Early Implementation: Lessons Learned from the Tule Red Tidal Restoration Project

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Restoration of 30,000 Acres of Habitat

1. Adaptive Management Program for California Delta Habitat Restoration
2. Regional Restoration Planning
4. Early Implementation: Lessons Learned from the Tule Red Restoration Project
Tule Red Tidal Restoration Project

- Background and Purpose of Project
- Project Team
- Design and Crediting
- Permitting
- Construction
- Monitoring
- Adaptive Management
- Lessons learned
Water Operations

- Delta is the hub of California’s water supply system
- Supplies water for 25 million people
- Supports $47.1 Billion agricultural sector
- California economy 5th largest globally, $2.66 Trillion GDP

Central Valley Project (CVP)

State Water Project (SWP)
Historical Decline of Tidal Marsh

477,467 acres  10,509 acres  (98% decline)
Declining Fish Populations

- Entrained in water diversions
- Loss of habitat
- Lack of food
- Invasive non-native fish and clams
Tidal Marsh Restoration Objectives

• Biological Opinions for CVP/SWP Operations (USFWS 2008, NMFS 2009)
  - Fish Restoration Program Agreement (FRPA)
  - 8,000 acres intertidal and associated subtidal habitat restoration

• Suisun Marsh Plan 2013
  - 5,000 – 7,000 acres tidal marsh restoration

• California EcoRestore 2015
  - 9,000 acres tidal and subtidal habitat restoration

• Agency Plans and Programs
  - Delta Plan
  - Delta Conservancy Strategic Plan
  - Cache Slough Complex Conservation Assessment
Where is restoration suitable and valuable?

Elevation

Subtidal = Too Deep
up to 30’ below sea level
Intertidal = just right

Native Fish Habitat – Delta smelt

“North Delta Arc”

Source: CDFW
Challenges for Implementing Restoration

- Land values
- Existing mineral rights and infrastructure
- Water rights
- Local opposition
- Design challenges
- Lack of funding
- Environmental compliance and permitting
- Uncertainty about suitability to contribute to species recovery goals
- Public access vs. species preserve
The Restoration Regatta

- **Regatta Officials**
  - USFWS, NMFS, CDFW, Delta Stewardship Council
- **Rowing Clubs**
  - State and Federal Water Contractors Water Agency
  - California Department of Fish and Wildlife
  - California Department of Water Resources
  - Suisun Resource Conservation District
- **Tule Red Boat**
  - Westervelt Ecological Services
  - CDFW
- **Tule Red Project Crew**
  - Coxswain – Rob Capriola, WES
  - Land Stewardship, Initial Bio surveys – WES
  - Engineering & Design – WES, Northwest Hydraulic Consultants, RMA
  - Permitting and Environmental compliance – ESA, ICF
  - Monitoring and Adaptive Management Plan – ESA
  - Construction – 4M Construction, KSN, WES
  - Long-term Stewardship - CDFW
Tule Red Tidal Restoration Project
Tule Red Duck Club

Diked managed wetlands for duck hunting-winter flooded only

Acquired in 2011 by WES
360 acres WES/SFCWA
60 acres CDFW

Approach: Establish tidal flows to create tidal wetland functions for fish and wildlife
Tule Red Tidal Restoration Objectives

1. Enhance **food web** productivity and export to support **delta smelt** and **longfin smelt**
2. Rearing habitat for young **salmonids**
3. **Habitat** for other aquatic and wetland species
4. Provide **ecosystem functions** of Delta brackish aquatic-wetland-upland interface
5. Provide **topographic variability** for succession and resilience to climate change/sea level rise
Tule Red Elevations

- Suitable elevation - Intertidal elevation within the site
- Which design?
  - Stability of channels
  - Full tidal exchange
Concept Design #1

- WES and NHC
- Engineering design of channel layout for full tidal inundation
- 685,000 CY of Excavation
Concept Design #2

- Revised Channel Layout
- Reduced excavation to that required by fill for Habitat Berm

- Technical Review
  - University of CA Davis
  - Expert Panel
Questions and Uncertainties

- Will the **breach fill** with sediment and close?
- Will the **channels erode**?
- Will wave **erosion affect the berm** and neighboring properties?
- What **food resources** will be produced/exported?
- Which habitat component **contributes most food**?
- What control measures for **invasive plants**?
- Will **clams** take over?
- Will **methyl mercury** production and bioaccumulation exceed ambient levels?
- How will **climate change** and **sea level rise** affect habitat outcomes?
Refining the concept design

• Questions
  - Sediment budget
  - Salinity modeling
  - Interior Habitat berm
  - Channel design
  - Food web support

• Design guidance
  - Take advantage of existing topography
  - Enhance primary production by increase retention of water in ponds – “Crockpot”
  - Create additional habitat diversity – from subtidal to upland
  - Balance cut/fill on-site
Design #3 FINAL

- Breach channel moved north
- Increase sinuosity and length of channel
- Habitat Berm
- Add high and low marsh plain ponds
- Add high marsh plain areas
- Build marsh plain ponds so inundated twice a month
- Add north high marsh channels
- 377 ac tidal wetlands
- 30 ac tidal channels & ponds
Habitat Berm Refinements

- **Wetland**
- **Transition/Refugia**
- **Upland**

Ridgway’s rail (formerly California clapper rail)

Salt marsh harvest mouse

20:1 or Greater - Proposed Habitat Berm

10:1 - Proposed Habitat Berm

USGS photo
Navigating Regulations

Many regulatory agencies with overlapping responsibilities:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- California Department of Fish and Wildlife
- Regional Water Quality Control Board
- Delta Stewardship Council
- Bay Conservation and Development Commission
- State Lands Commission
- Coast Guard
- Counties
Permitting and Environmental Compliance

- CEQA Compliance
- NEPA Compliance
- Environmental Permits
  - Clean Water Act Section 404
  - RHA Section 10
  - Clean Water Act Section 401
  - NHPA Section 106
  - California Fish and Game Code Section 1600
  - ESA Section 7 USFWS
  - ESA Section 7 NMFS
  - CESAs ITP
  - Bay Conservation and Development Commission permit
  - Porter-Cologne WDR/Clean Water Act Section 402 (SWPPP)
  - State Lands Commission Lease
  - Delta Plan Consistency Determination
  - Suisun Marsh Plan Consistency
Ready, Set, Go!

• 2017
  - Construction prep
  - Soil surcharge at new crossing

• 2018
  - Construct channel network and habitat berm
  - Structure modifications to CDFW outfall
  - Vegetation planting (tules), native herbaceous seeding

• 2019
  - Revegetation, weed control
  - Remove existing structures and tide gates
  - fall 2019 - breach outer berm, connect channel to tidal exchange

• 2020
  - Begin Year 1 post-construction monitoring
2018 Construction
2018

NCER 2018

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Monitoring for Adaptive Management

1. Verify the Project was implemented as designed and permitted, to meet regulatory requirements
   Compliance monitoring

2. Project had the expected effects
   Effectiveness monitoring

3. Monitor triggers for operations, stewardship and corrective responses
   Management triggers

4. Reduce uncertainties to guide restoration and adaptive management
   Learn and adapt
Tule Red Adaptive Management and Monitoring Plan

- Objective-based monitoring: Define indicators or parameters related to the Project’s objectives
- IEP Tidal Wetlands Restoration Monitoring Framework provided methods for consistency and comparability
- CDFW FRP Monitoring team for sampling
CDFW Fish Restoration Program

TIDAL WETLAND BENEFITS

MHHW

MLLW

Intertidal

Mud flat

Intertidal channel

Nutrients

Production

Shallow subtidal

Deep subtidal
Adaptive Management triggers

1. State expected outcomes defined for each objective
2. Select metrics, set goals and trigger levels
3. Identify potential management responses

Objective - Enhance regional food web productivity and export
   - Levee breach and channel will increase tidal exchange
   - Productivity in ponds will be greater than in primary channel, and higher than bay.

Potential adaptive management responses
   - Remove obstruction from breach
   - Adjust height of berm around ponds to hold water longer to boost productivity
Lessons Learned

• Several ways to achieve restoration
  - By the State, By private entities, By responsible parties, and partnerships

• Design will evolve with more information
  - Modeling, studies
  - External technical review and science

• Permitting takes time, and compromises

• Each project is an experiment
  - Uncertainties and questions for each project
  - Adaptive management
  - Regional context and comparisons among projects

• Leveraging resources and partners

• Construction requires site-specific expertise
Restoring 30,000 acres of California Delta Habitat

- Delta-wide Governance
- Delta-wide Science
- Regional Planning
- Regional Monitoring
- Individual Project implementation
- Adaptive Management
Go Team – Winning the Restoration Regatta

- Square oar, feather oar... wait - a bird!
- Less crowded than rowing on Lake Merritt
- Can't stop smiling!
- Can we catch those stripers?
- Stroke, stroke, power 10!
- Starboard star, pulling hard!
- An hour on the water beats a meeting
- Rowing like my dad!
- Gonna show these old folks how it's done
- My mom made me come, but it was actually fun!
- Queen of the bow
- A born coxswain!

Go Team – Winning the Restoration Regatta
IEP Tidal Wetlands Restoration Monitoring
- Alice Low
- Stacy Sherman
- Rosemary Hartman
- Dave Contreras

WES
- Rob Capriola
- Hal Holland
- Kim Erickson
- Matt Gause
- Mark Young
- Chris Holland

SFCWA
- Byron Buck
- Bruce DiGennaro

ESA
- Gerrit Platenkamp, Ph.D.
- Priya Finnemore
- Rachel Brownsey

NHC
- Brad Hall
- Brian Wardman