

# “The Restoration Arc”

## Suisun Marsh to Cache/Yolo

A rainy day virtual tour of restoration projects for the Delta ISB

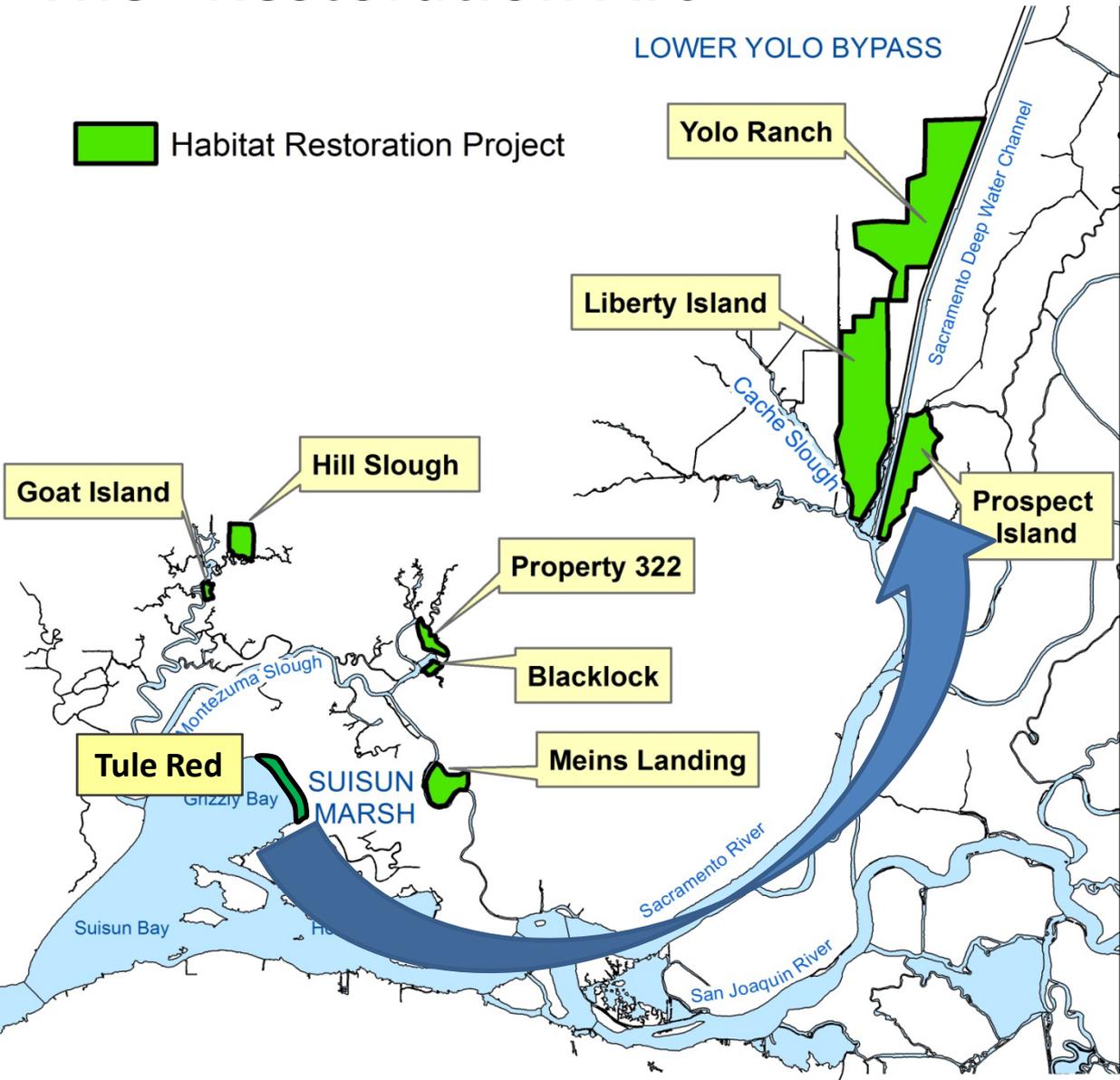
November 29, 2012



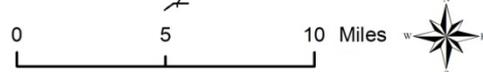


# The "Restoration Arc"

 Habitat Restoration Project



Habitat restoration project boundaries are approximate.  
Map by Martina Koller, 11/27/2012

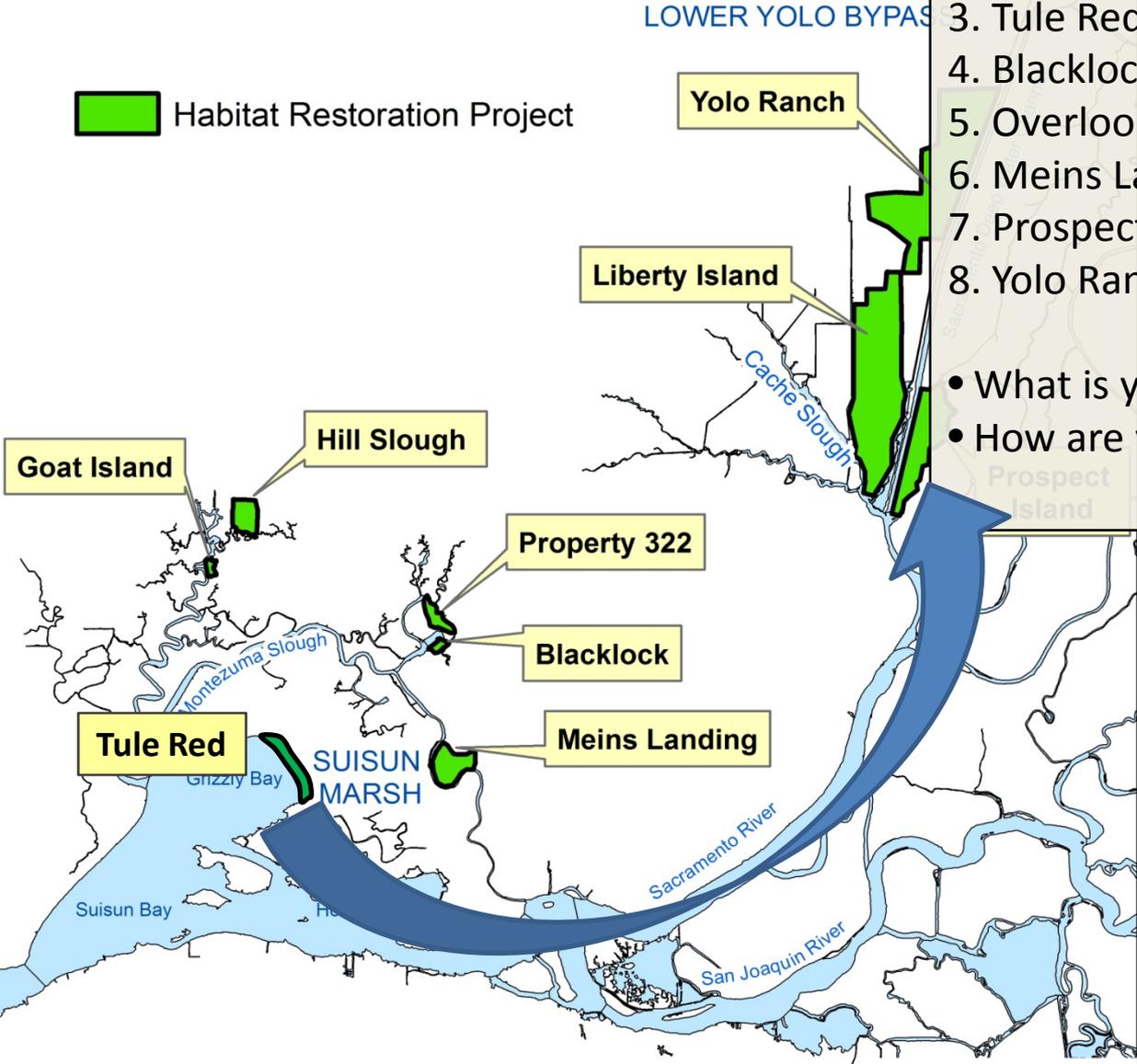


# Restoration activity reports

1. Hill Slough -- Sarah Estrella DFG
2. Rush Ranch -- Ben Wallace SLT
3. Tule Red – Curt Schmutte MWD
4. Blacklock – Katie Shulte Joung DWR
5. Overlook – Katie Shulte Joung DWR
6. Meins Landing – Randy Meager DWR
7. Prospect Island – Dennis McEwan DWR
8. Yolo Ranch – Curt Schmutte MWD

- What is your adaptive management plan?
- How are you incorporating sea level rise?

 Habitat Restoration Project



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Map by Martina Koller, 11/27/2012

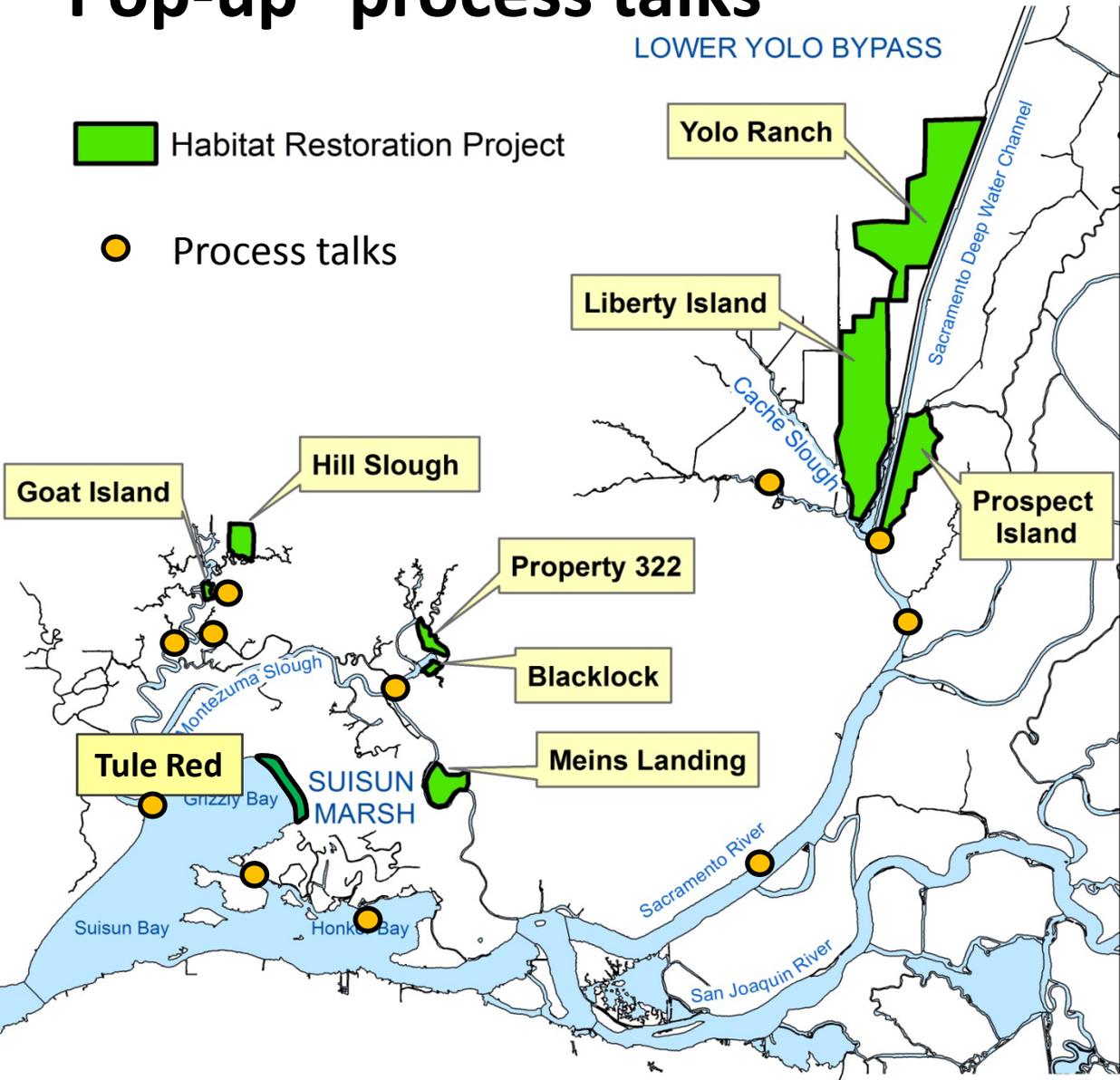


# “Pop-up” process talks

LOWER YOLO BYPASS

 Habitat Restoration Project

 Process talks



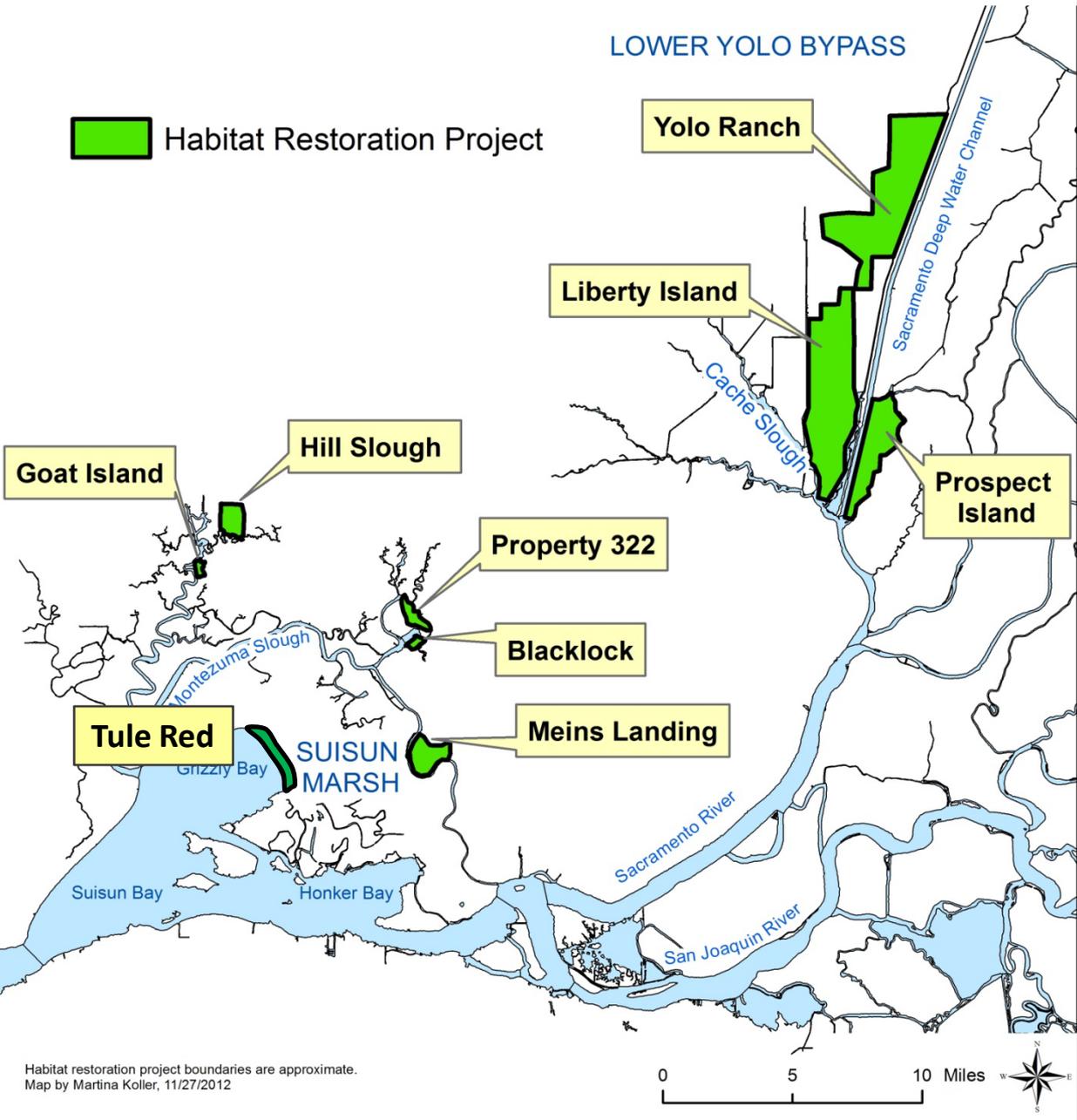
Jon Burau -- USGS  
Chris Enright – DSP

- Suisun Marsh overview
  - Hydrodynamics and transport
  - Tidal marsh function
  - Delta smelt surveys
  - Salmon surveys
- Implications for restoration

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Map by Martina Koller, 11/27/2012



Speakers:  
Tell the  
Independent  
Science Board  
how they can  
help you.

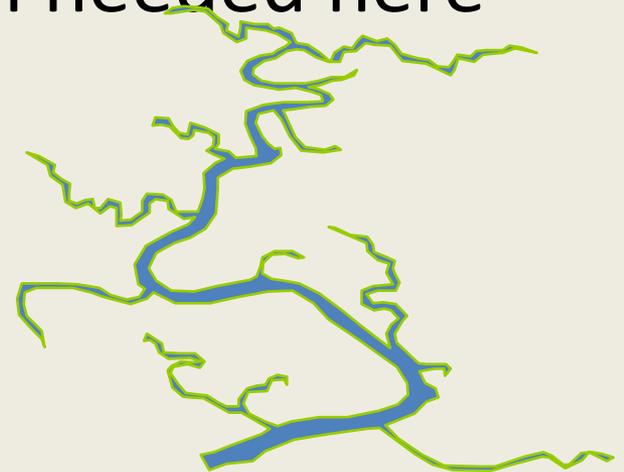


# Adaptive management of ecosystem restoration: conventional wisdom

Most people believe AM is largely the following:

- Acquire some property.
- **Plan** a restoration for the property
- **Do** the restoration
- **Evaluate and adapt** <-- decision needed here

I am dubious.



# Actual adaptive management: Science questions at every step

<u>AM Decision</u>	<u>~Time scale</u>	
• Do we acquire it?	30 d	It's a science and modeling question
• Do we hold or implement?	30d-1yr	
• What is interim management?	30d	
• What is the design?	1 yr	
• Is it working? (signal-to-noise)	1-20 yrs	
• <i>Do we adapt?</i>	>10 yrs	



# Actual adaptive management: Science questions at every step

## 1. *Do we acquire it?*

- What is the landscape potential?
- Decide *really* fast (way too fast for today's agency arrangements)

It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 1. *Do we acquire it?*

Consider:

- Assume 120,000 acre goal
- Assume acquisitions are 500 ac each
- Assume 20 years
- *That's 200 acquisitions –*  
~1 per month, *every month*, for 20 years...

It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 2. *Do we implement or hold?*

Do we have

- Physical/ecological scale?
- Economical scale?
- If we hold, how to manage it?

It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 2. *Do we implement or hold?*

Do we have

- Physical/ecological scale?
- Economical scale?
- If we hold, how to manage it?

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question

**Hold and manage** decisions needed every *~30 days*

**Implement** decisions needed every *~1 year*



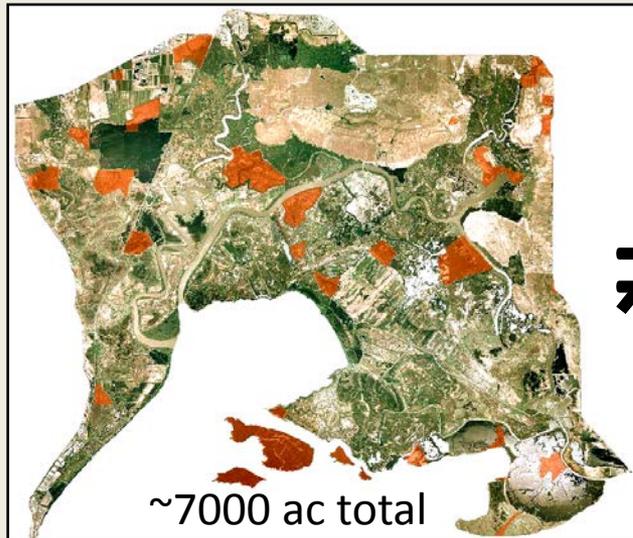
# Actual adaptive management: Science questions at every step

## 2. *Do we implement or hold?*

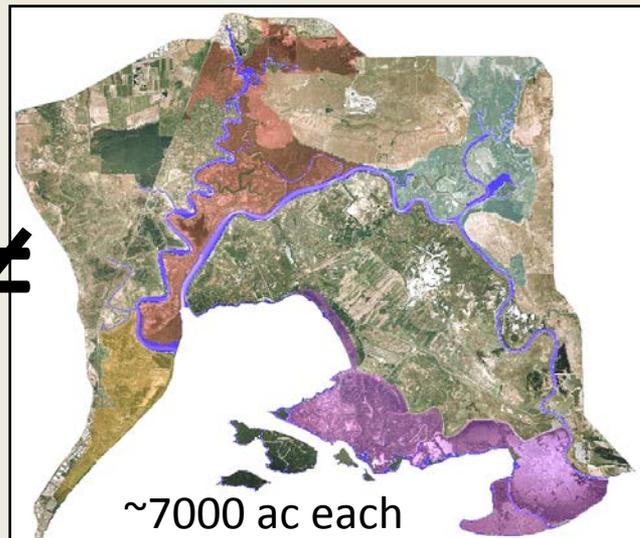
Property scale  
(expensive and  
ineffective)

or

Restoration scale:  
species relevant  
and economical



≠



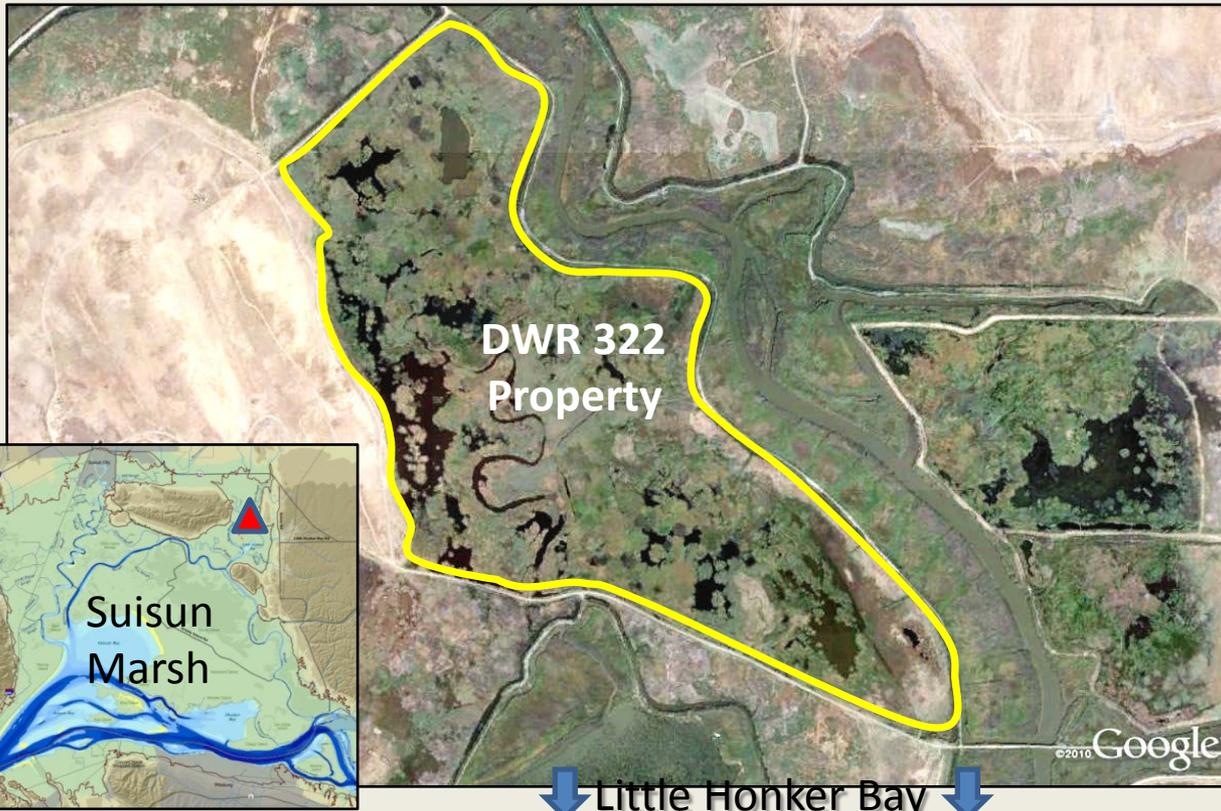
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# Actual adaptive management: Science questions at every step

## 2. *Do we implement or hold?*

example “postage stamp” restoration:



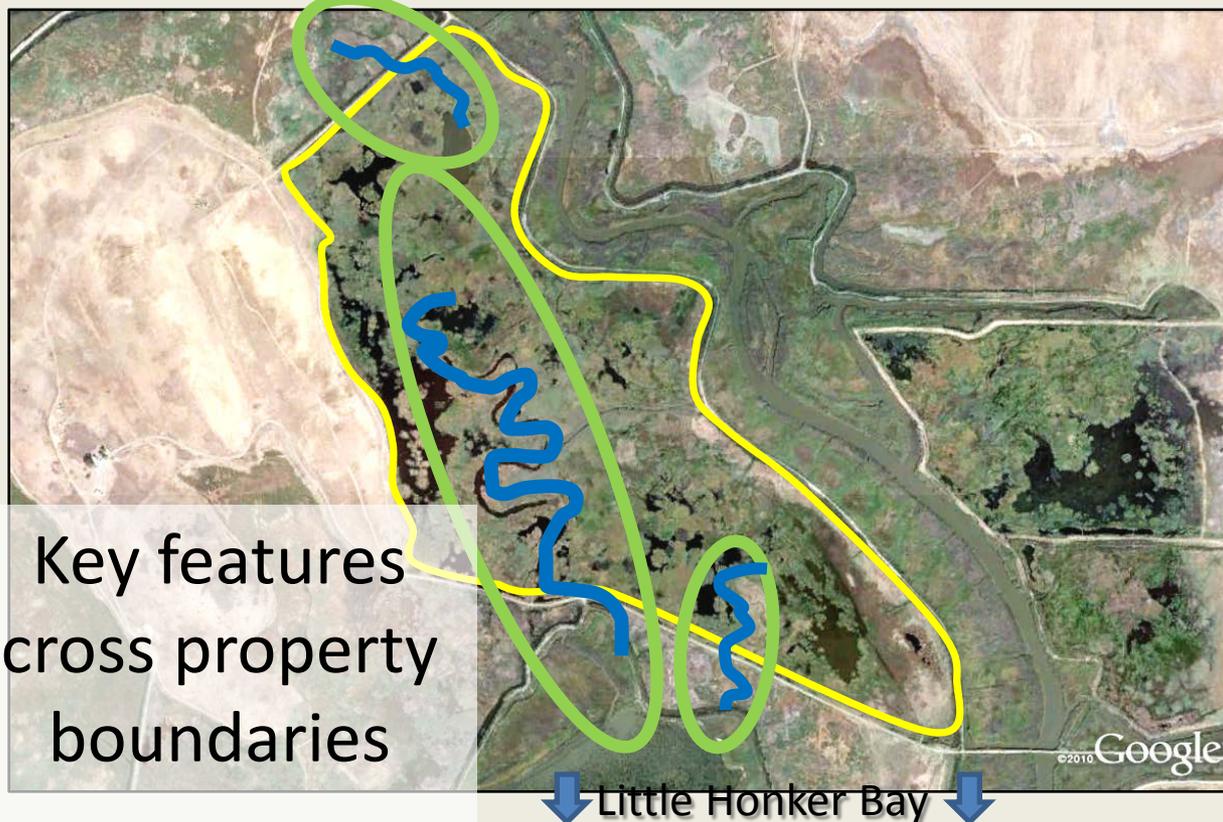
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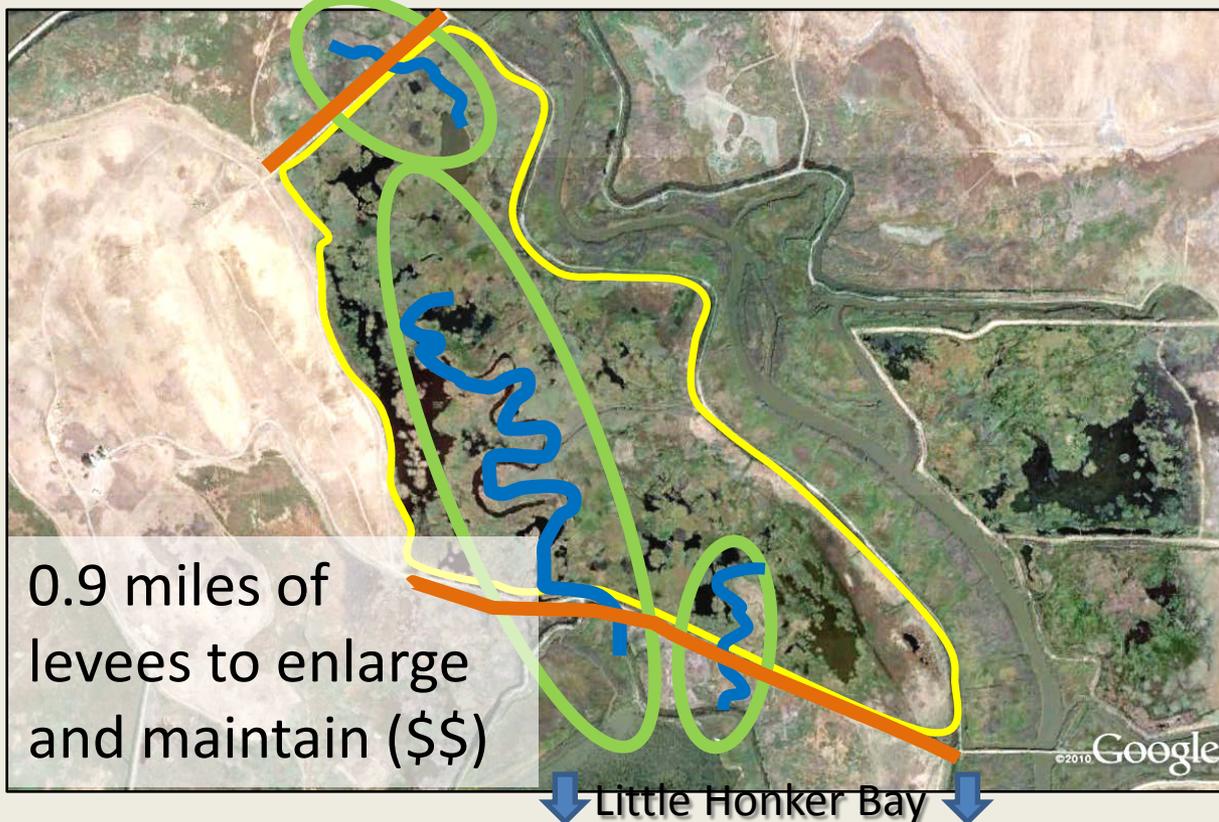
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# Actual adaptive management: Science questions at every step

## 2. Do we implement or hold?

example “postage stamp” restoration:



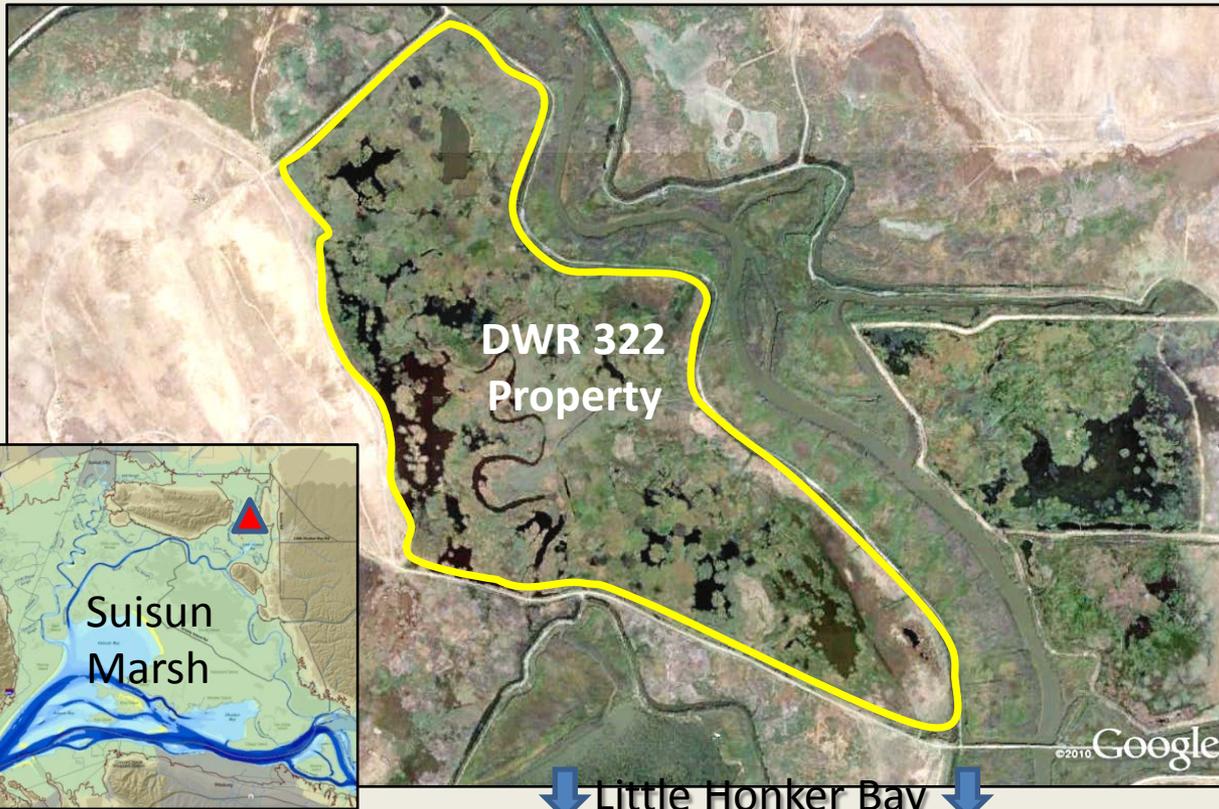
It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 2. *Do we implement or hold?*

- Holding many properties is a *huge* adaptive management opportunity/challenge...



It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 3. *What is the restoration design?*

Possible design/experiment treatments

reference marshes

1  
Narrow breach

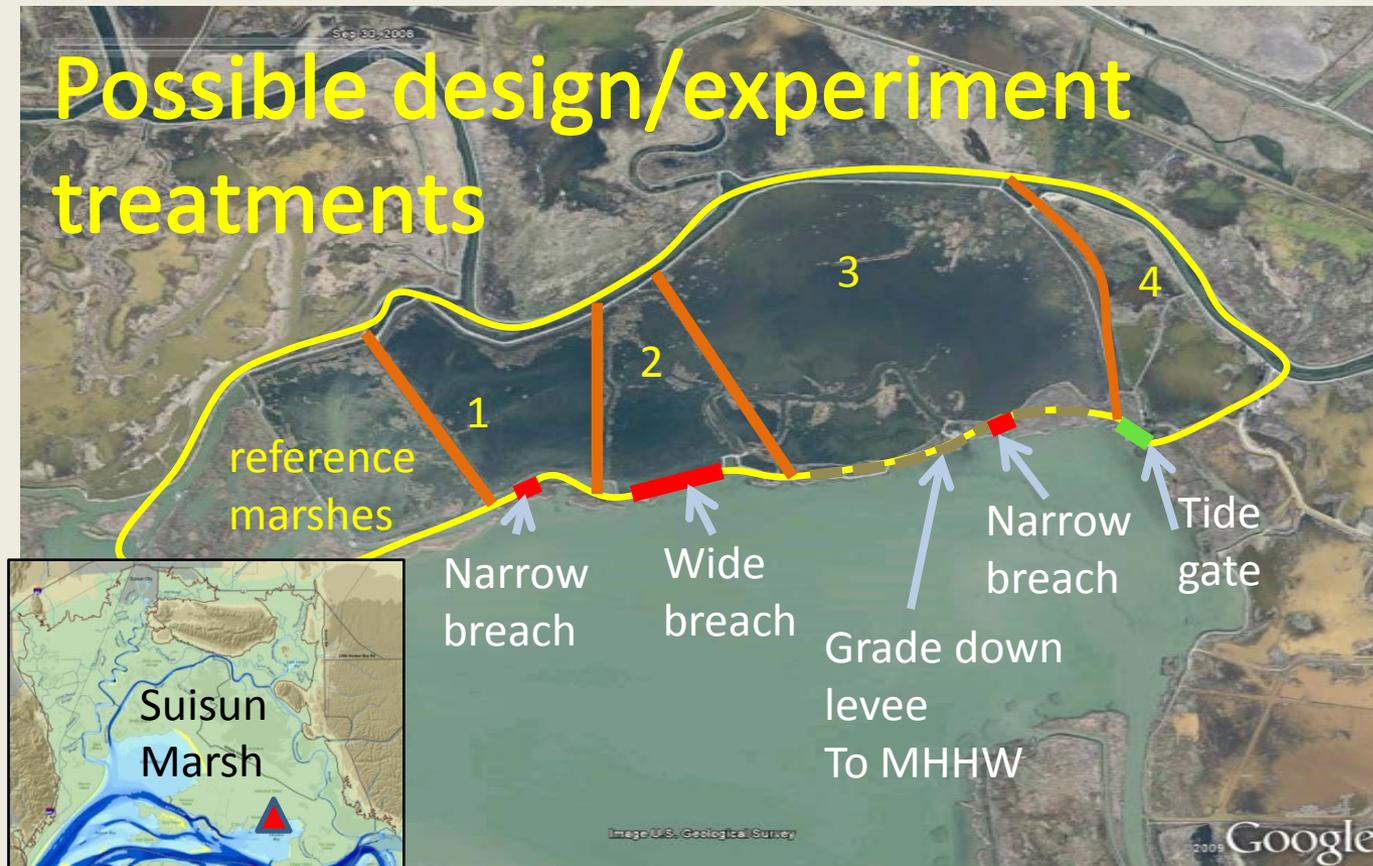
2  
Wide breach

3  
Grade down levee  
To MHHW

4  
Narrow breach

Tide gate

It's a science and modeling question

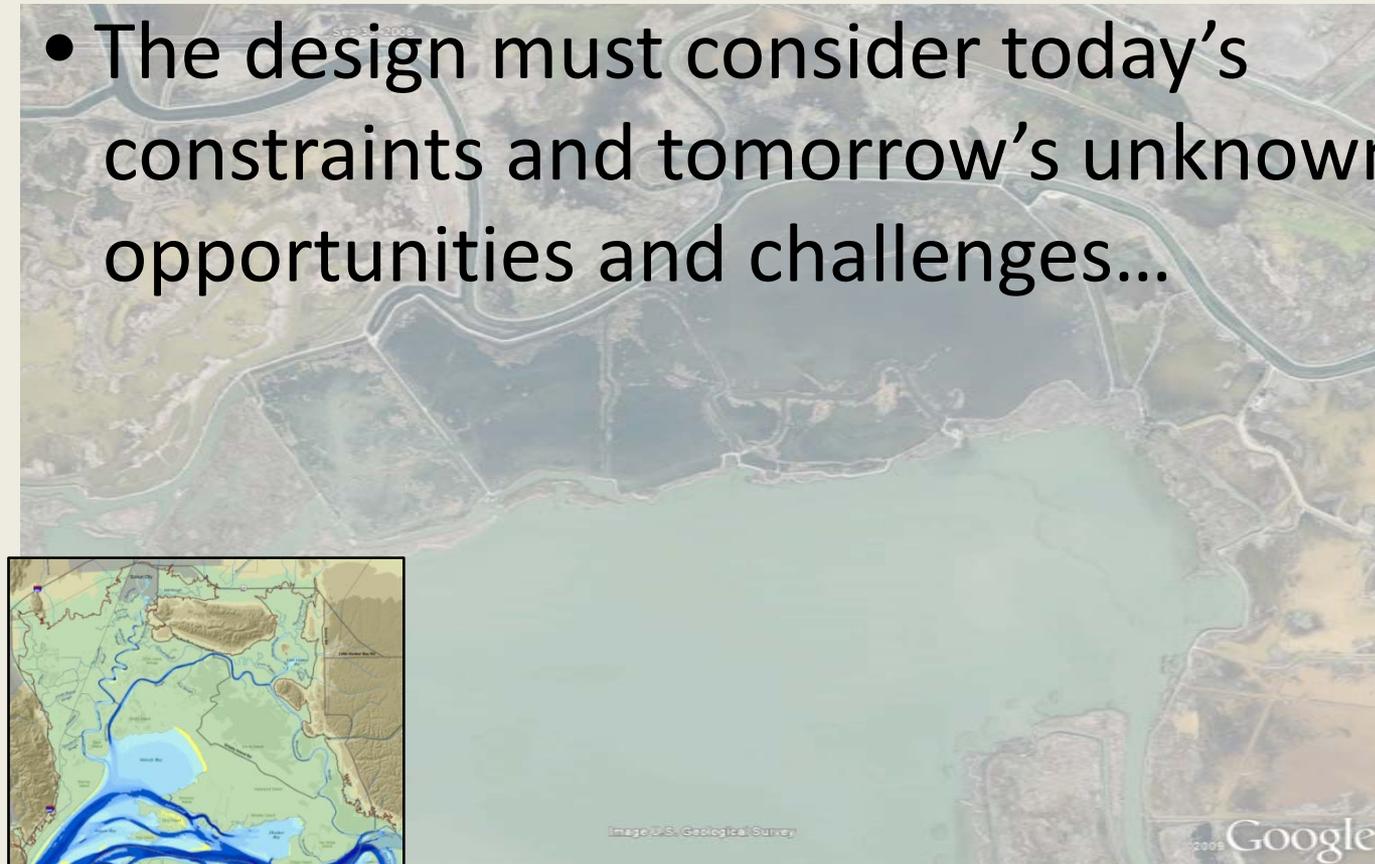


# Actual adaptive management: Science questions at every step

## 3. *What is the restoration design?*

- The design must consider today's constraints and tomorrow's unknown opportunities and challenges...

It's a science and modeling question



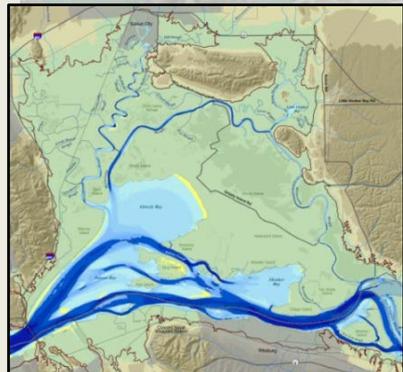
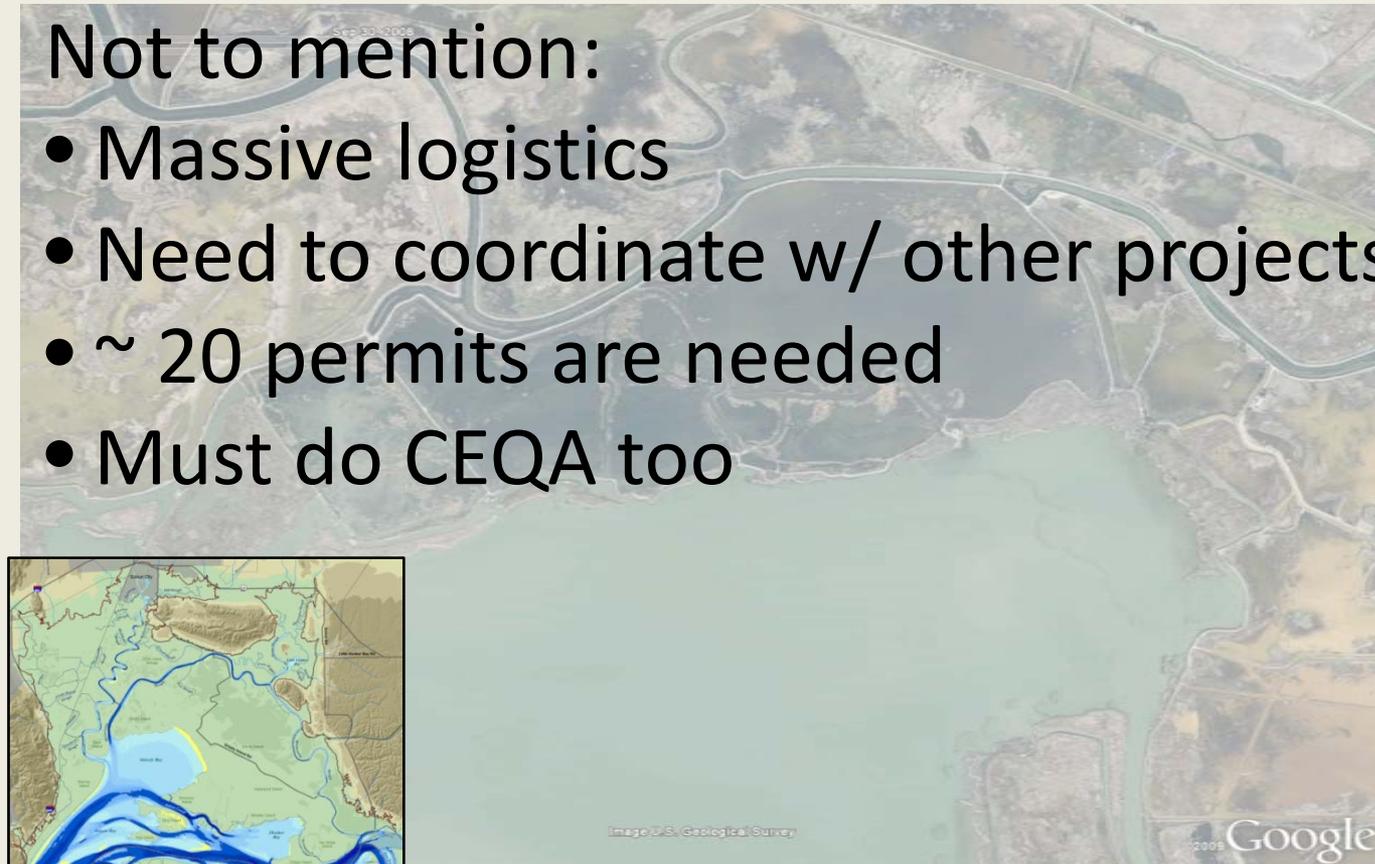
# Actual adaptive management: Science questions at every step

## 3. *What is the restoration design?*

Not to mention:

- Massive logistics
- Need to coordinate w/ other projects
- ~ 20 permits are needed
- Must do CEQA too

It's a science  
and modeling  
question



# Actual adaptive management: Science questions at every step

## 4. *Is it working?*

*Based on the science we did:*

- is it building elevation?
- is it habitat option diverse?
- is it producing food, refuge and reproduction space for the right species?
- What are the system-scale effects?

This is not monitoring! Must resolve signal-to-noise for mechanistic understanding

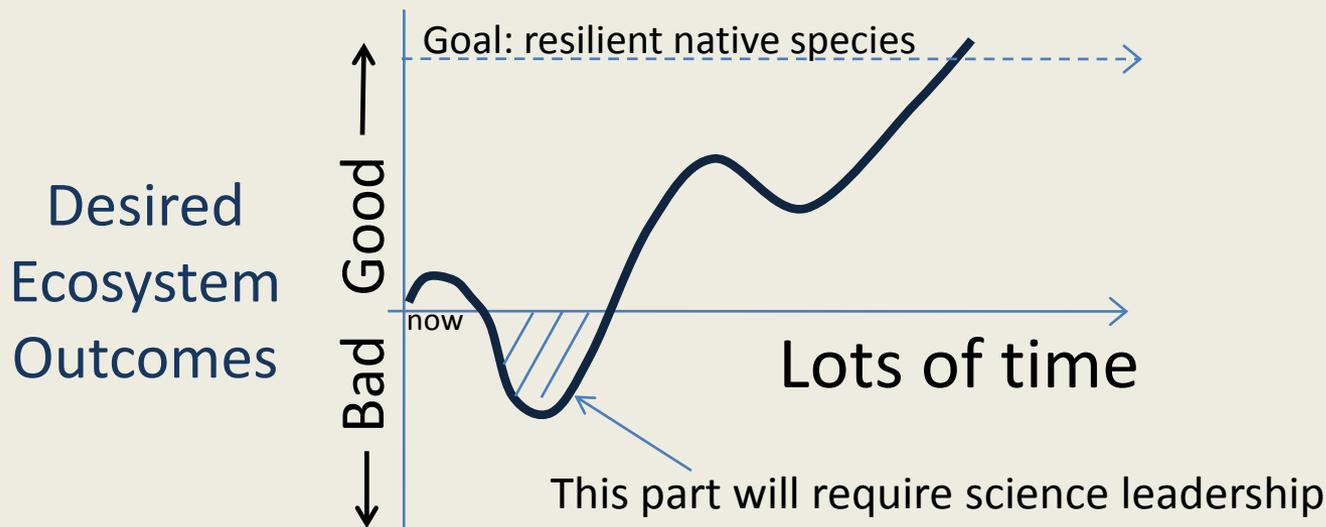
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# Actual adaptive management: Science questions at every step

## 5. Do we need to “adapt” it?

- The least of our worries...
- Gotta be patient and clever

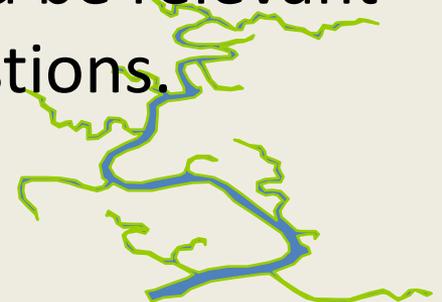


It's a science and modeling question



# Actual adaptive management: Science questions at every step

- The scale of the restoration opportunity is large.
- Our response must be commensurate.
  - The usual ad hoc agency coordination won't work.
  - Several novel skill sets are needed.
  - “Science” is centrally involved.
  - The science plan should anticipate and be relevant to the real adaptive management questions.





# Current science capabilities

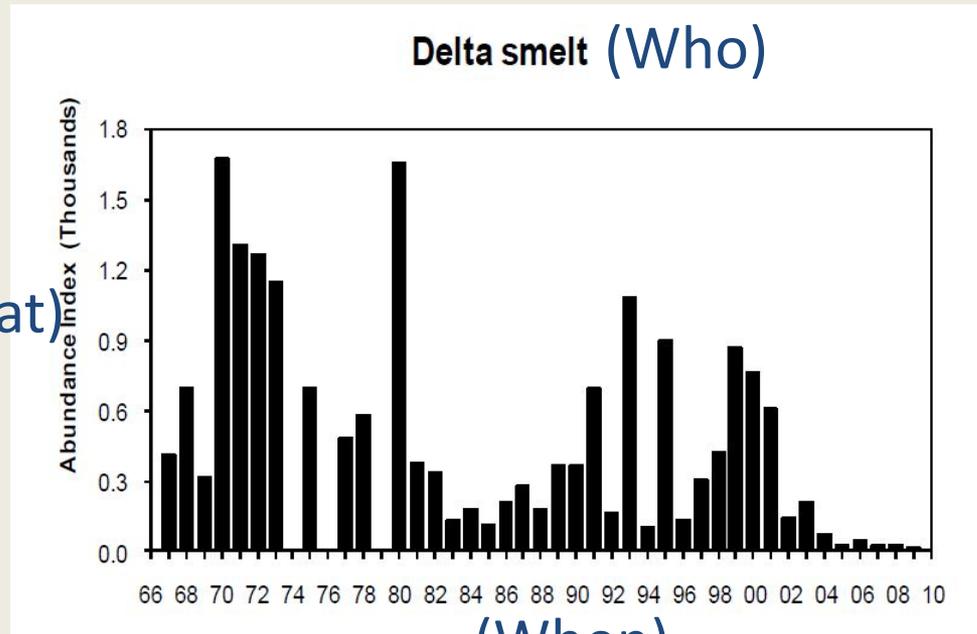
## Science source

- IEP (9 agencies)

## Area of expertise

Status and trends monitoring;  
recently back to system study...

(What)

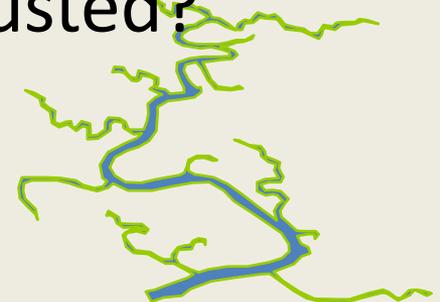


# Current science capabilities

## Science source

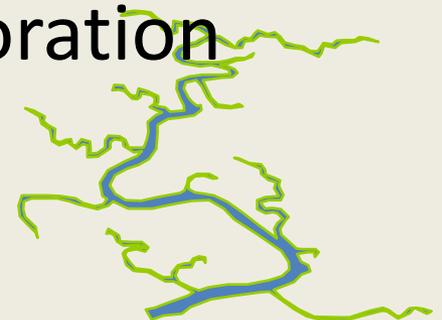
## Area of expertise

- IEP (9 agencies) Status and trends monitoring; recently back to system study...
- Delta Sci Prog Science facilitation, communication science funding source
- Universities Basic science and innovation
- Agencies IEP overlap + key busy individuals
- Stakeholders Limited, high quality, trusted?
- Consultants Modeling



# Needed restoration science capability

- Not monitoring (who-what-when and rear view mirror science)
- Hypothesis driven (how/why science)
- Observe at the scale of the process (resolve signal to noise—space and time)
- Scientists and modelers in the same room.
- *Responsible* for solving the eco-restoration problem



# Attributes of the needed restoration science entity

- Independent—in fact and perception
- Policy relevant, goal oriented
- Culture of applied science excellence
- Expands the knowledge base
- Interdisciplinary
- A science leader is responsible
- “scientist habitat” – nurture polymaths
- Keepers of the landscape-level restoration design model.



# Be guided by landscape-scale conceptual models

- 500' design at estuary scale--*on the map*
- Clearly defines initial system state
- Mechanistically defines expected trajectories of change given alternative designs (a hypothesis generator)
- Seamless with numerical models (phy,chem,bio,eco)
- The living holder of Best Available Science for restoration—*adaptively managed*
- Value is the *doing* as much as the completing



# Thank you

First Mallard Branch  
Suisun Marsh



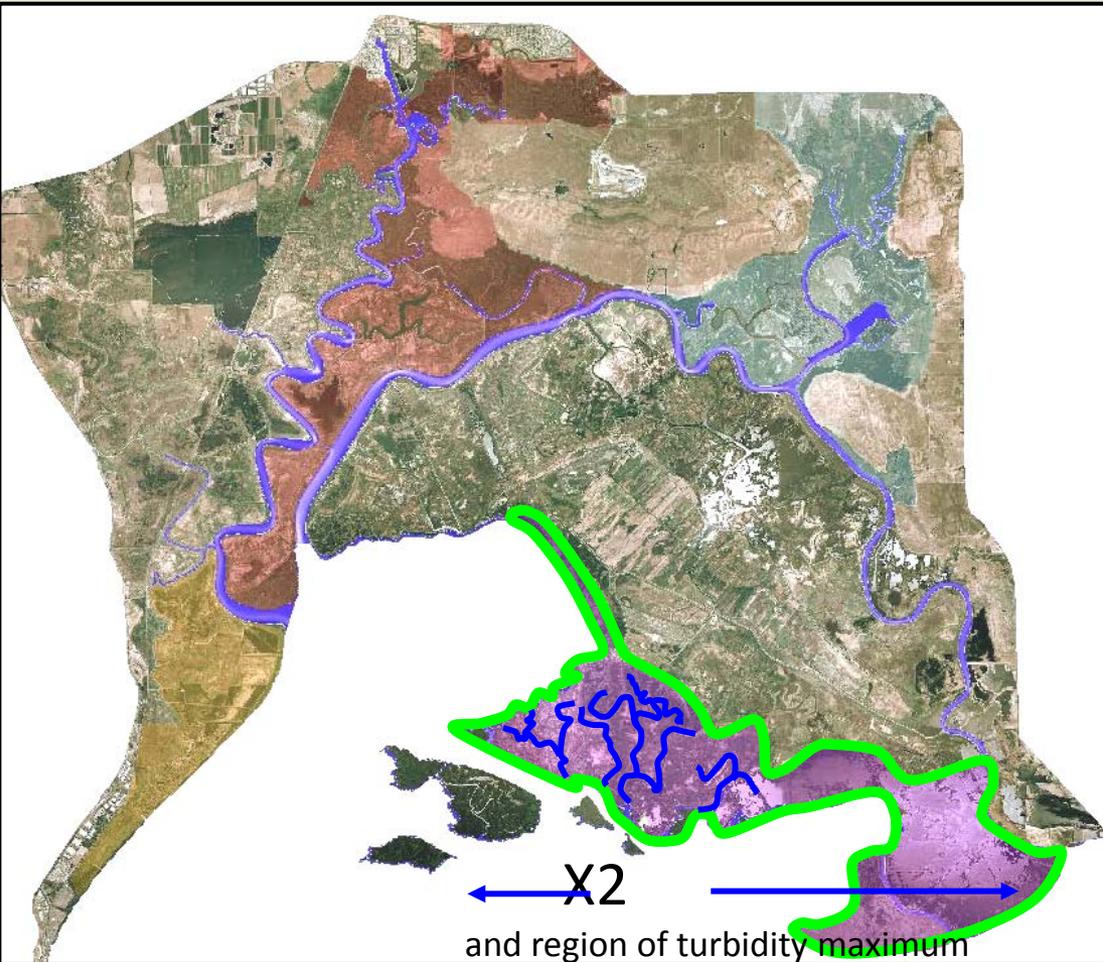
extras

## 2. Relevant restoration scales

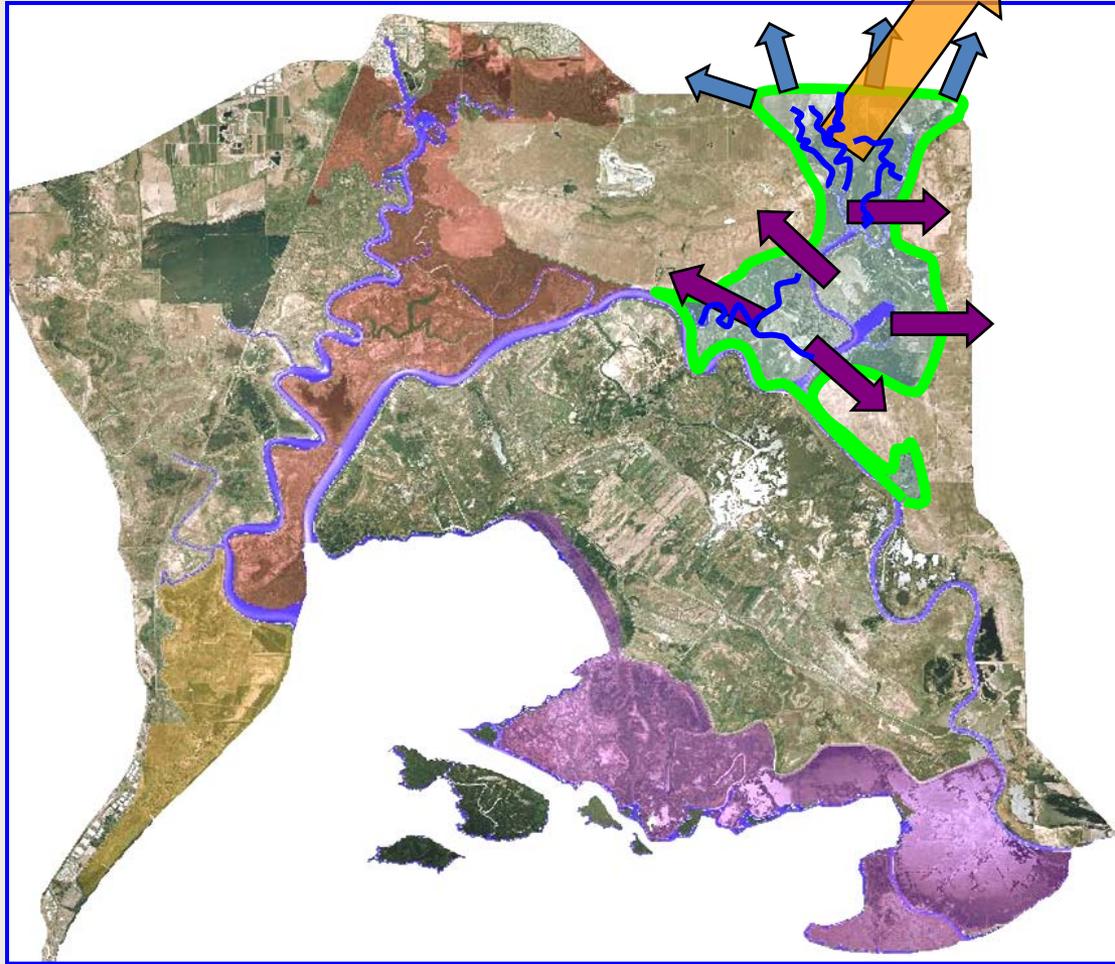
### South of Roaring River

At this scale:

- Adjacent to X2
- Salinity grad. corridor
- Excellent DS habitat
- Sediment source rich
- Large remnant tidal creek systems.



## 2. Relevant restoration scales



### Nurse Slough Complex

At this scale:

- SLR accommodation
- Minimal subsidence
- Terrestrial corridor
- Upland trans ecotone
- Large remnant tidal creek systems
- Fringing tule marsh.

## 2. Relevant restoration scales

### Joice-Rush-Hill Corridor

At this scale:

- Estuarine corridor
- Mostly public land
- Topographic diversity
- Remnant tidal sloughs
- Existing tidal marsh.

