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Spring-run Chinook Salmon in California's Central Valley:

Reintroducing fish to historic habitat upstream of large dams to prevent extinction and promote recovery

Howard Brown

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Overview of Presentation

- Background on the Central Valley
- Summary of spring-run salmon life history, status and distribution
- Discuss 4 key reasons to consider for reintroducing fish to historic habitat
- Feasibility
- Why here? Why now?

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California's Central Valley

- Approximately 23,000 mi²
- Bounded by large mountains
- Mediterranean climate
- Major river systems
- Extensive agriculture and very large dams

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Spring-run Life History Primer

- Anadromous Fish
- Name is based on adult upstream migration timing
- Adults hold over summer
- Spawning: September-October
- Juvenile stream residency: 3-15 months
- Emigration: late fall-winter

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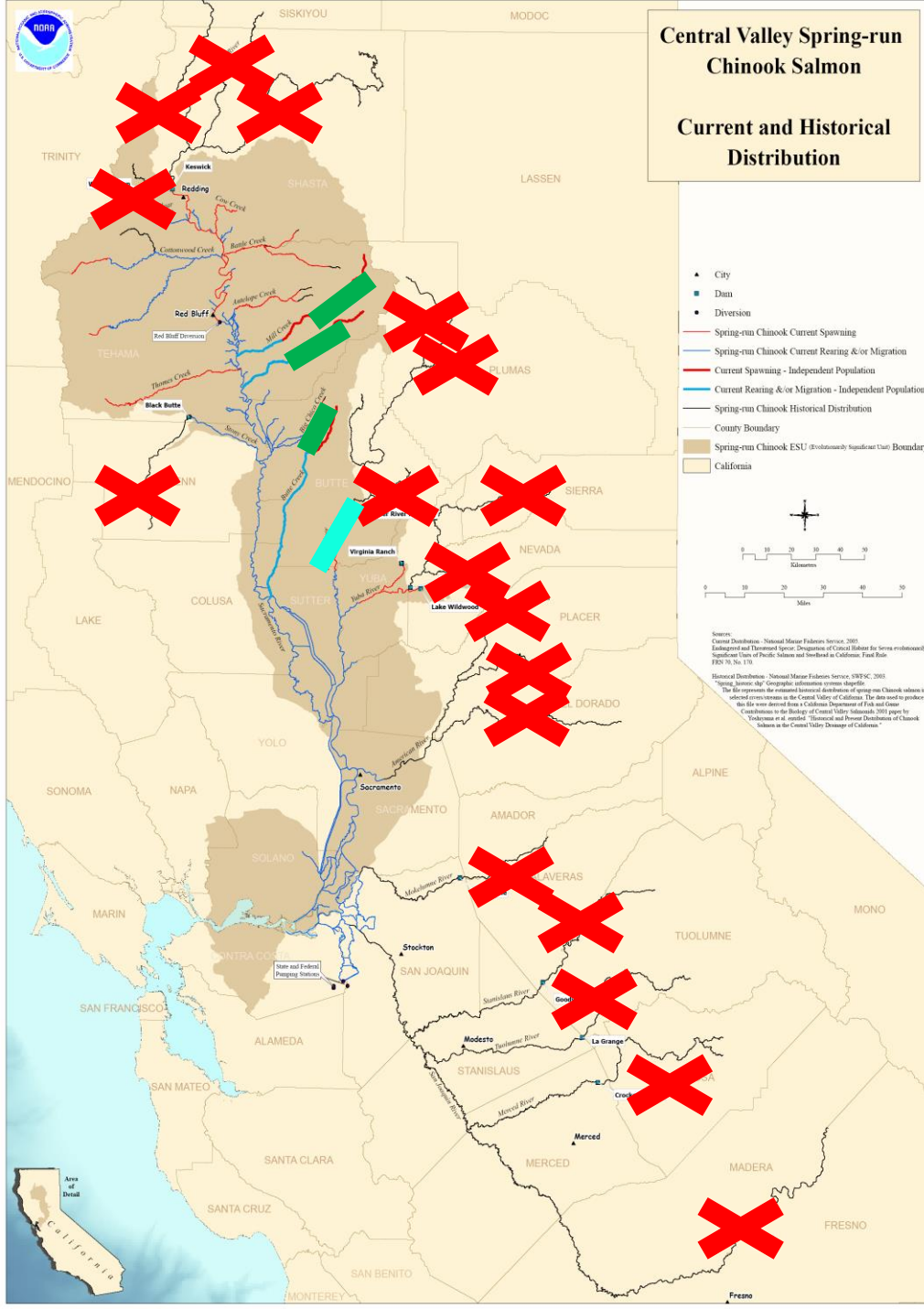
Central Valley Spring-run Chinook salmon (Threatened)



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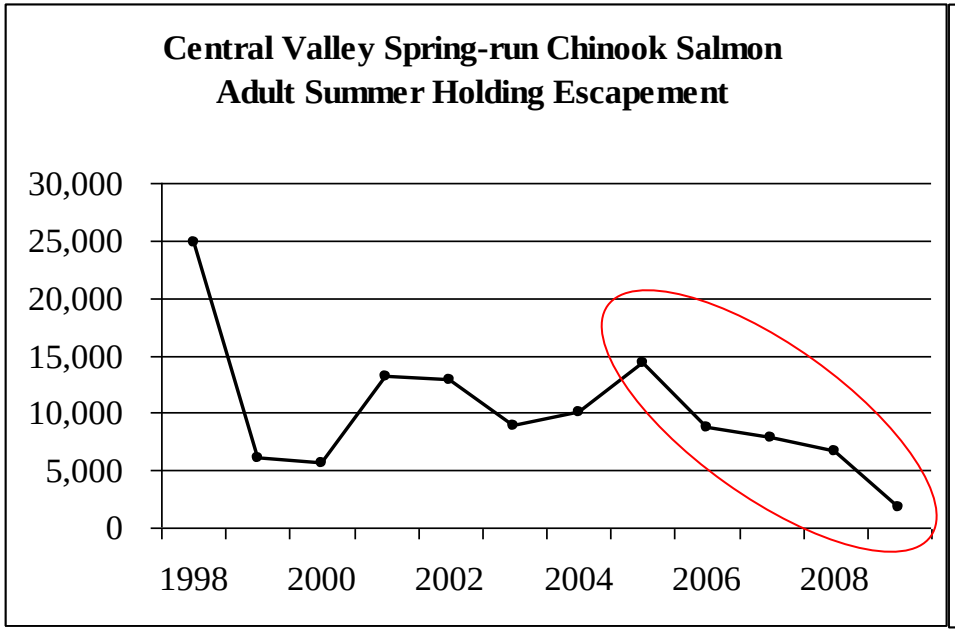
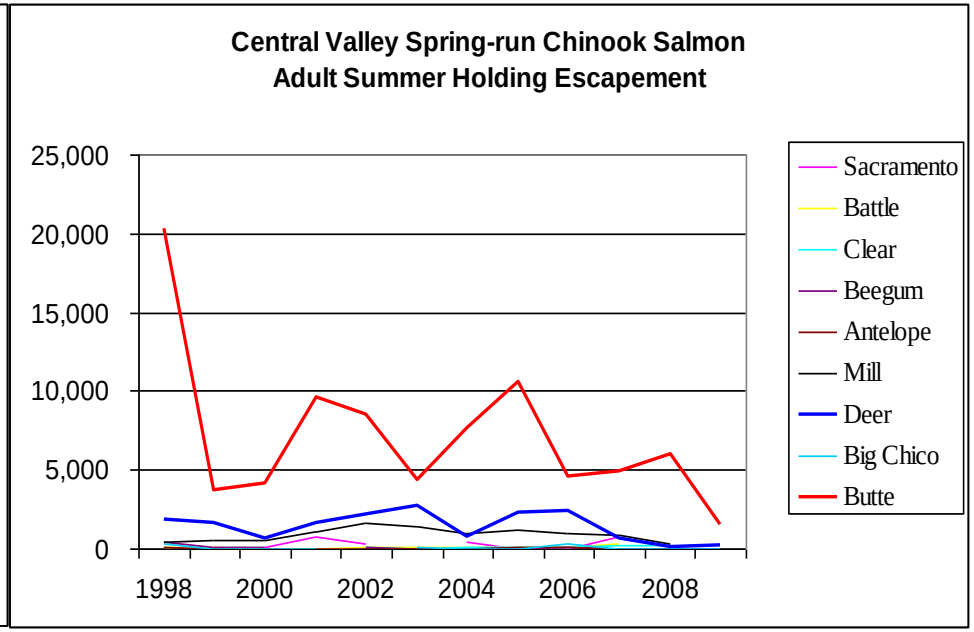
Status and Trends: Spring-run Chinook salmon





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4 Key Reasons for passage

1. **The vast majority of historic habitat is located upstream of large dams**
2. **Managing salmon on the valley floor has had limited success**
3. **Warm water temperatures and climate change is making salmon management on the valley floor even more difficult**
4. **Recovery plans and recovery science highlight fish passage for species recovery**

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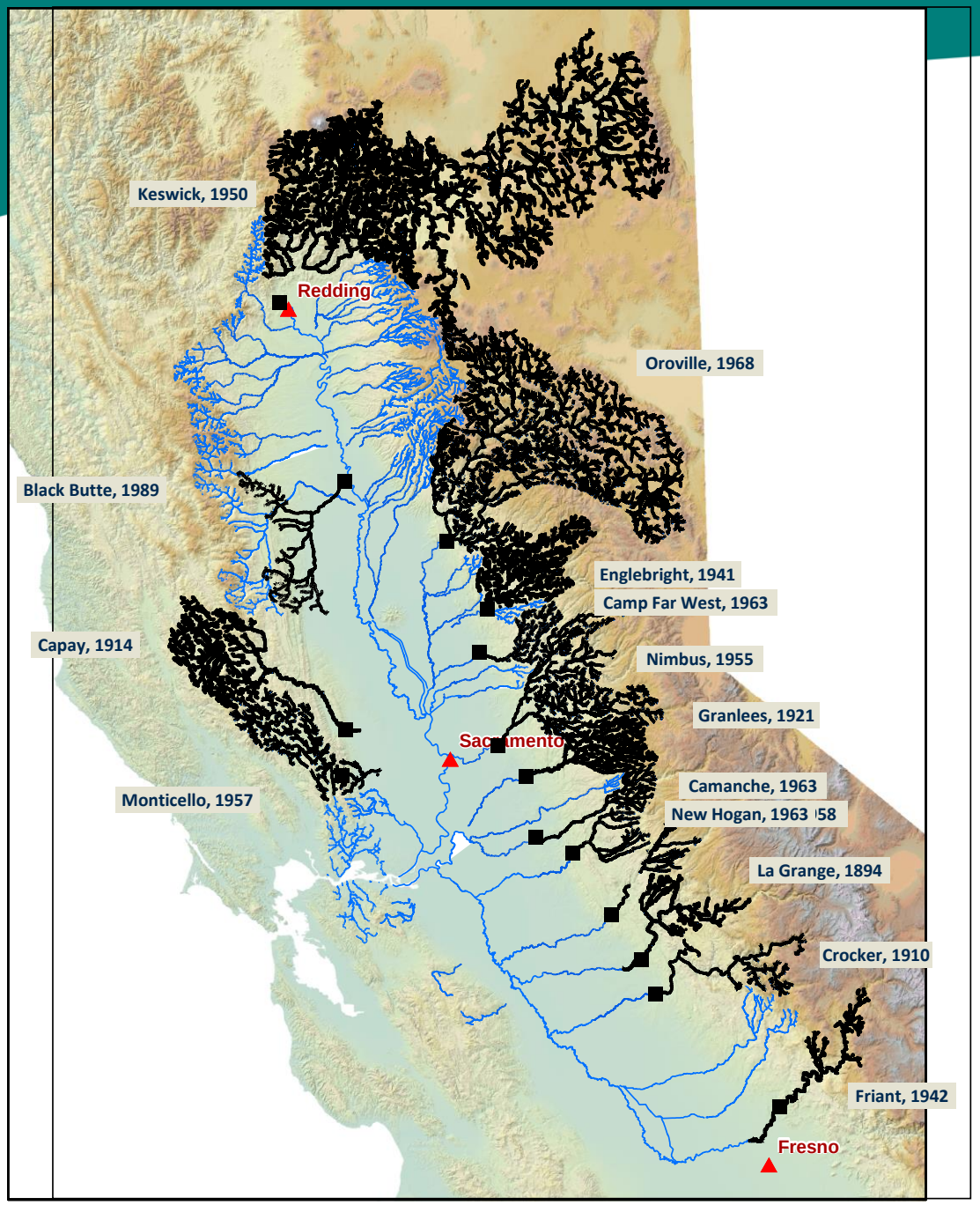

Source:
Lindley et al.: Historical population structure of Central Valley steelhead and its alteration by dams. SWFSC, 2007

Intrinsic Potential Model of Potentially suitable Historical Habitat

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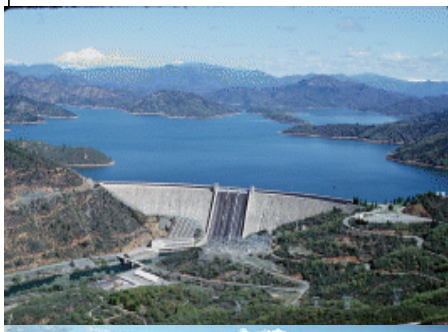

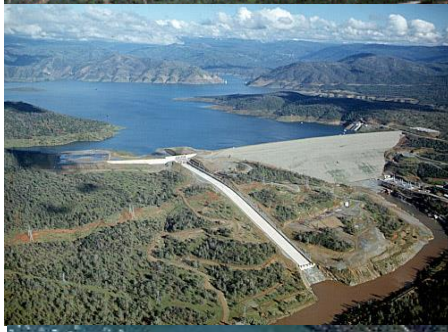

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4 Key reasons for passage

1. The vast majority of historic habitat is upstream of impassable dams

2. **Managing salmon on the valley floor has had limited success**

- Extensive restoration efforts have not recovered fish
- Hatchery effects are significant
- Limited isolation of spring-run from other Chinook salmon = hybridization, genetic introgression

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4 Key reasons for passage

1. The vast majority of historic habitat is upstream of impassable dams
2. Managing salmon on the valley floor has had limited success
3. **Warm water and climate change is making salmon management on the valley floor even more difficult**

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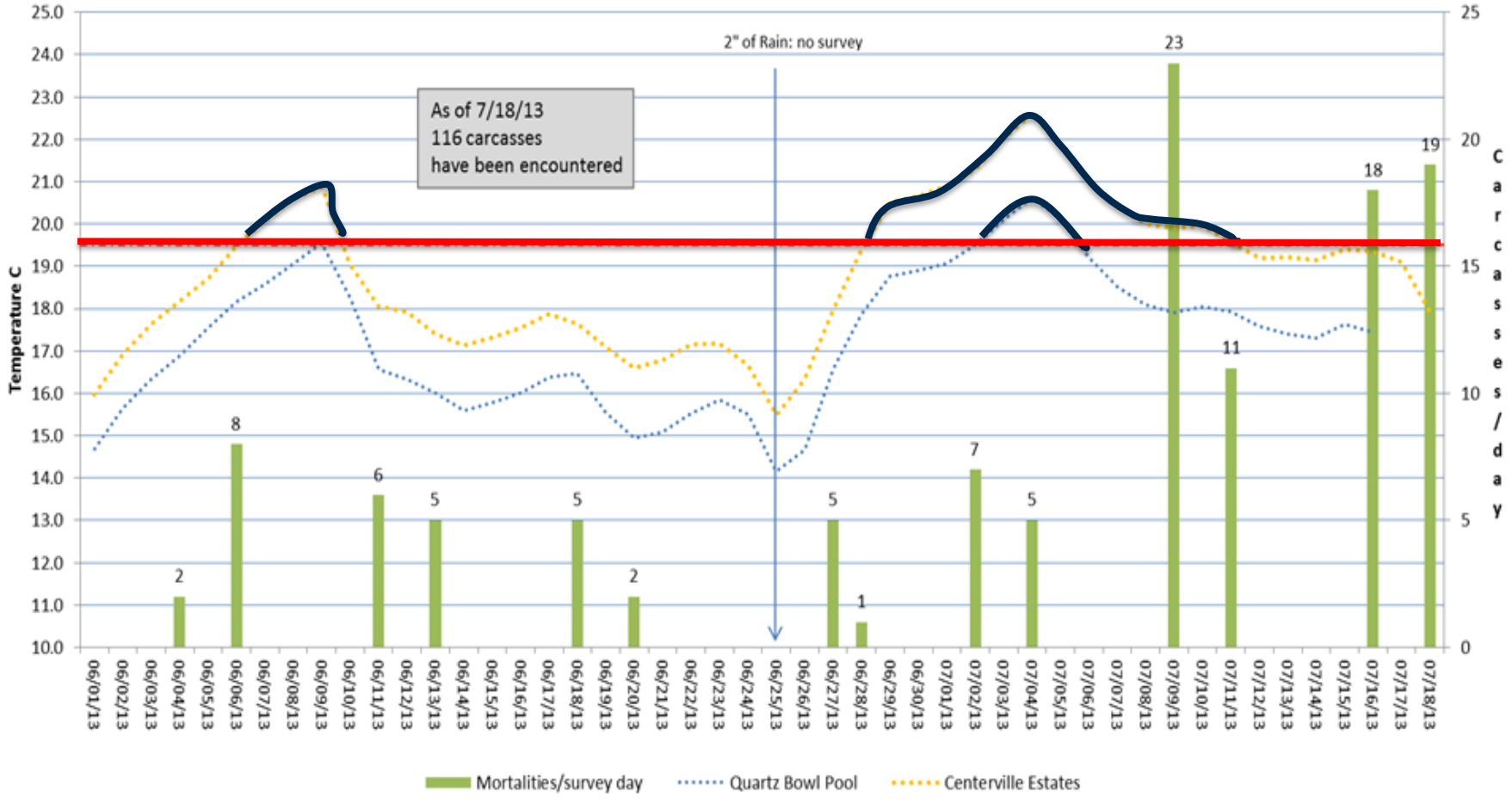
Butte Creek Water Temperature



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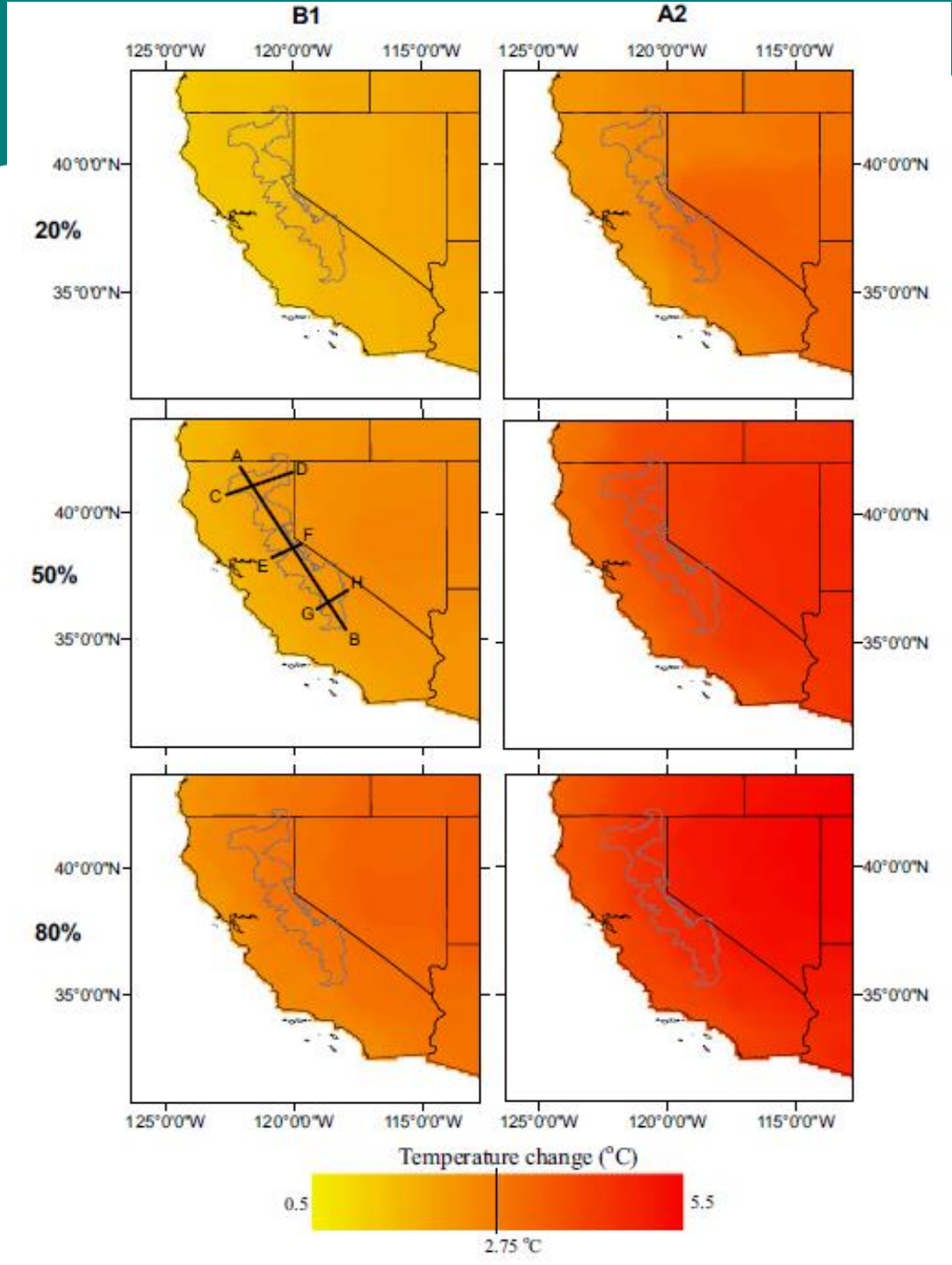
Climate Change: Air Temperature Rising in the Central Valley means that water temperature will rise



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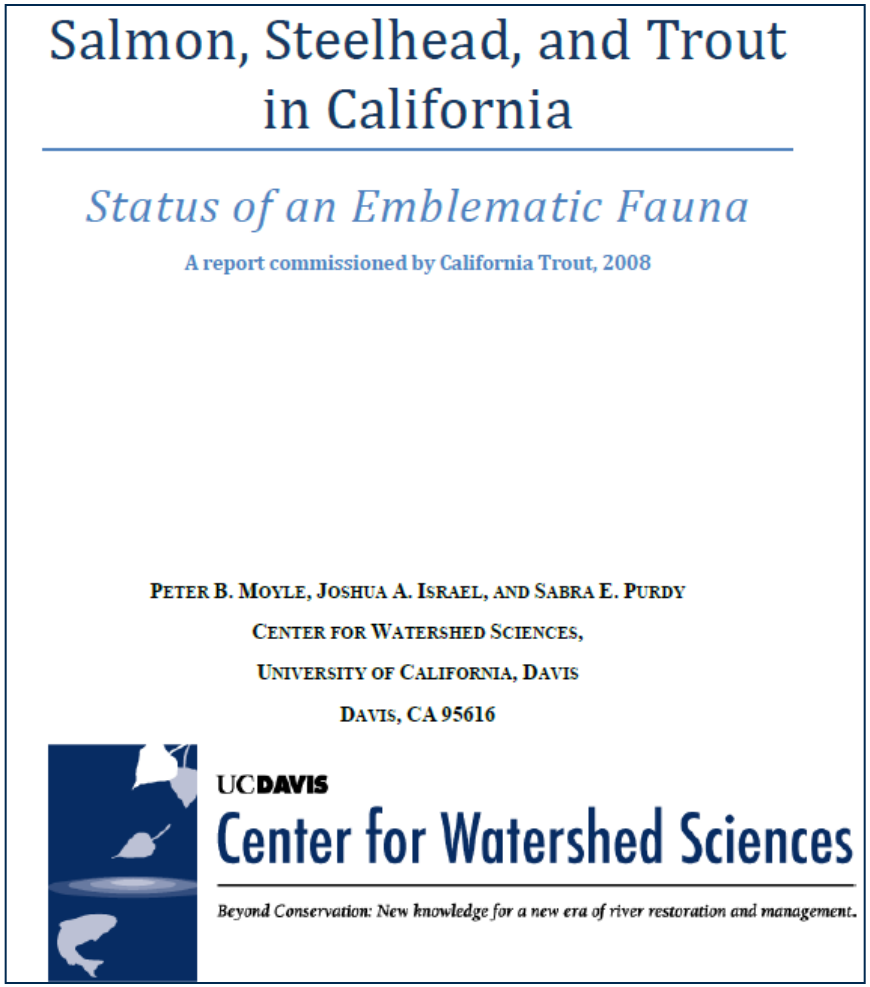
Recovery Perspective on Passage



Salmon, Steelhead, and Trout in California

Status of an Emblematic Fauna

A report commissioned by California Trout, 2008

PETER B. MOYLE, JOSHUA A. ISRAEL, AND SABRA E. PURDY
CENTER FOR WATERSHED SCIENCES,
UNIVERSITY OF CALIFORNIA, DAVIS
DAVIS, CA 95616

UCDAVIS
Center for Watershed Sciences

Beyond Conservation: New knowledge for a new era of river restoration and management.

From Moyle *et al*. 2008:

"…Chinook will need to get higher in the watersheds than current infrastructure (dams) allows. Barrier removal or some kind of trap and truck operation will thus likely be a major part of spring Chinook conservation in the next century."

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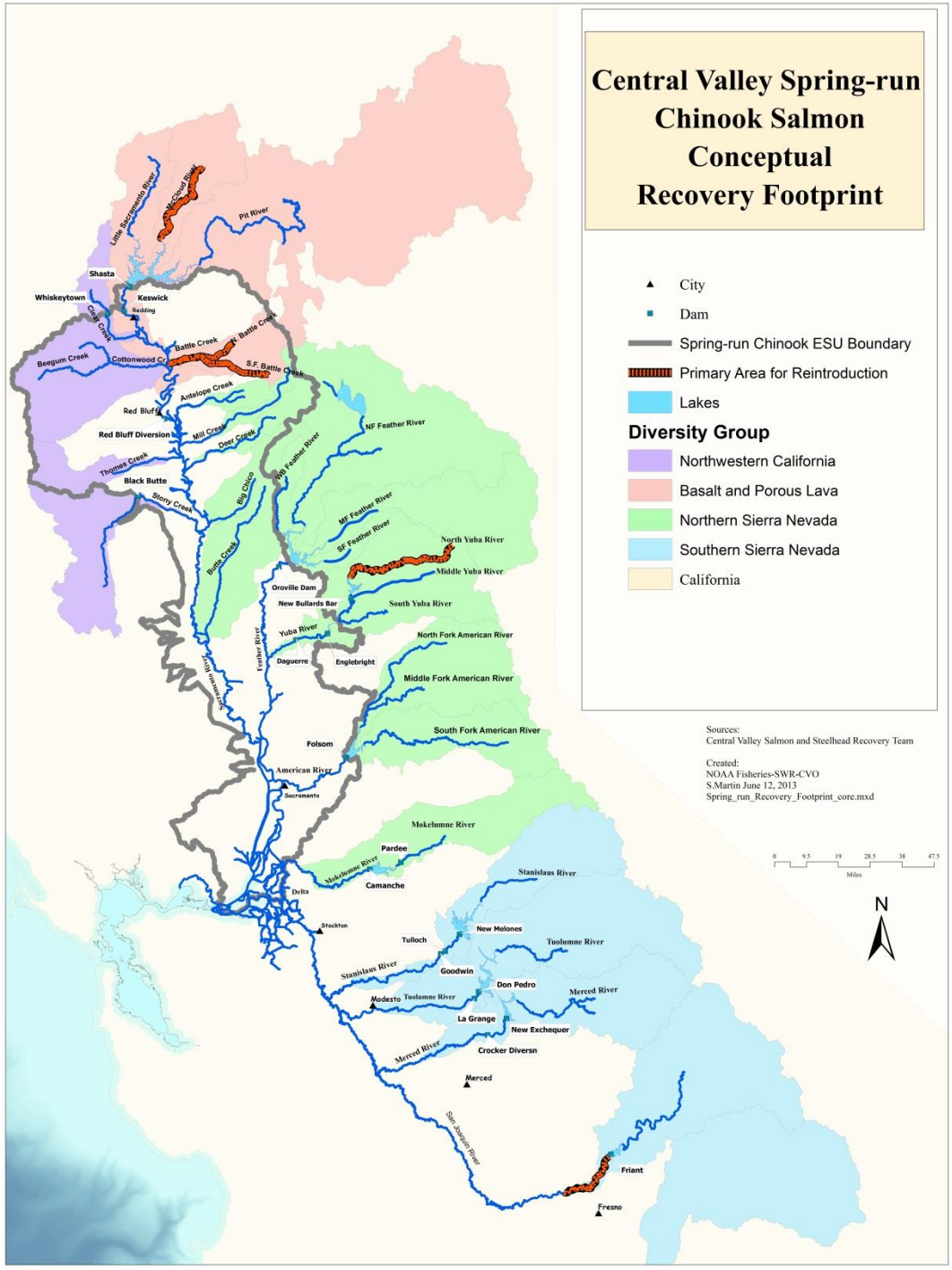
Where should reintroductions occur?



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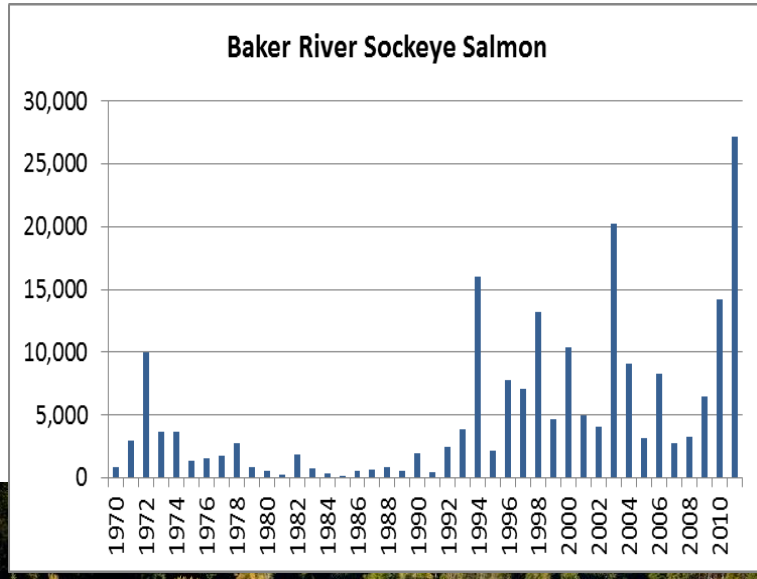
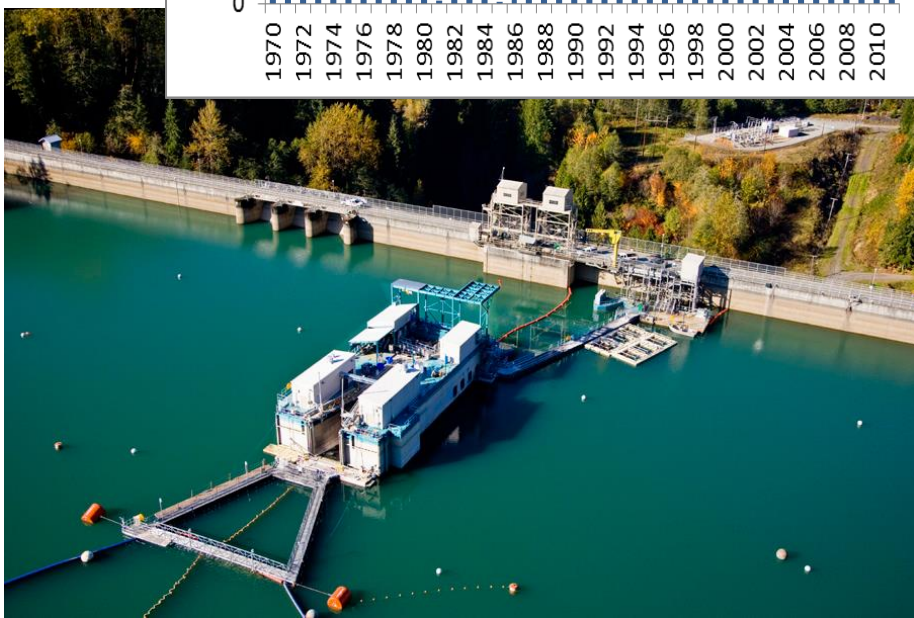
Feasibility: Can it be done?

- Costly
- Technically feasible
- Widely applied in Washington and Oregon
- Cultural feasibility: will require a change in conventional among restoration specialists





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So, why here and why now?

1. Habitat above dams is extensive and is cold enough to buffer from climate change
2. Production potential of historic habitat is high
3. Reintroduction takes time
   - Habitat studies and modeling
   - Pilot efforts
   - Engineering
   - Capitol expense
4. Extinction is inevitable without reintroduction

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