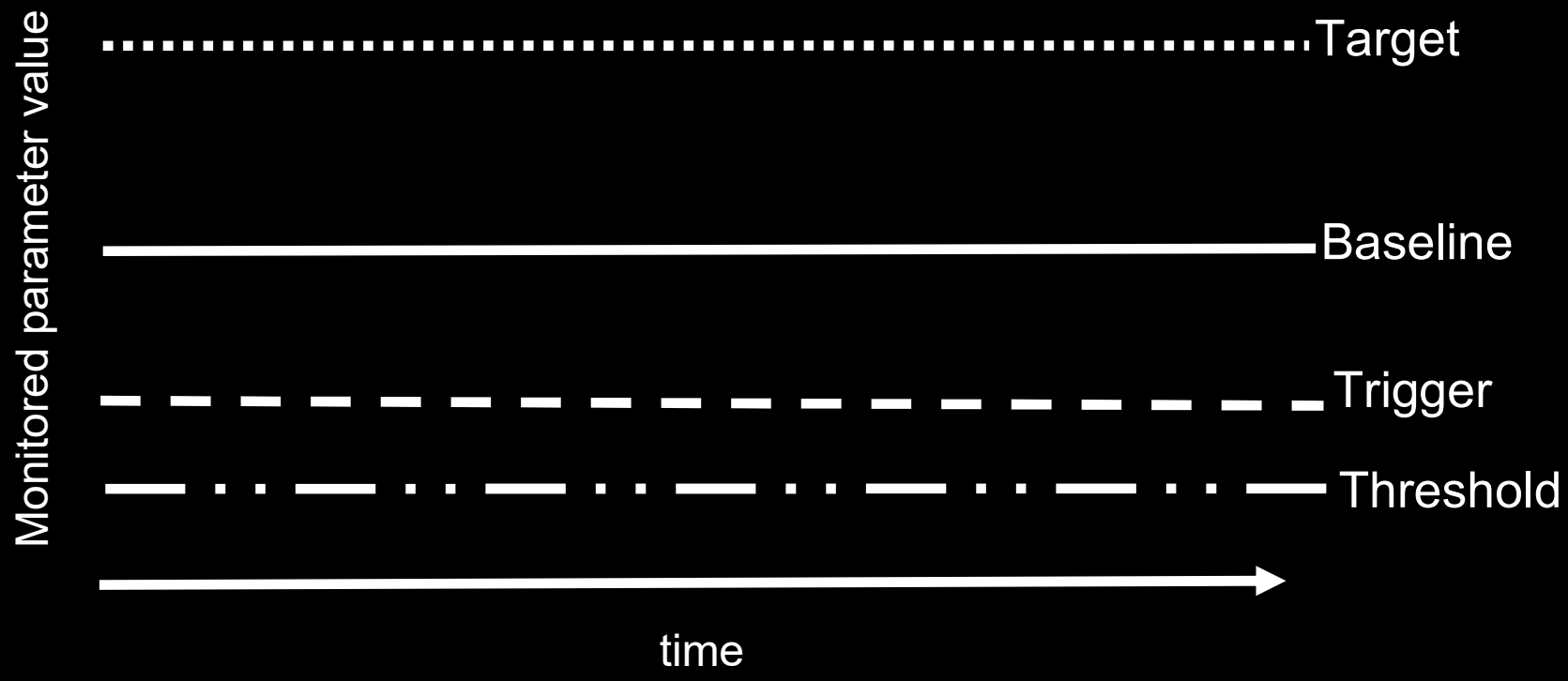
Meets/Exceeding Expectations



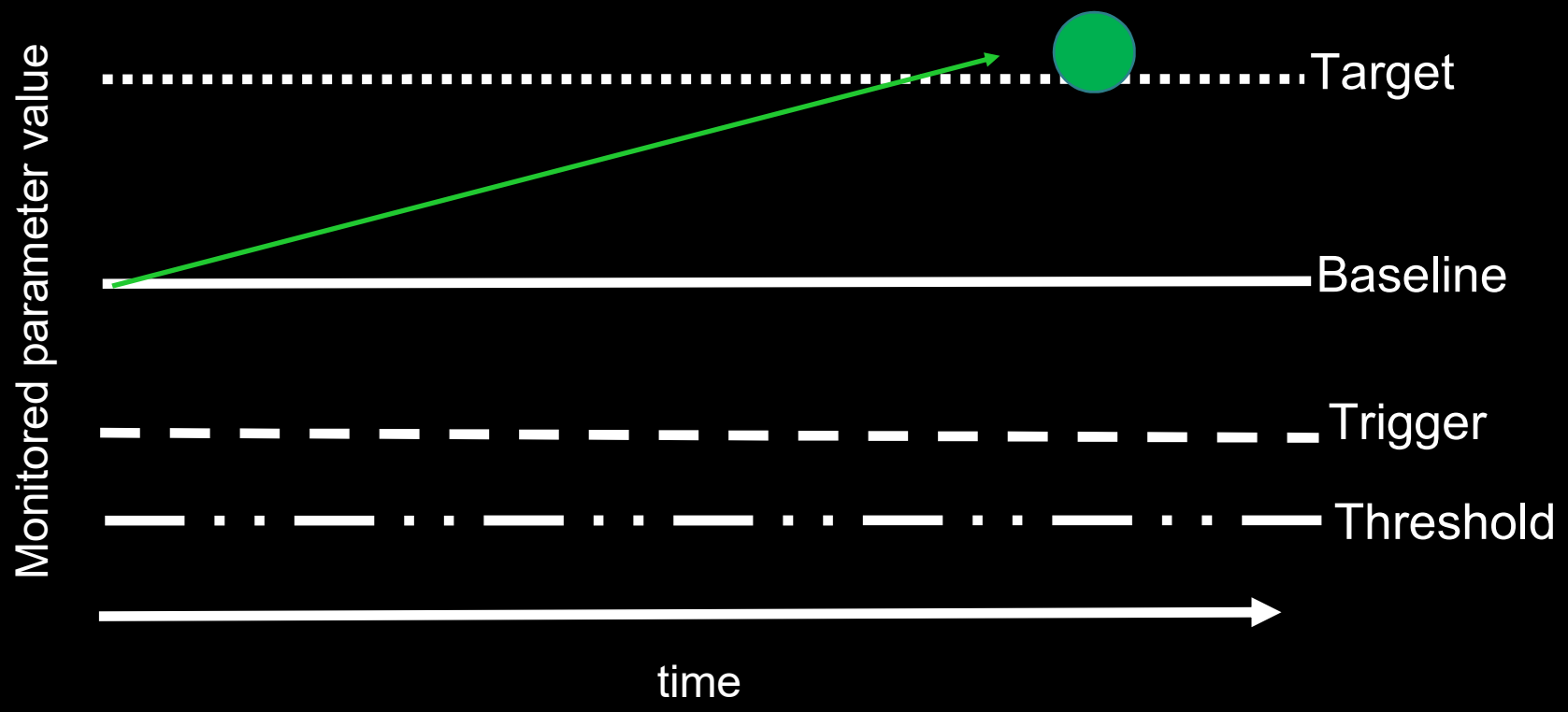
Trending Negative

Trending Positive

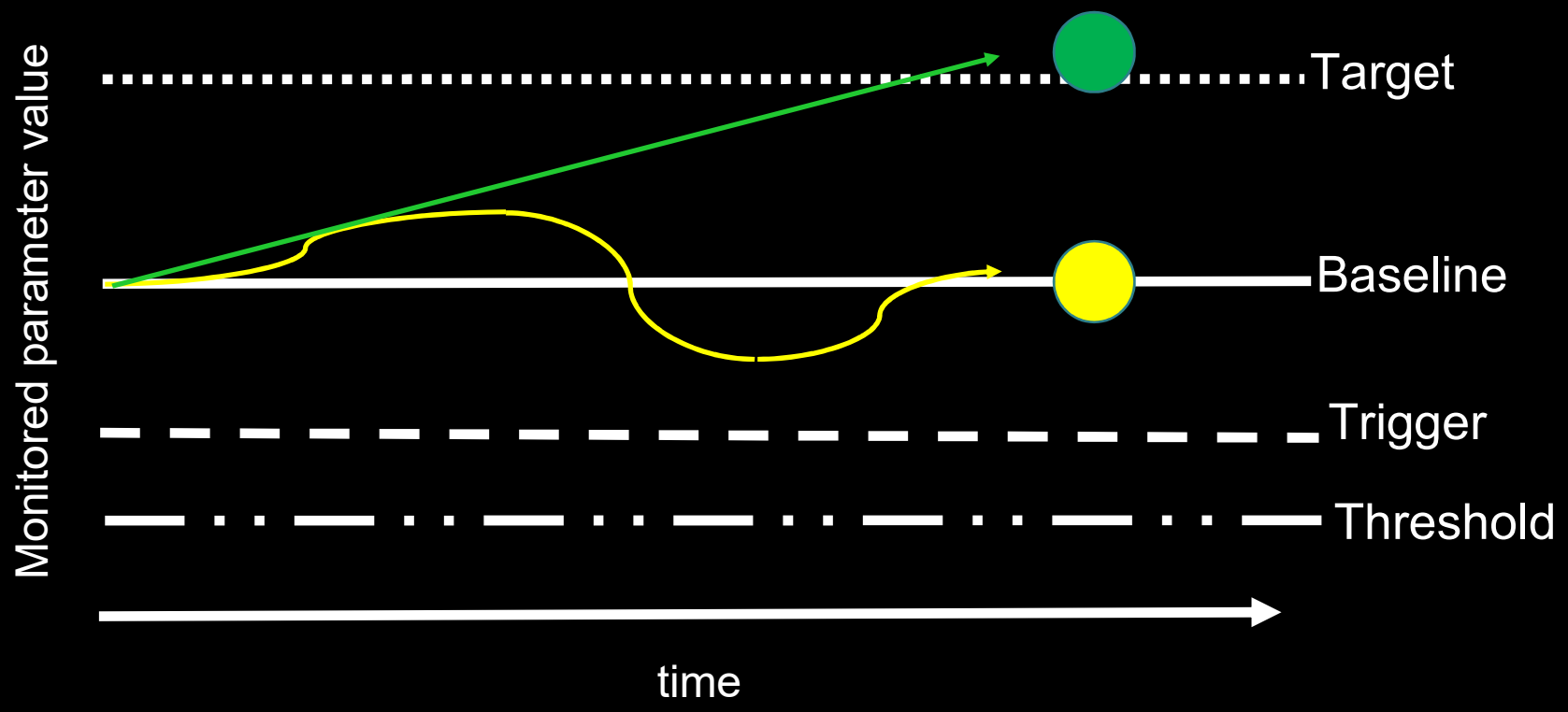
Expanded stoplight and triggers/targets



Expanded stoplight and triggers/targets



Expanded stoplight and triggers/targets



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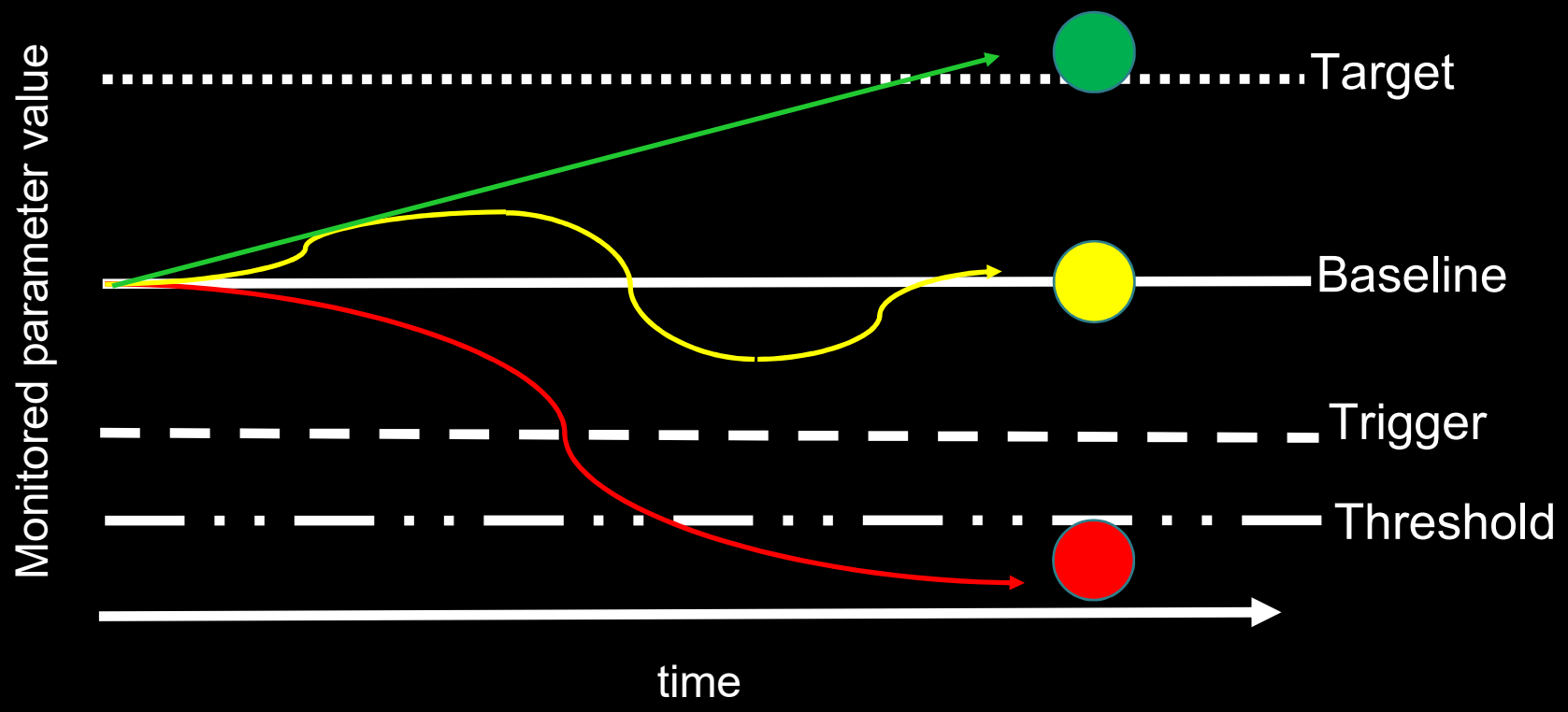

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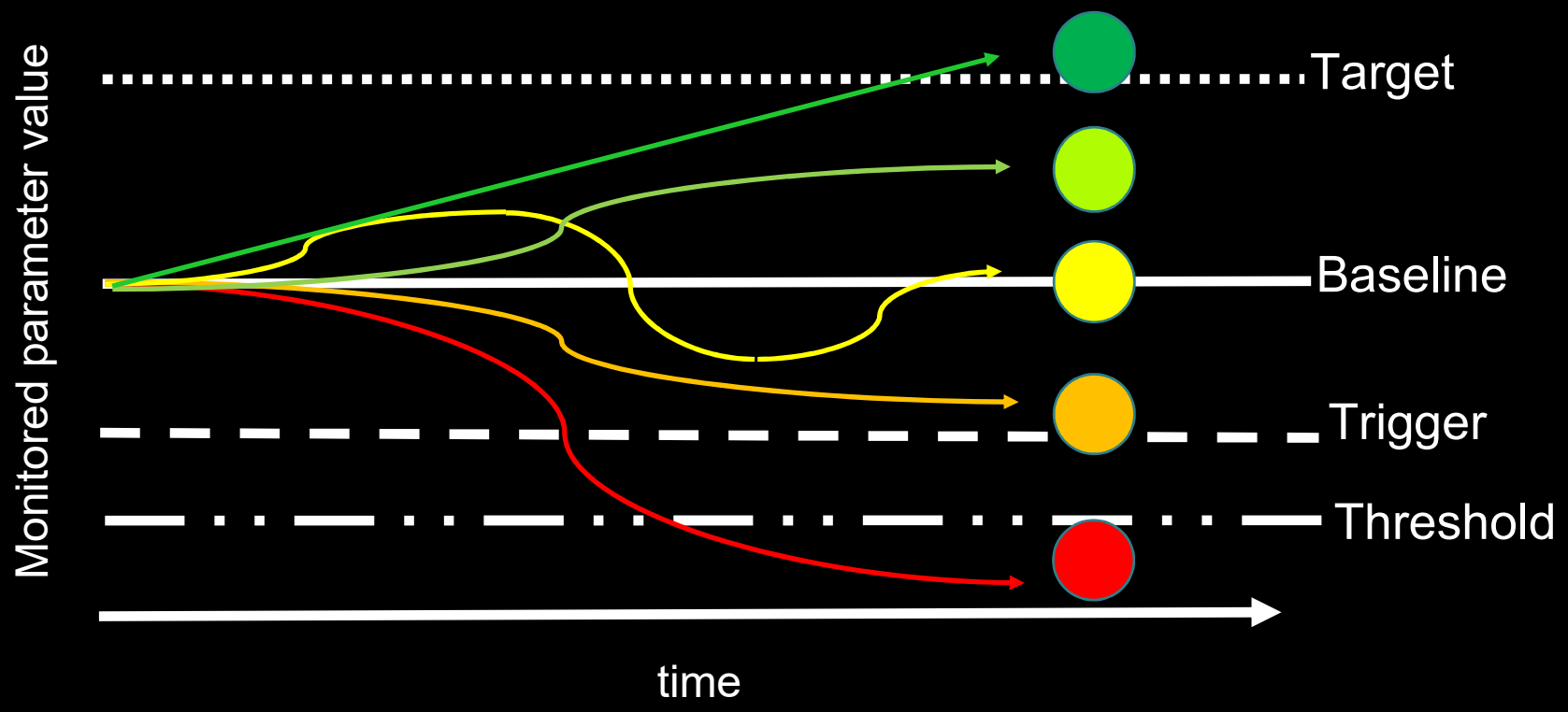
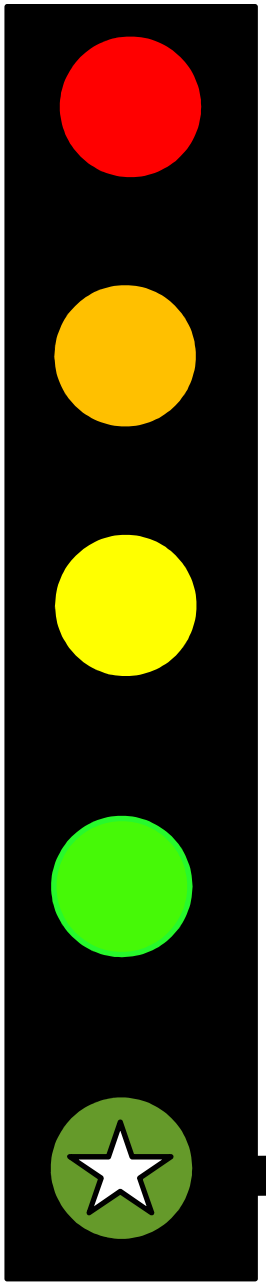
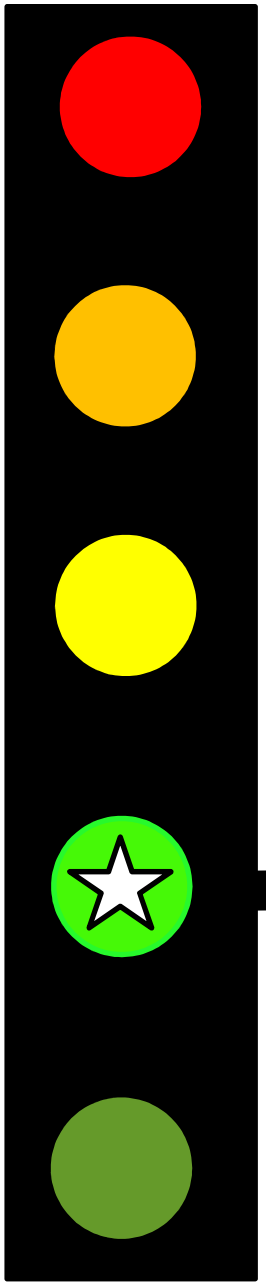




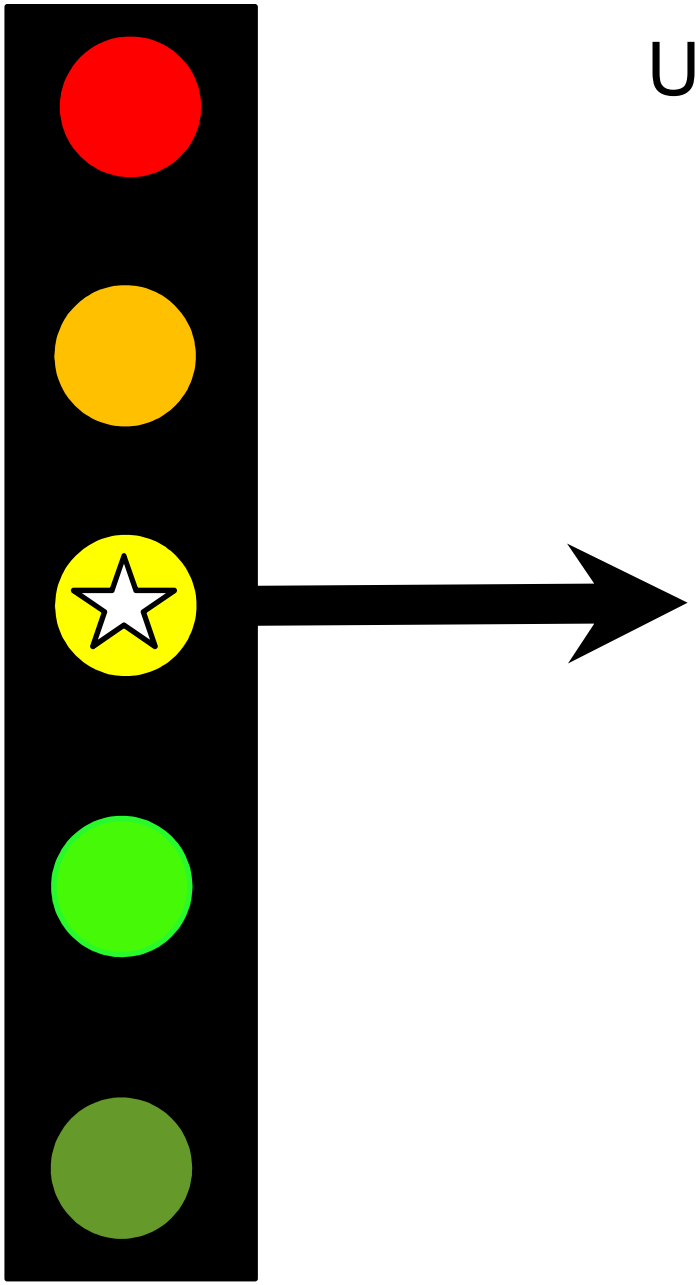
Meets/Exceeding Expectations

-Marsh Accretion Rates
-Snowy Plovers



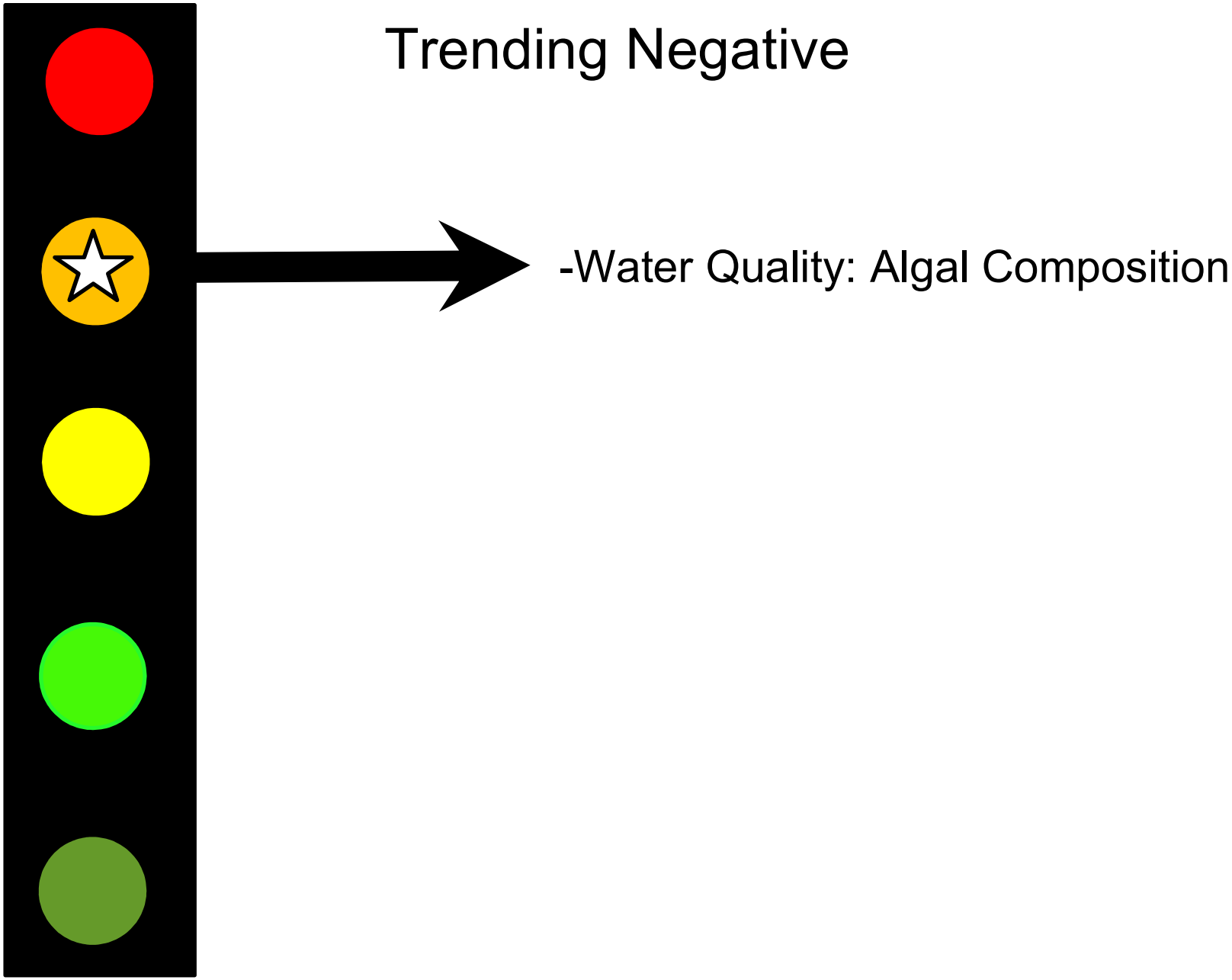
Trending Positive

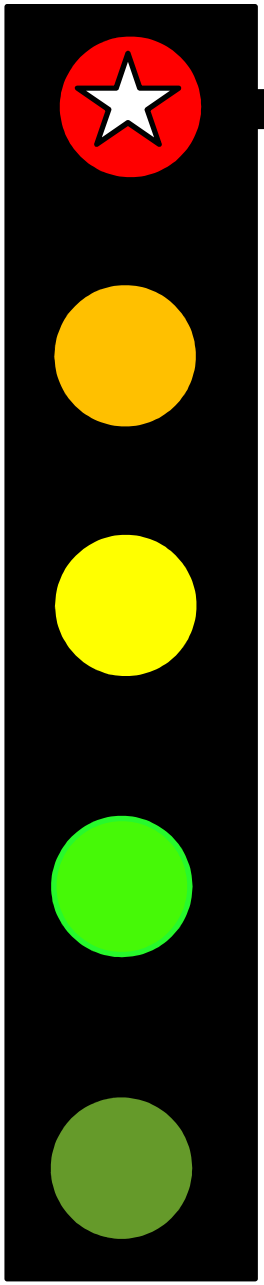
-Tidal Marsh Establishment
-Ridgway's Rail
-Salt Marsh Harvest Mouse
-Sediment to Support Marsh
-Sustaining Mudflats
-Long-term Hg Impacts from Pond Management
-Channel Scour and Hg
-Diving Ducks
-Ruddy Ducks
-Migratory Shorebirds
-Salt Pond Specialists
-Estuarine Fishes
-Harbor Seals
-Visitor Experience
-Species/Public Interactions



Uncertain

-California Gulls
-California Least Terns
-Water Quality: Regulatory Objectives
-Steelhead


Trending Negative
-Water Quality: Algal Composition



Not Meeting Expectations

-Short-term/Construction Hg Effects

-Reconfigured Nesting Islands

Phase 1: Lessons Learned

Sediment and Marshes

Scientific Question	Score
Is current vegetated marsh maintained or increased? Is marsh vegetation establishment trending toward reference marsh quality?	
Will sediment accretion rate in restored tidal areas be adequate to create and support emergent tidal habitat ecosystems within the projected 50-year timeframe?	
Will sediment movement into restored tidal areas significantly decrease mudflat habitat?	

- Sediment supply fluctuates, but marshes have built quickly in newly-opened ponds
- Caveat: Sediment supply changes & sea level rise may affect future marsh creation

Rails, Mice, Fish & Seals

Scientific Questions	Score
Do tidal marsh habitat for Ridgway's rails and numbers of birds within the Project area meet recovery plan criteria?	
Do tidal marsh habitat for salt marsh harvest mice and numbers of mice within the Project area meet recovery plan criteria?	
Have the number of native adult and juvenile fish increased in estuarine rearing and foraging habitats?	
To what extent will increased tidal habitats increase survival, growth and reproduction of harbor seals?	

- SMHM & Breeding Ridgeway's Rails at the Island Ponds
- Native fish abound in new tidal marshes
- Harbor seal numbers holding
- Caveats: Migrating salmonids; Invasive *Spartina*

Mercury and Species

Scientific Questions	Score
Will pond management increase methylmercury levels in sentinel species and ponds during/immediately after construction?	
Will pond management or tidal marsh restoration increase methylmercury levels in sentinel species and habitats post-construction?	

- Studies at A8 showed an increase in mercury levels in terns and fish after construction, but levels decreased over time
- Caveat: Overall mercury levels in eggs of nesting birds, esp. terns, are still elevated in South Bay

Migratory Waterbirds

Scientific Questions	Score
• Are the numbers of **diving ducks, ruddy ducks,** and foraging and roosting habitat for **migratory shorebirds** maintained? • Will reconfigured and managed ponds significantly increase the prey base for, and pond use by **waterbirds**?	

- Migratory bird numbers doubled from 2002 to 2014
- Caveat: Conversion to tidal marsh will reduce pond habitat for migratory birds in Phase 2

Nesting Birds

Scientific Questions	Score
To what extent will the creation of large isolated pond **islands** maintain numbers and reproductive success of **terns, avocet and stilts**?	
• Will **California gulls** adversely affect nesting birds in managed ponds? • Is the number of **California least terns** maintained?	

- Nesting birds down & low use of created islands
- Social attraction successful for some species (CATE)
- Caveat: Gulls & corvids are serious predators; Mercury still a concern

Hot off the Press: Nesting California Least Terns at Eden Landing!

Snowy Plovers

Scientific Questions	Score
Will managed ponds provide breeding habitat to support sustainable densities of **snowy plovers**?	

- Breeding bird numbers seem to be increasing
- Caveat: Conversion to tidal marsh will reduce plover breeding habitat in Phase 2; Predators remain a concern

Photo credit: Jenny Erbes

Photo credit: Karine Tokatlian

Public Access

Scientific Questions	Score
Will trails significantly affect birds or other target species, short-term or long-term?	
Will new trails and other access provide the recreation and experiences the public wants in the short or long term?	

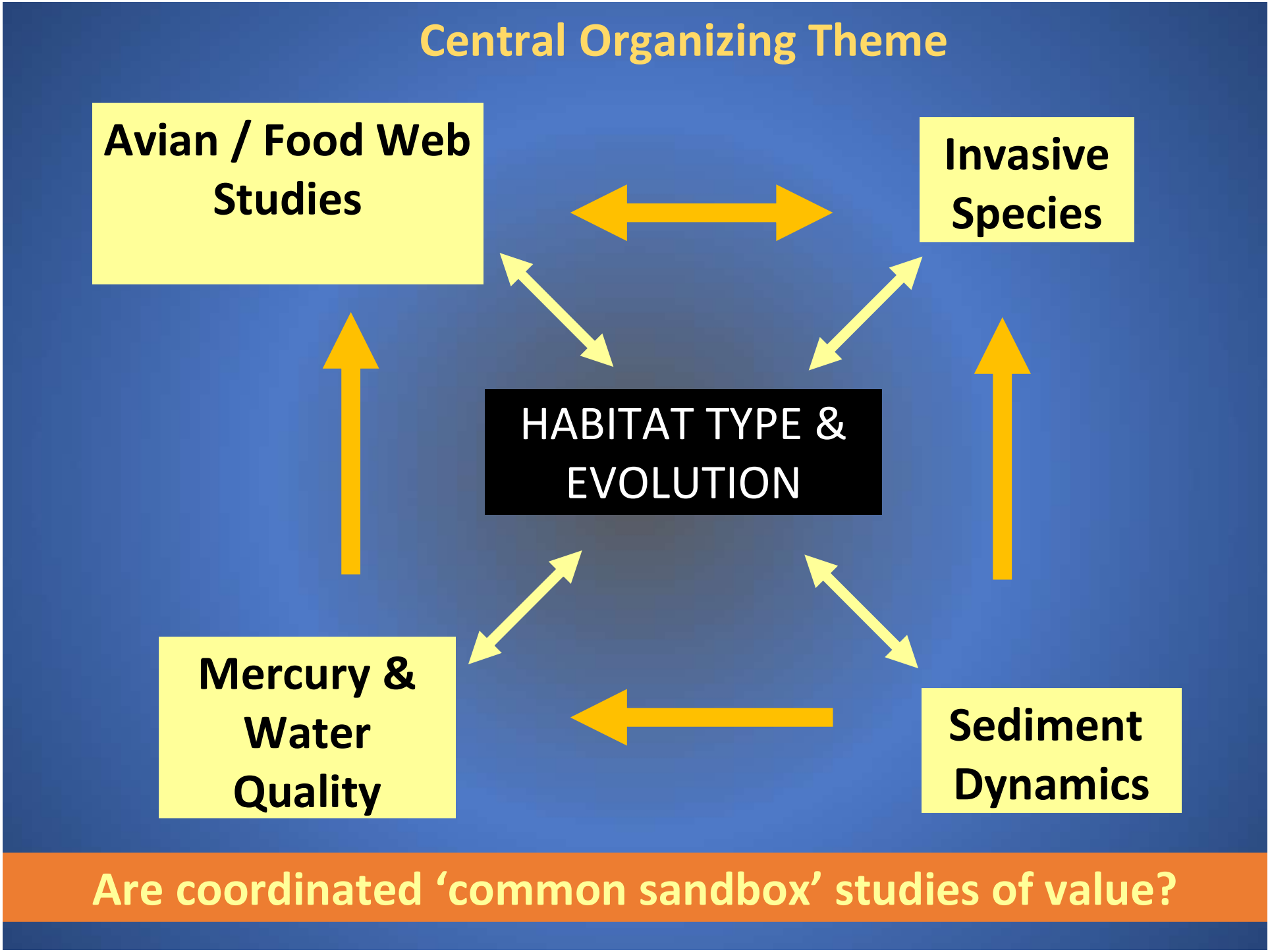
- Wintering shorebirds tolerant of trail use; Waterfowl much less so - stayed 200m from trail users
- Public happy with trails – recommend more signs, restrooms and connections with trails
- Caveat: Studies of boating impacts

Phase 1: Lessons Learned

- What lessons to take into consideration as we move forward into Phase 2?

In Process: Proposed Phase 2 Science

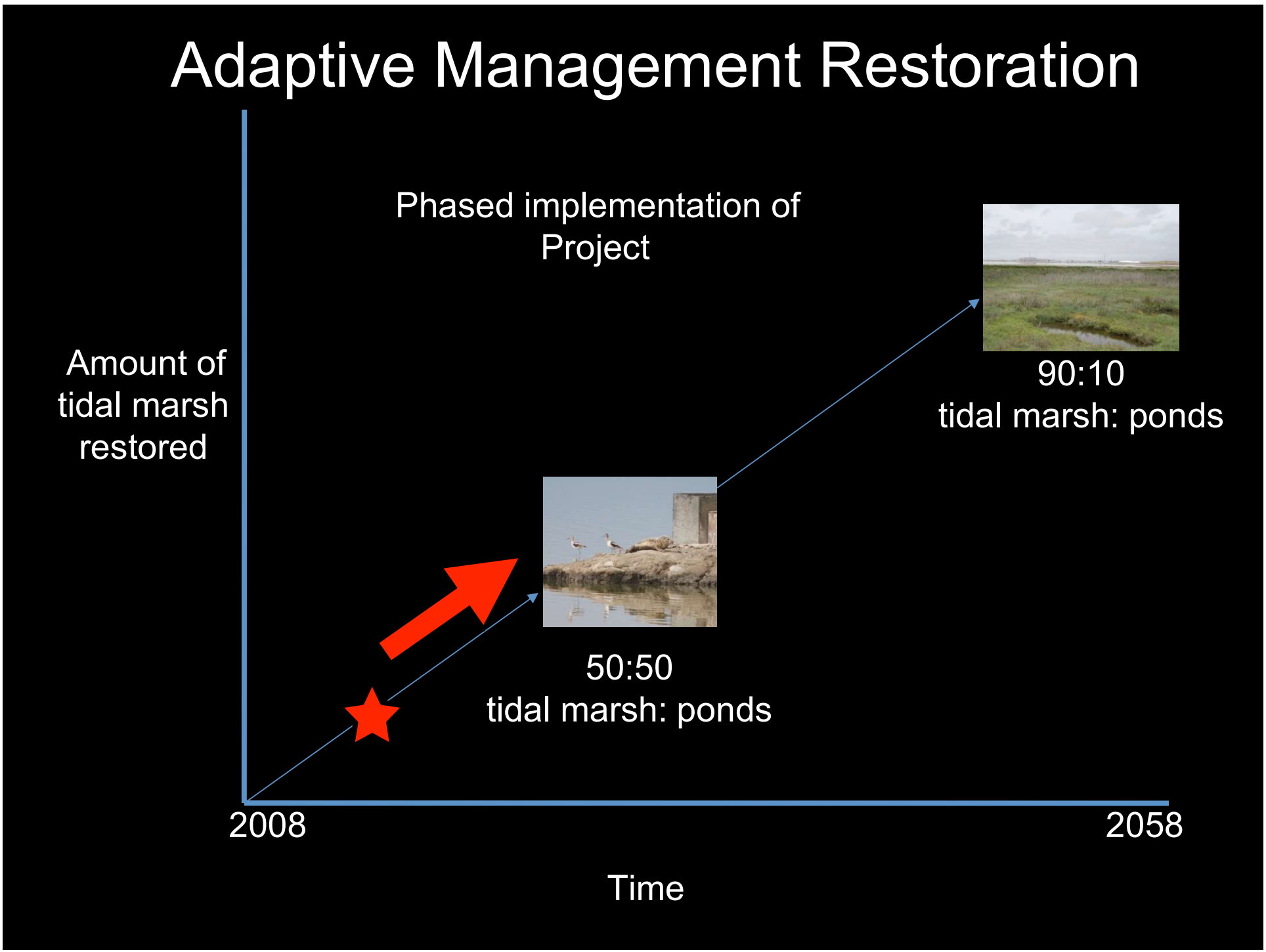
- Integrated Study approach to monitor multiple restoration targets
- Greater focus on climate change and sea level rise


Central Organizing Theme
Avian / Food Web Studies
Invasive Species
HABITAT TYPE & EVOLUTION
Mercury & Water Quality
Sediment Dynamics
Are coordinated 'common sandbox' studies of value?

WHAT WE CAN DO

- *Restore complete systems, including processes*
- *Restore soon, in areas marshes are likely to persist*
- *Plan for the Baylands to migrate*

Adaptive Management Restoration



Partnerships

South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

Coastal Conservancy

Resources Agency California Department Fish & Game

U.S. Fish & Wildlife Service

Santa Clara Valley Water District

East Bay Regional Park District

USGS science for a changing world

Flood Control & Water Conservation District

Water Boards

Cargill

United States Environmental Protection Agency

bcdc

National Oceanic and Atmospheric Administration U.S. Department of Commerce NOAA

San Francisco Bay Bird Observatory

The Bay Institute

SFEI

Center for Collaborative Policy

Save the Bay

USF

The University of California Davis

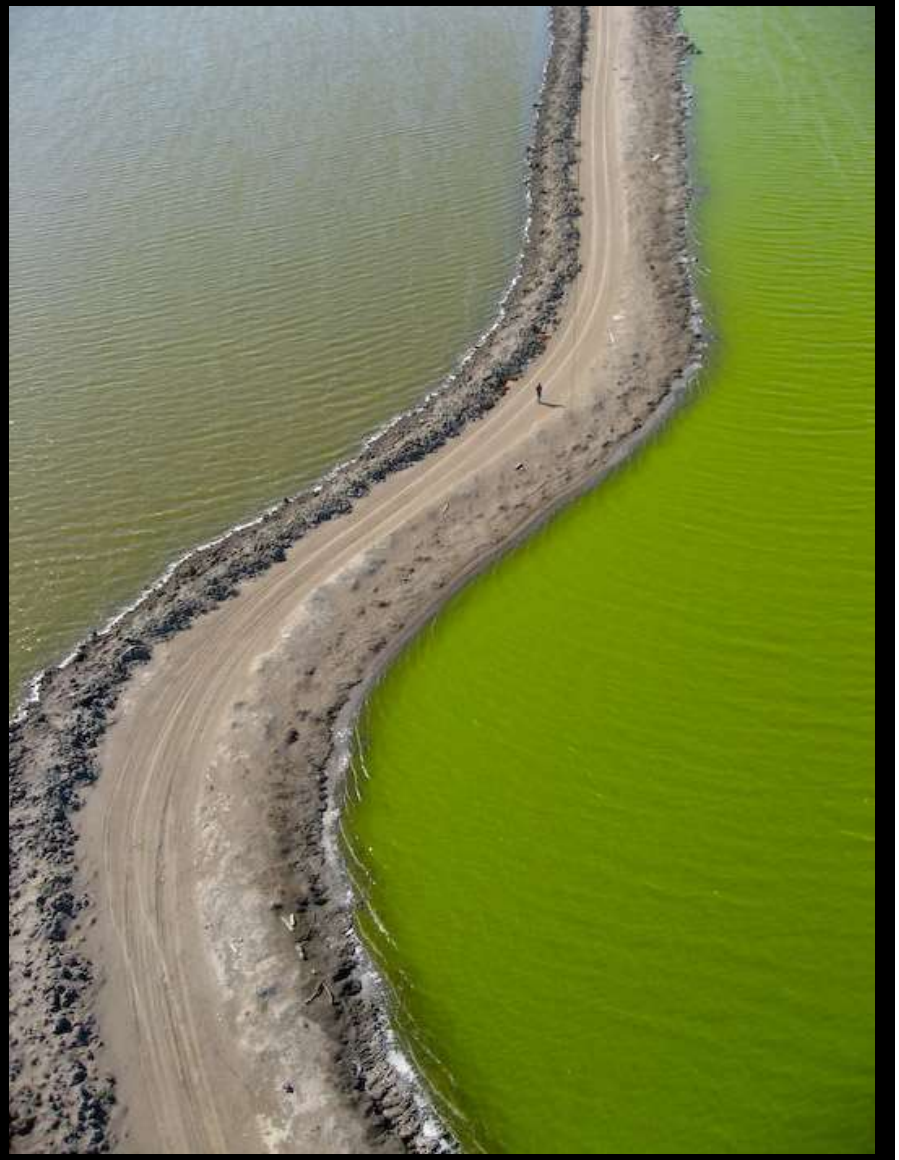
San José State University

WCB State of California Wildlife Conservation Board

Ducks Unlimited

Point Blue Conservation science for a healthy planet

San Francisco Bay Joint Venture



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www.southbayrestoration.org

or, follow us on Facebook

South Bay Salt Pond Restoration Project Phase 2: Balancing Habitat Restoration with Public Access and Flood Risk Management in Construction Designs (Seth Gentzler)

Bathymetric Change within Alviso Slough as Salt Pond Restoration Progresses: 2010-March 2017 (Amy Foxgrover)

Processes Governing Tidal Mudflat Width in South San Francisco Bay (Bruce Jaffe)

Primary Productivity and Nutrient Uptake Rates in South Bay Measured during Spring 2016 (Frances Wilkerson)

Evaluation of Oyster Shell Enhancement on Western Snowy Plover Breeding Success (Karine Tokatlian)

Environmental factors that influence benthic macroinvertebrate prey resources for waterbirds in managed ponds at Eden Landing Ecological Reserve, South San Francisco Bay (Alison Flanagan)

Environmental Drivers of Macroinvertebrate Biomass and Waterbird Abundance in Managed Ponds of South San Francisco Bay (Laurie Hall)

Wintering Waterfowl Avoidance and Tolerance of Recreational Trail Use (Lynne Trulio)

Progress Toward Eradicating Invasive Spartina from the San Francisco Estuary--2005-2016 (Peggy Olofson)

Exploring Methane Flux from the South Bay Salt Pond Restoration Project (Haley Miller)