Isolating Water Conveyance: In Theory a Silver Bullet, But in Practice?

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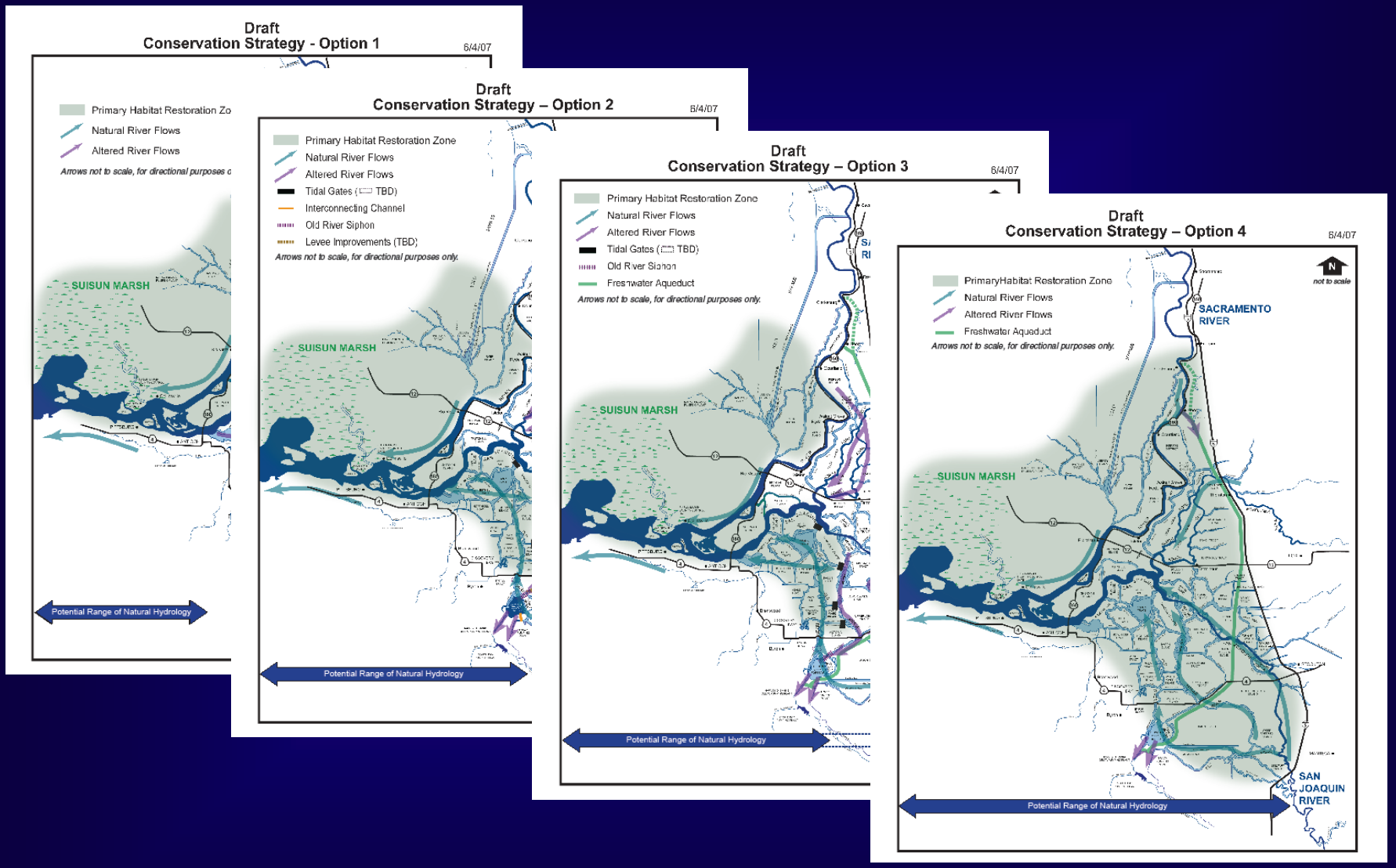
"In theory, there is no difference between theory and practice.
But in practice, there is." - Yogi Berra


Six Key Points:
History
Uncertainty
Experiment
Risk
Best Available Science
Isolated Facility

So, you want eco-friendly water conveyance, do you?



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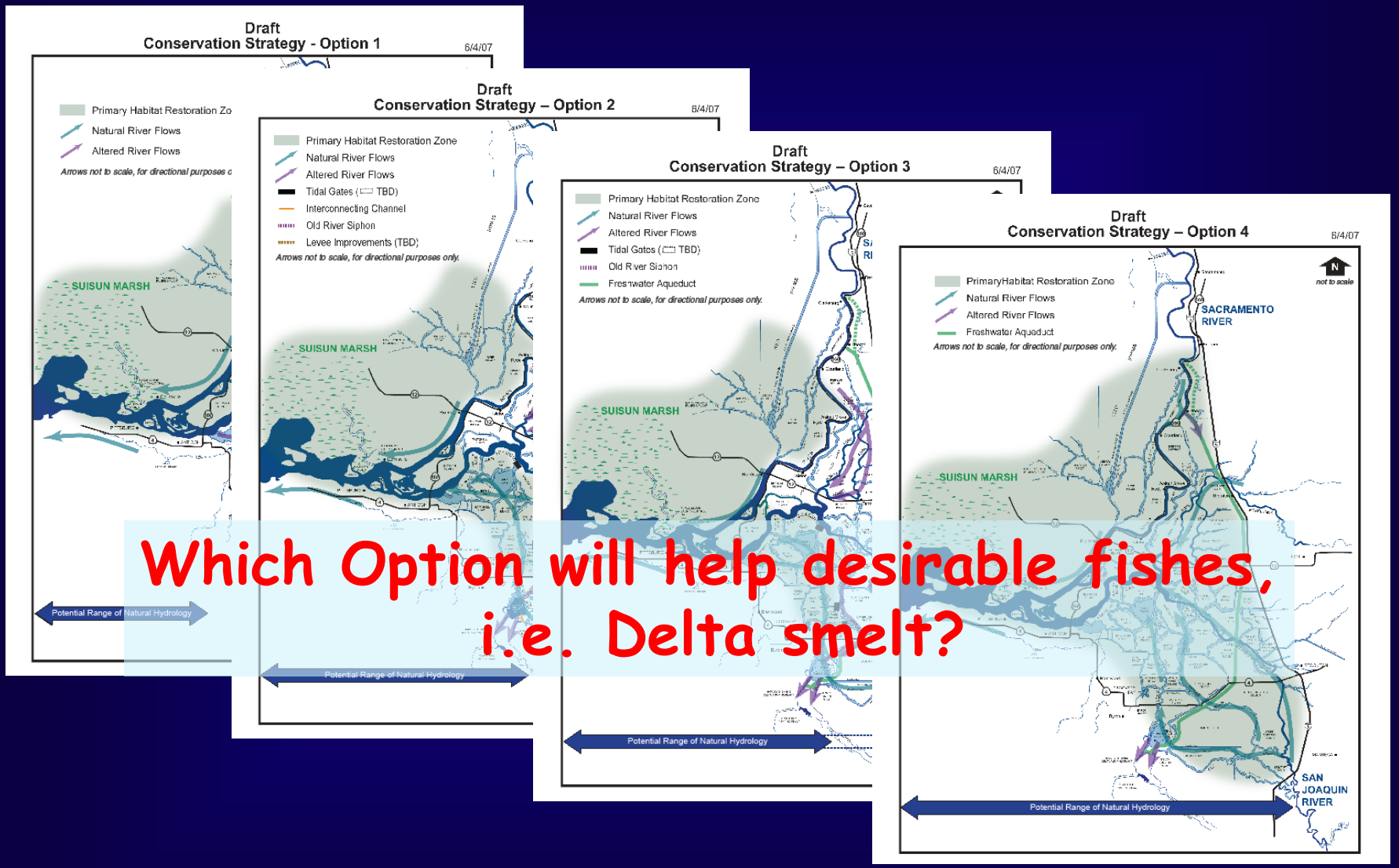

Which Option will help desirable fishes, i.e. Delta smelt?

We have no idea !

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OK, everyone apparently has a lot of ideas, but…

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Clearly, uncertainty rules:

- scientific (ecological) knowledge
- many engineering options
- potential operating standards
- conflicting restoration targets
- competing human services

Will Isolated Conveyance Benefit Desirable Fishes?

ISSUES ?

Do we need a PC; is it the "Silver Bullet"?
How big, how much, when?
We've done enough studies?
Where's the "Best Available Science"?
How do we begin to implement a PC- type option?

WHAT DO WE KNOW ?

Current situation untenable
Assumption/Belief: exports are the primary fish problem
Overall, we know a lot more now than in 1982
but it's the specifics that matter.

HOW DO WE IMPROVE ?

Guess?
Learn by doing?

How should we approach the problem?

1. Develop short-term and long-range options
2. Involve all interested parties
3. Interview best available scientists
4. Develop public awareness & support
5. Choose an option
6. Get necessary permits and start digg'n.

7. Cross your fingers & hope it works !

OR,

3. Develop conceptual & simulation models
4. Design each action as an experiment
5. Monitor and analyze what happened.
6. If outcome is positive, go to #7; if not begin again at #3.
7. Get permits and move on in direction dictated by experimental outcomes.

6. Learn how this new system works by doing!

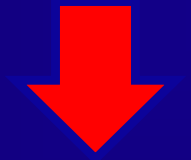
Experimentation is not new!

Garstand & ICES "Overfishing Committee", 1880s

Thompson vs. Hjort, 1900s

Thompson vs. Burkenroad, 1950s

Modeling vs. Experimentation ?

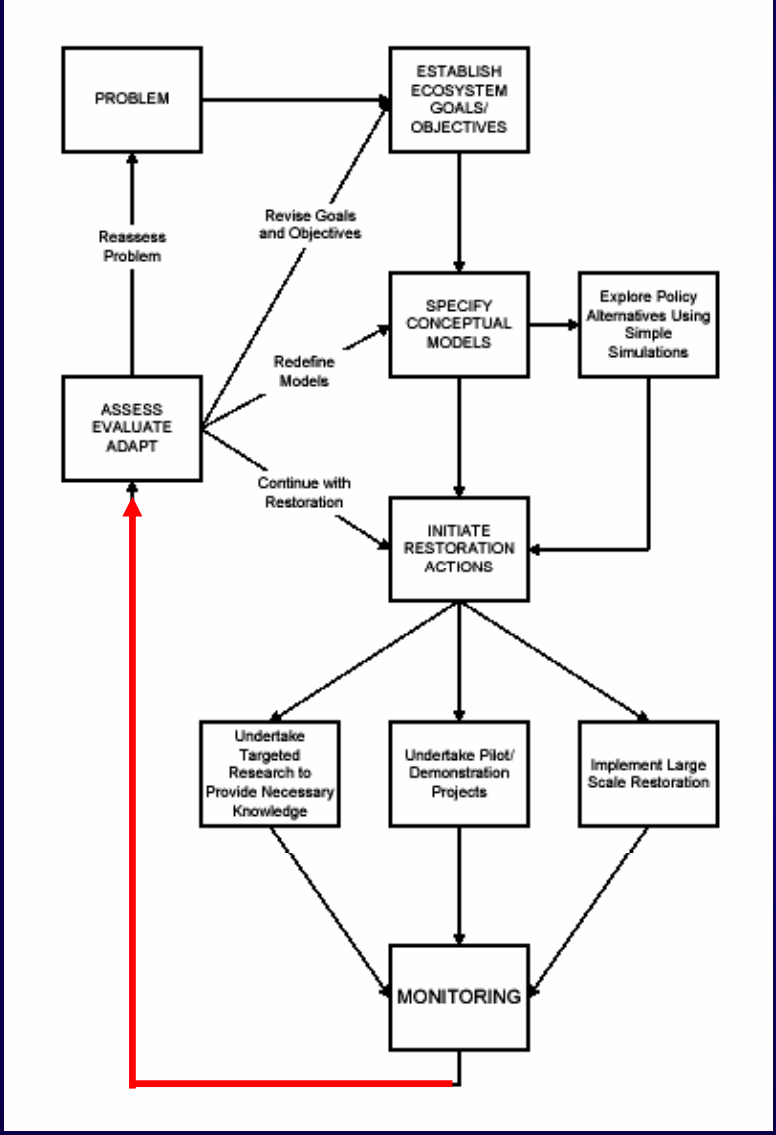


Holling and Walters, 1970s

Integration of Modeling & Experimentation

"Adaptive Management"

It's Even Tailored to CALFED Restoration Issues!



"The Big Model Paper"

Healey, Angermeier, Cummins, Dunne, Kimmerer, Kondolf, Moyle, Murphy, Patten, Reed, Spies, Twiss

"The Healey Diagram"

Tools & Measures

Physical Engineering Options

- Rock barriers
- Gates
- Siphons
- Canals

Restoration Metrics

- Fish abundance spp. vs. assemblage
- Distribution of Brazilian water weed
- Density of Corbula
- Zooplankton density vs. composition

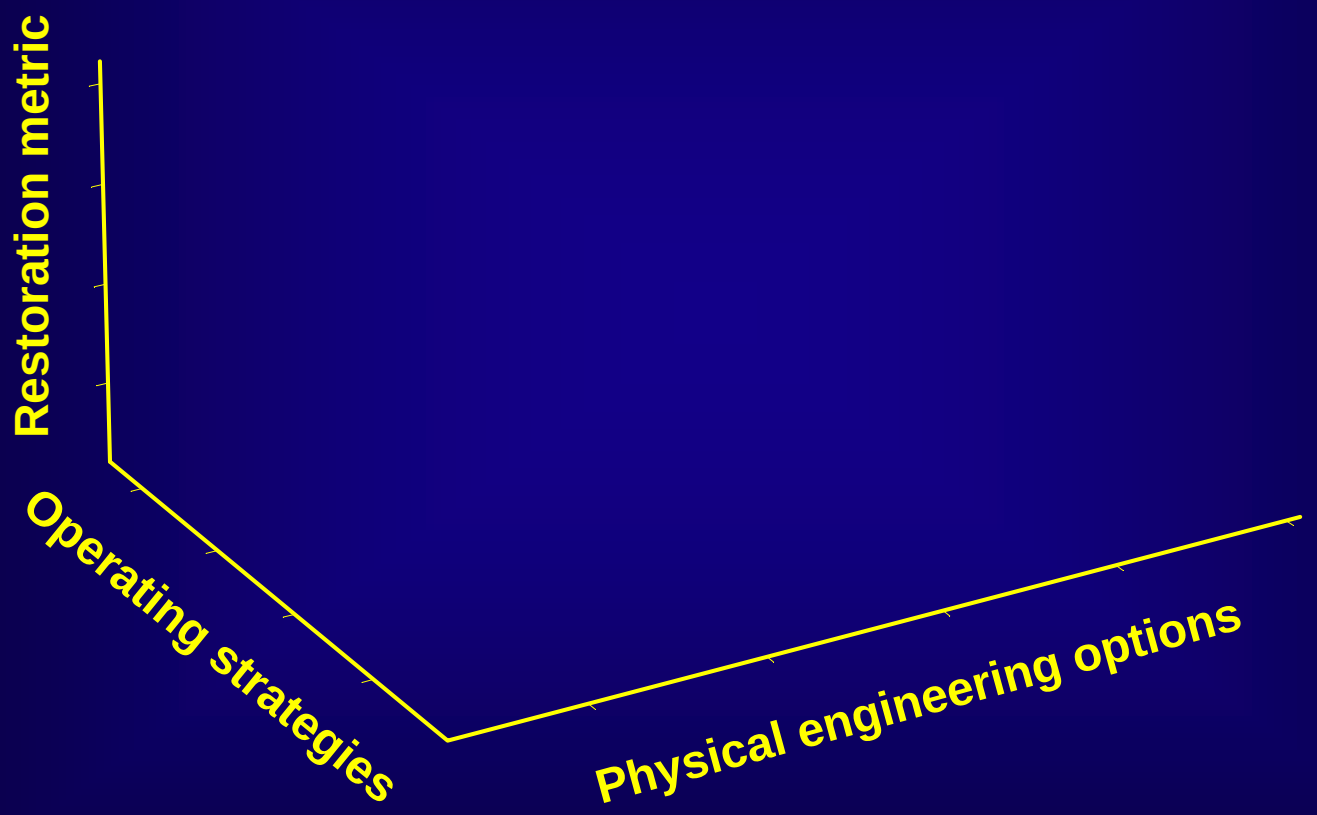
Operating Strategies

- Seasonal, Tidal,
- Day vs. Night
- X2, mean vs. variance
- Real-time & Big-Gulp

Temporal Considerations

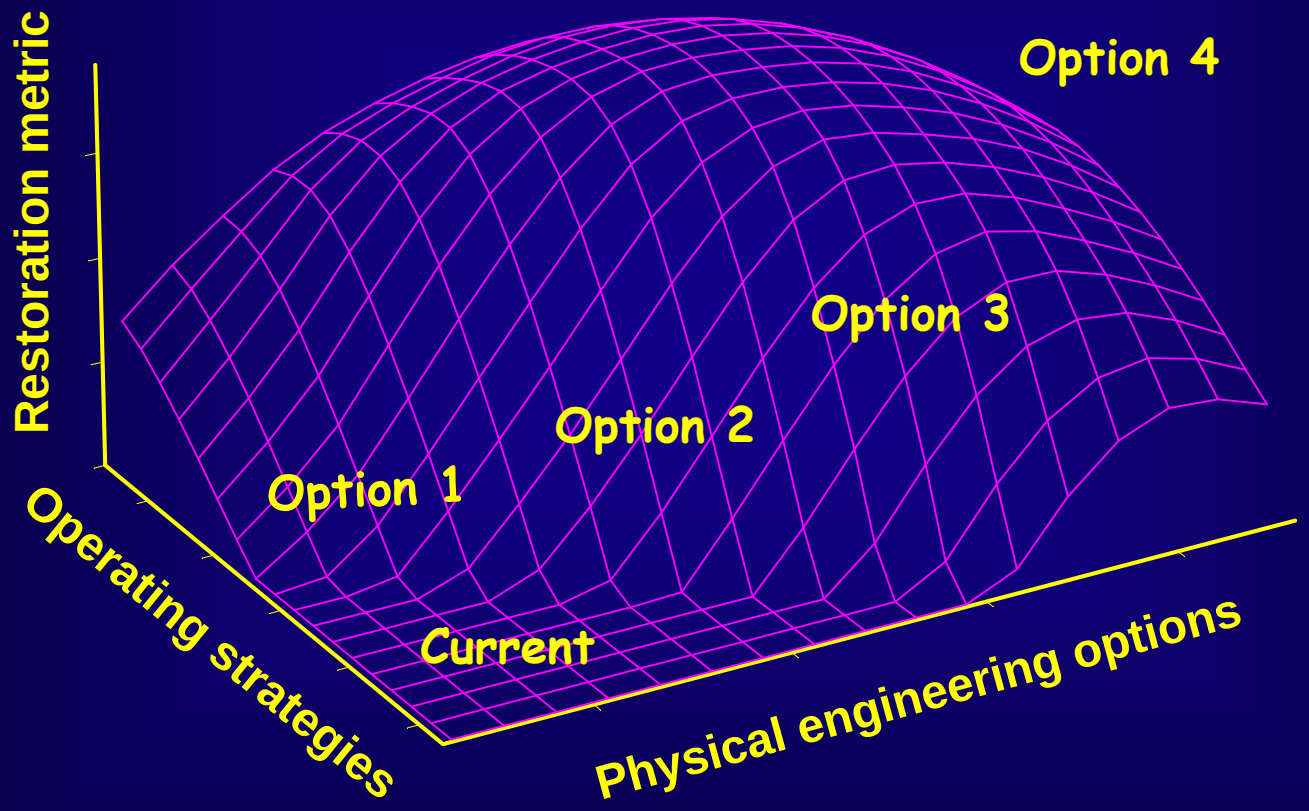
- Time Lags of system response
- Organism generation times
- Institutional logistics:
  - planning, construction
  - monitoring, analysis, etc.

Experimentation as a "Conservation Strategy"



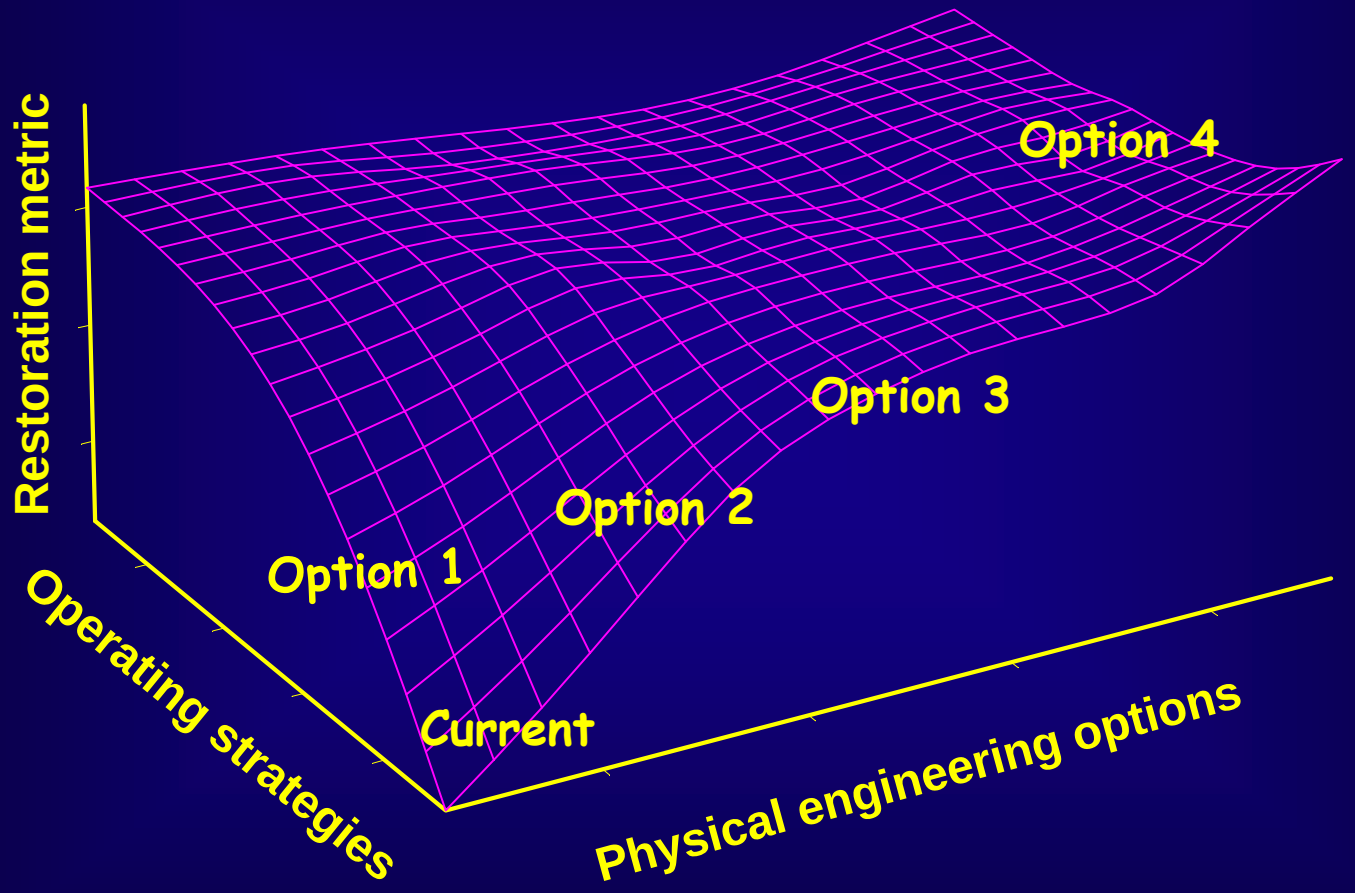
Experimentation as a "Conservation Strategy"

Scenario 1: Implied outcome: improvement from Option 1-4



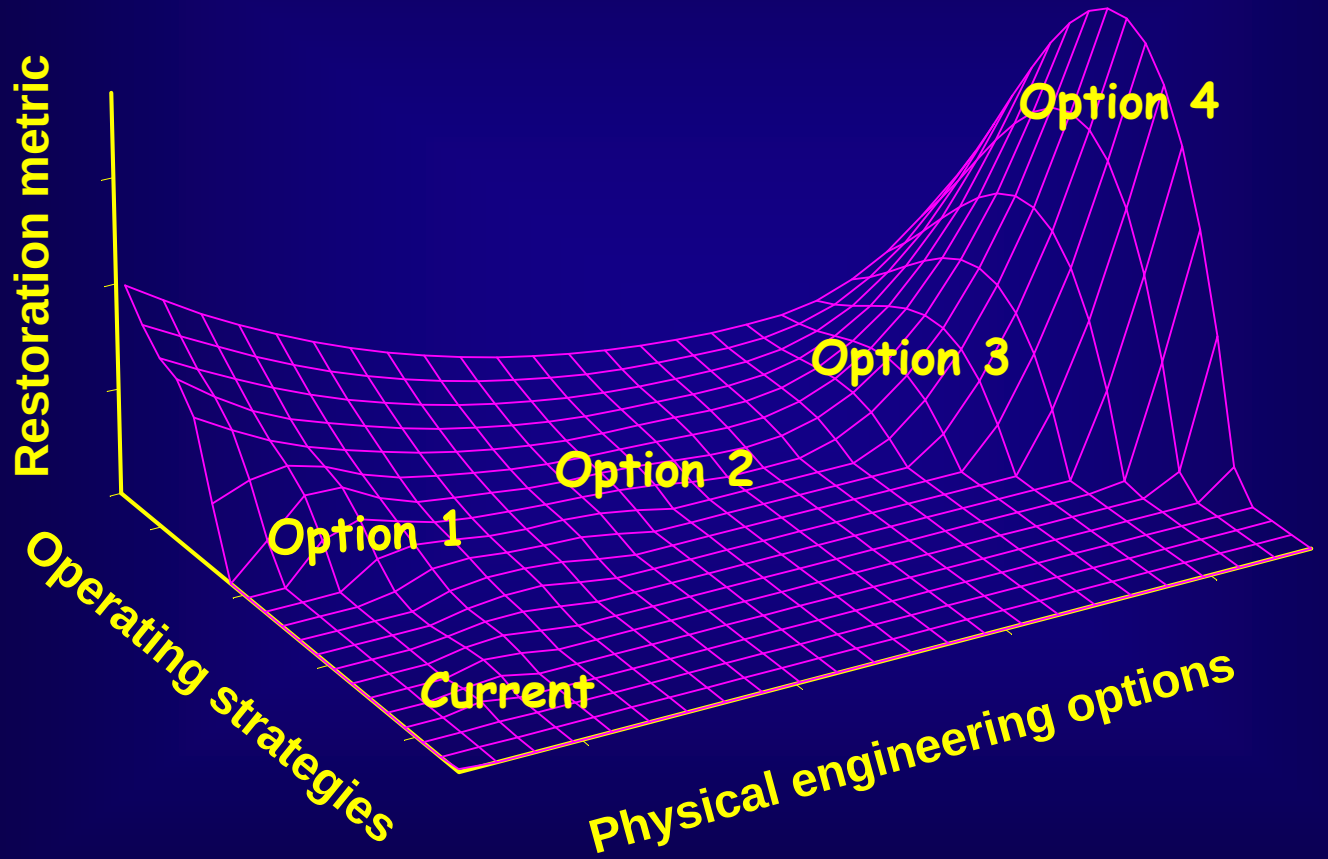
Experimentation as a "Conservation Strategy"

Scenario 2: Refining Option 1 ~ Options 2-4



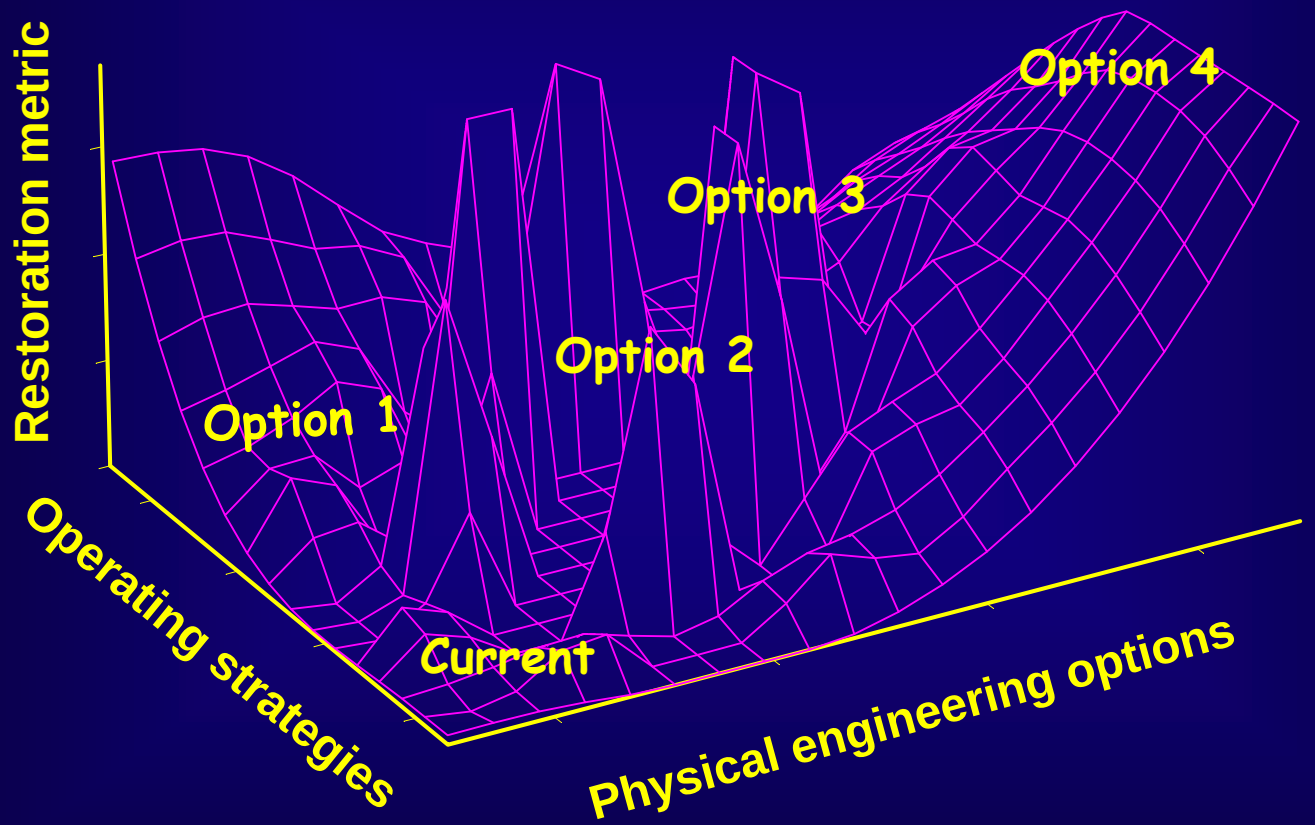
Experimentation as a "Conservation Strategy"

Scenario 3: Refining Option A, > Options 2-3, ~ Option 4



Experimentation as a "Conservation Strategy"

Scenario 4: Locally sensitive vs. robust maxima



Constraints & Impediments

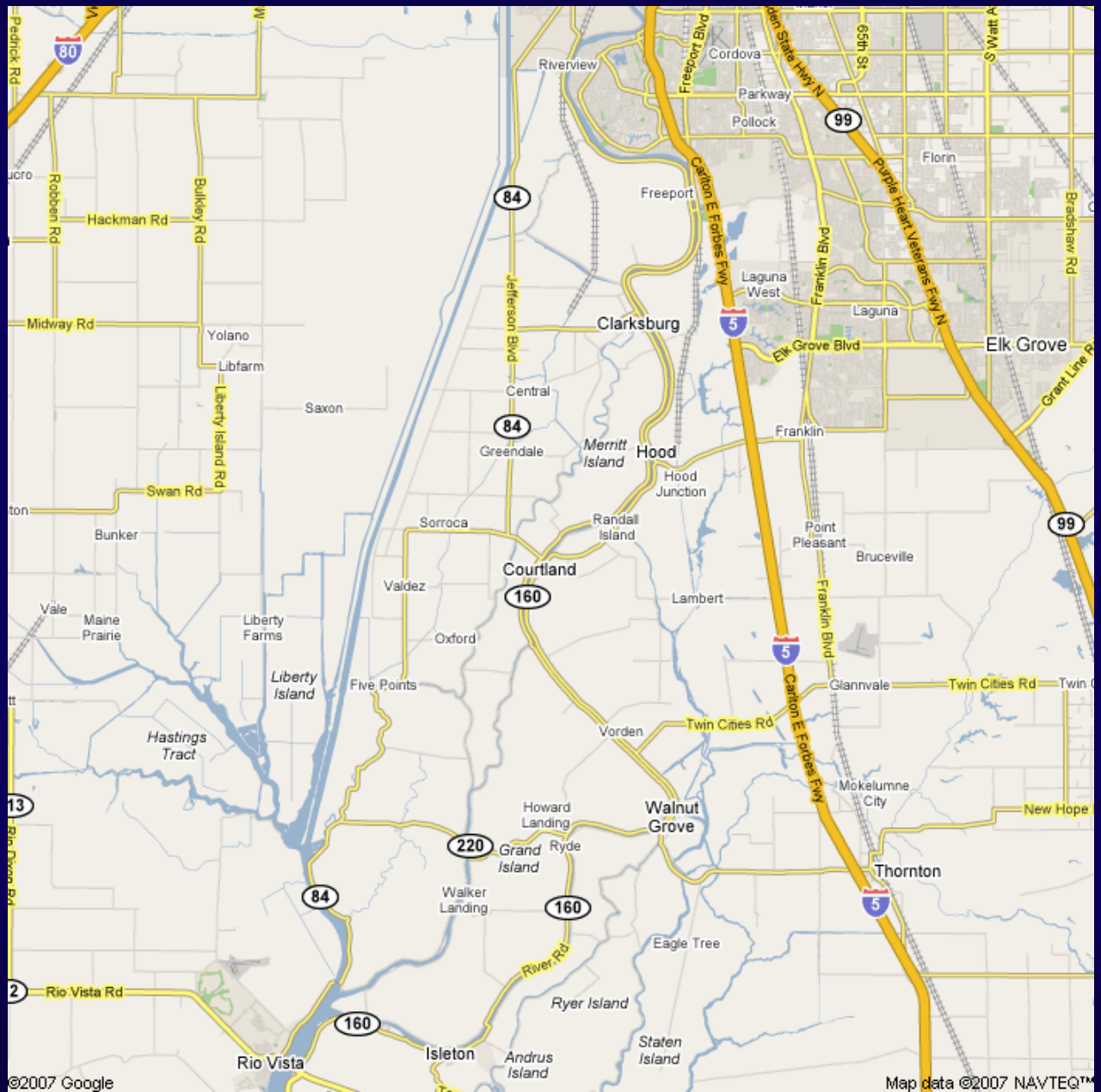
RISK, RISK, RISK !!

- Potential resource impacts
- Capital investment
- Surprises!

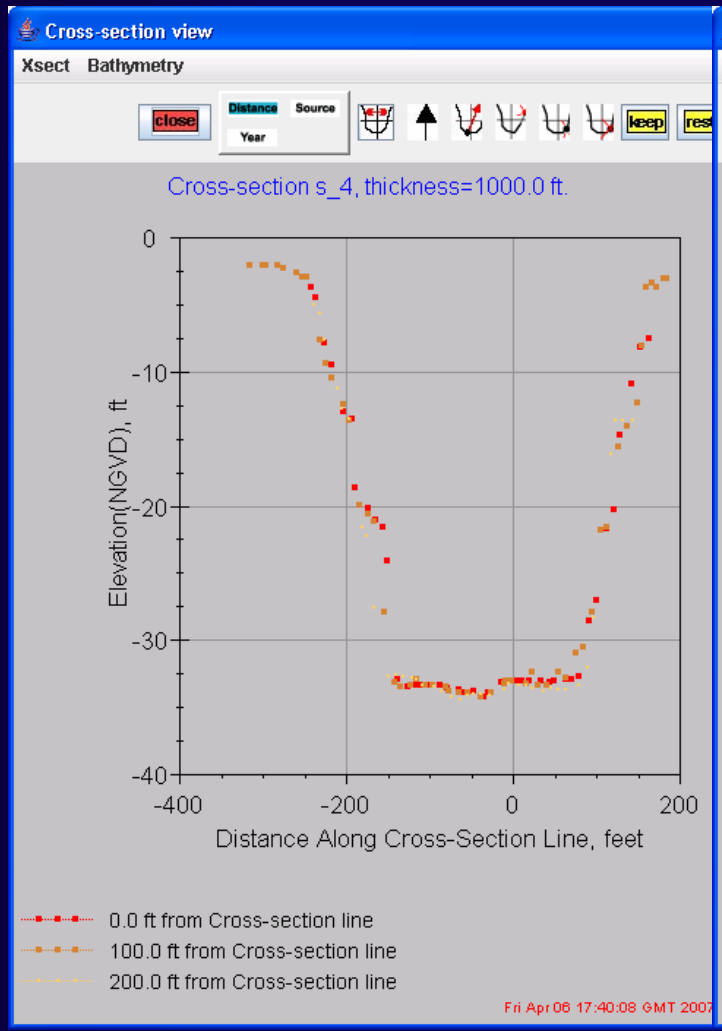
Political, Institutional Memory !!

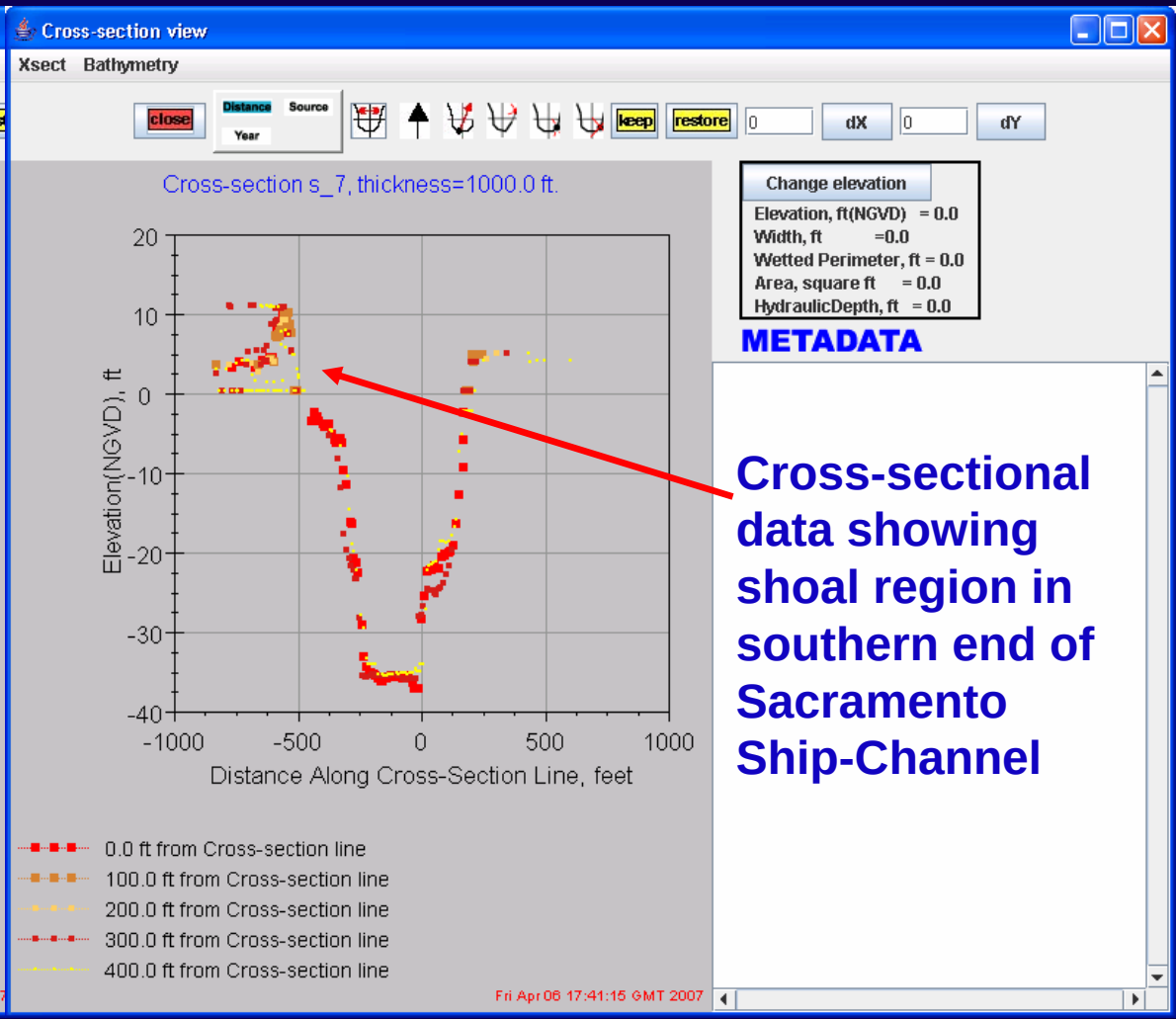
- Term limits
- Career changes
- Dissertation, Promotion requirements
- Surprises!

Where Do We Begin?



Identifying Delta Smelt Spawning Habitat?





Cross-sectional data showing shoal region in southern end of Sacramento Ship-Channel

Six Key Points:

History

Uncertainty

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Risk

Best Available Science

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This could be the last time we have to make a comprehensive plan to fix CA's water supply.

Lester Snow.