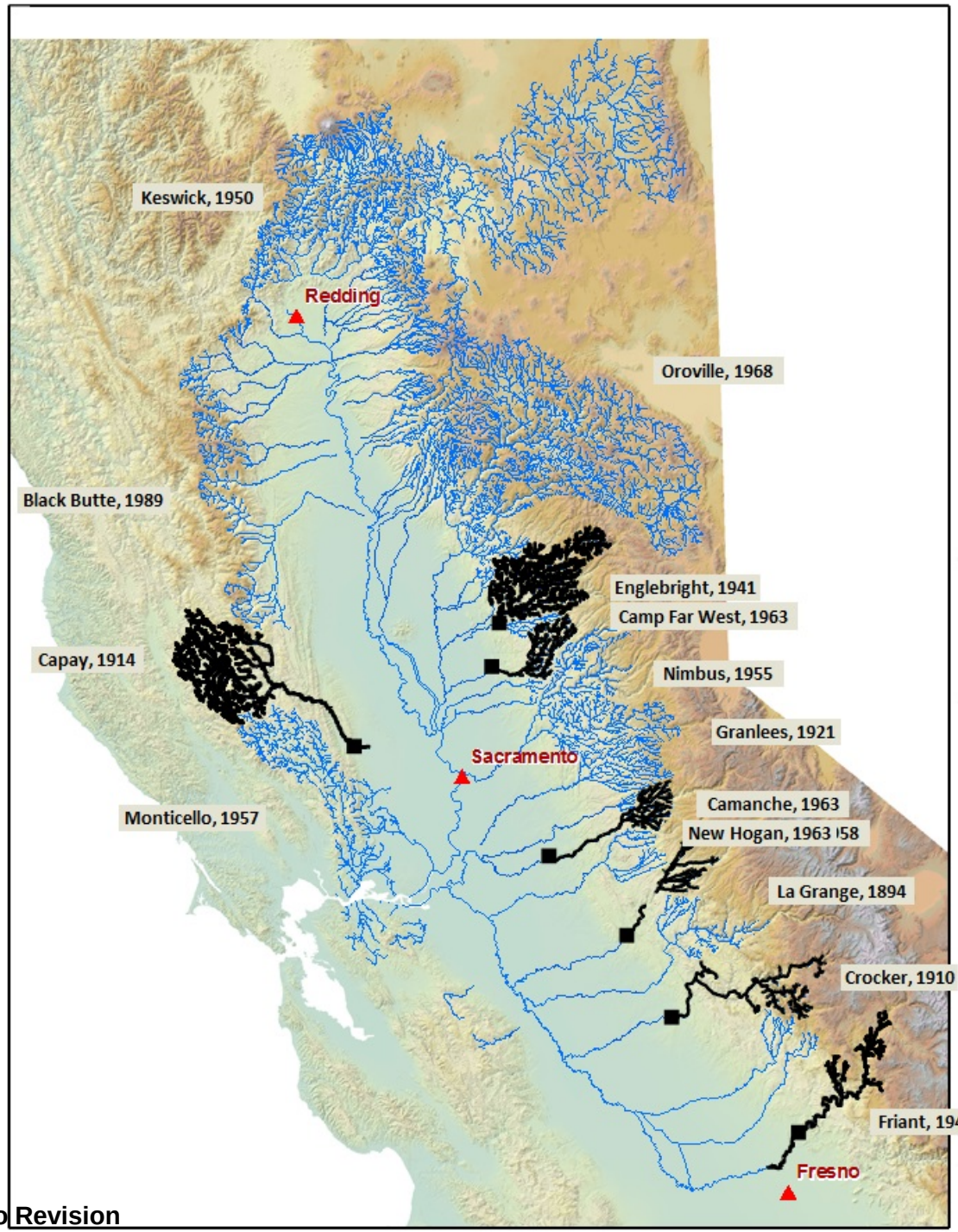


Central Valley Salmon and Steelhead Recovery: why habitat expansion?

- **Managing salmon and steelhead on the valley floor has had limited success.**
- **Climate change will make salmon management on the valley floor even more difficult.**
- **Recovery criteria cannot be met without access to historical habitat.**
- **The vast majority of historic habitat is upstream of impassable dams.**

NOAA FISHERIES SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

How Central Valley Dams have affected anadromous steelhead habitat over time

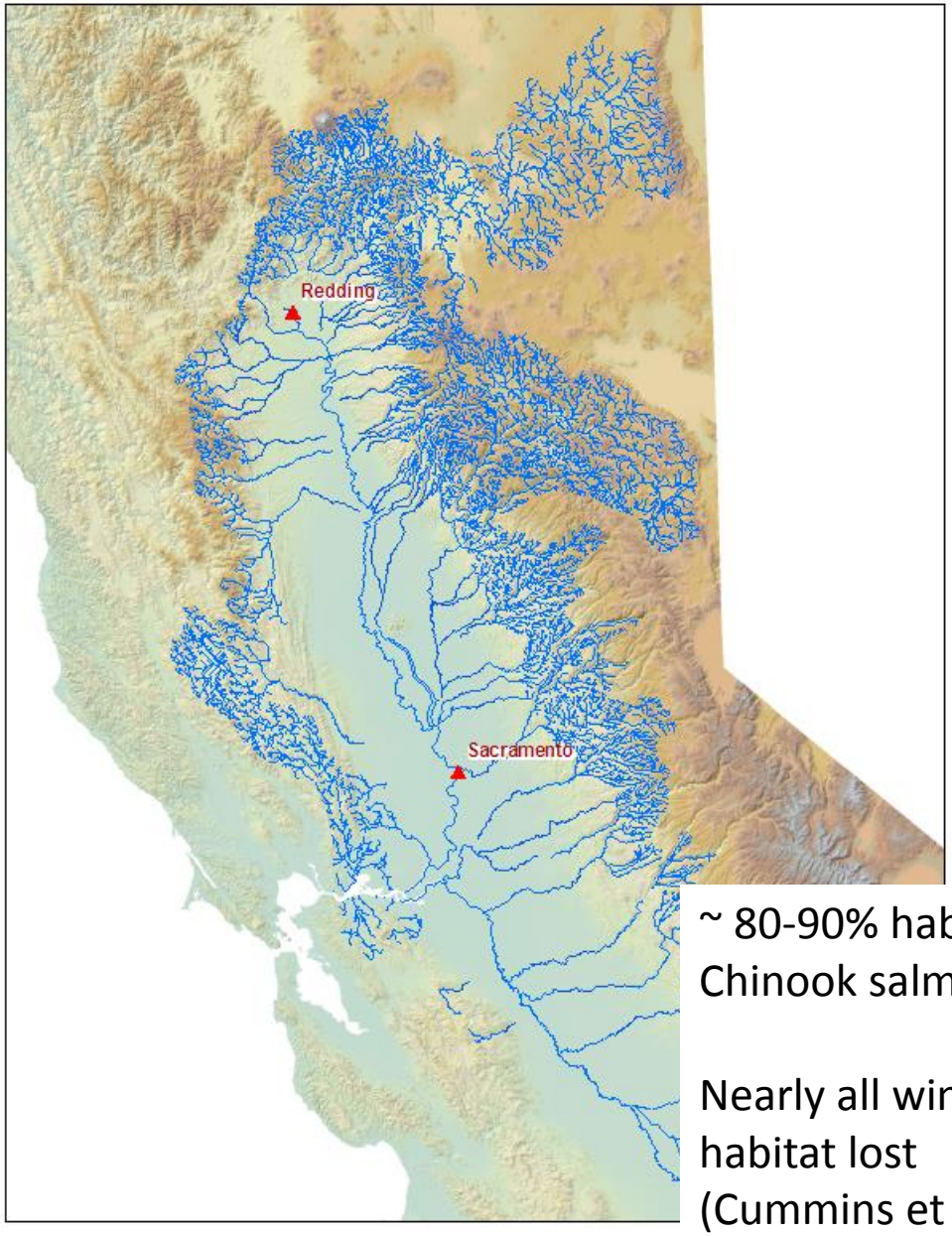


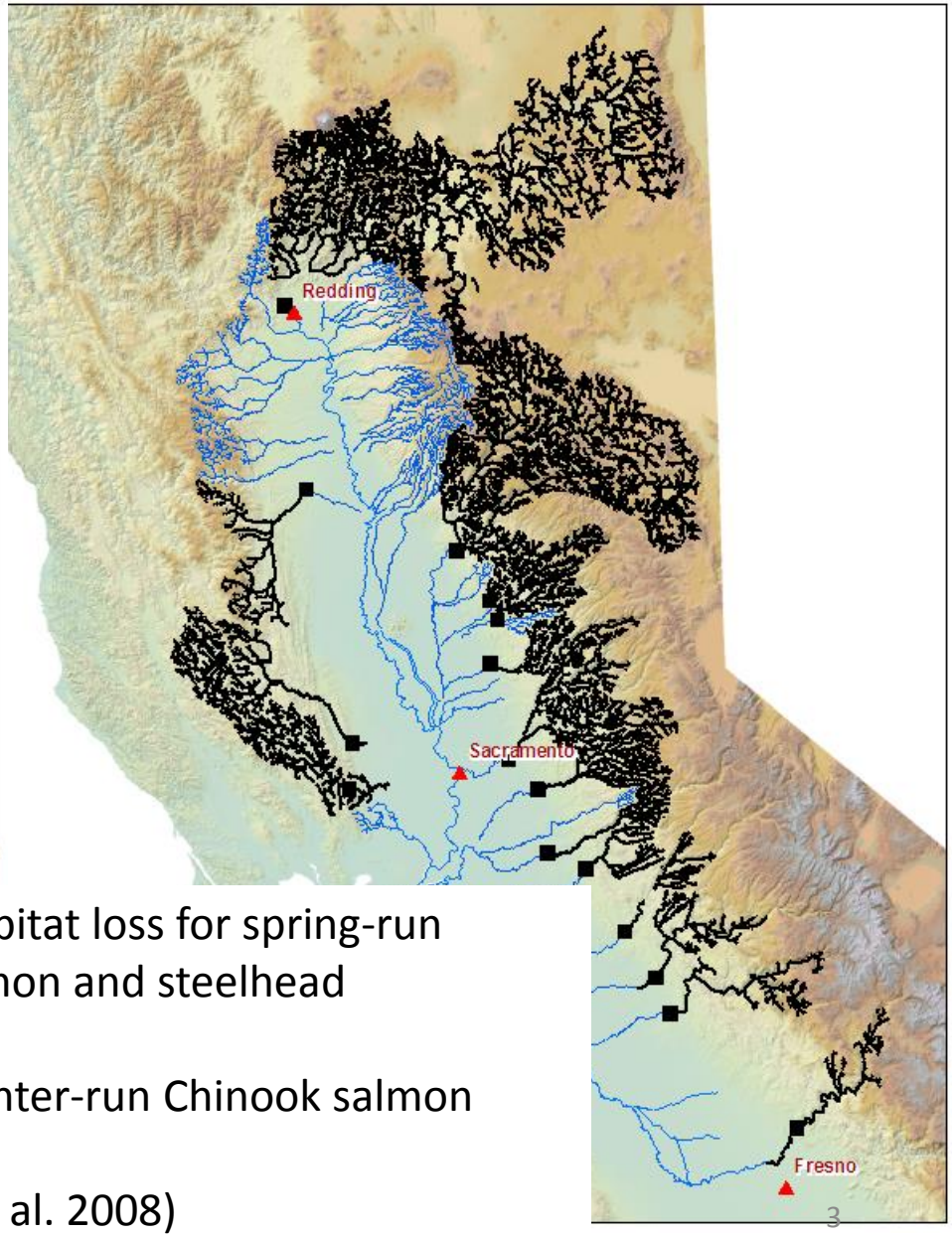
Source:
Lindley et al.2006: Historical population structure of Central Valley steelhead and its alteration by dams

Model of suitable historical habitat for steelhead

Then

Now





~ 80-90% habitat loss for spring-run Chinook salmon and steelhead

Nearly all winter-run Chinook salmon habitat lost
(Cummins et al. 2008)

Habitat Loss & Species Viability

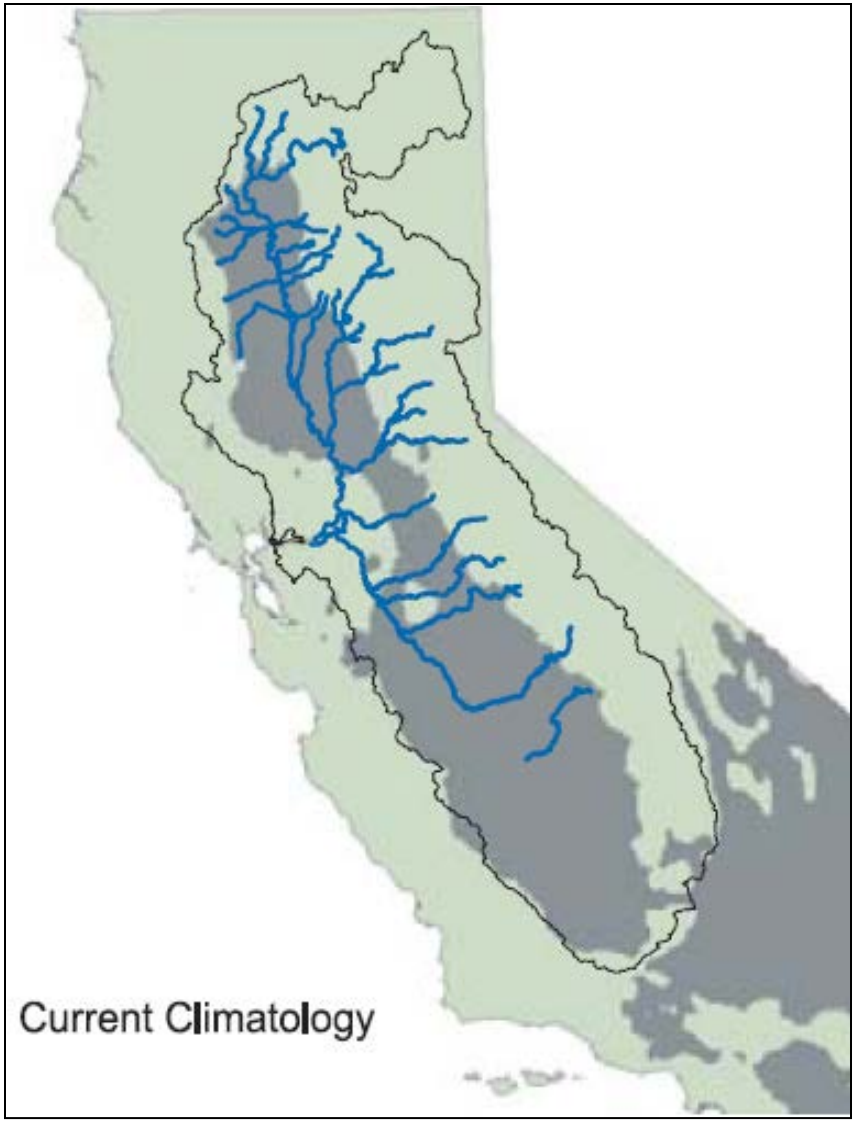
- The ability to spread risk and maximize future potential for adaptation was lost.
- **CV spring-run Chinook salmon**: 15 of the 18-19 historical pops. are extinct.
- **CV winter-run Chinook salmon**: all 4 historical pops. extinct (within their historical spawning range).
- **CV steelhead** mod. to high risk of extinction (hatchery influenced steelhead pops. are at high risk of extinction). “There is no evidence that there are viable pops. anywhere in the CV.”

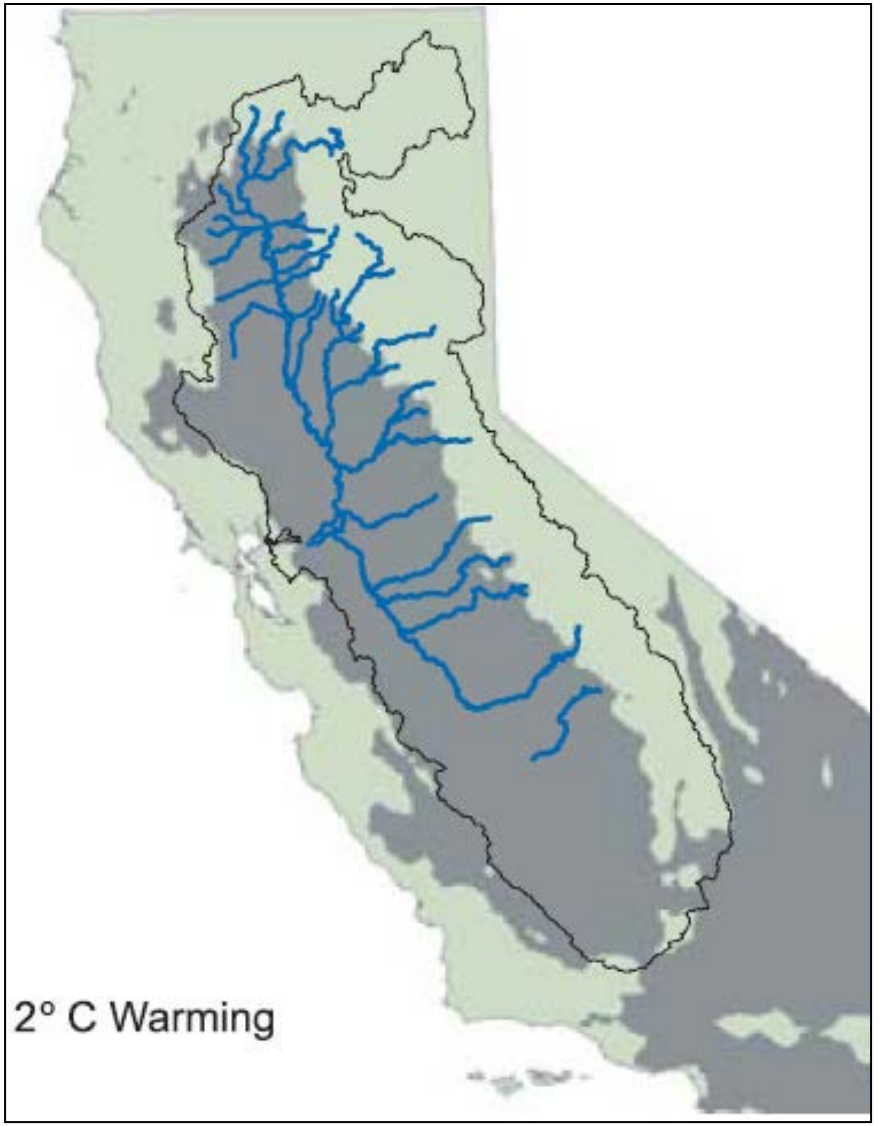
Climate Change Predictions: Freshwater Streams

- Increased temperatures
  - Habitat contraction
  - Delayed spawning
  - Thermal migration barriers
- Change in magnitude and timing of runoff

— Total precipitation decline, less snow fall, more frequent & severe drought, increased frequency of scouring floods

  — reduced productivity (loss of eggs)
  — Smolt migration difficulty
  — Reduced living space, increased competition & predation





Lindley et al. 2007

Mean August air temp > 25 °C

Historical distribution of spring-run Chinook salmon

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Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin

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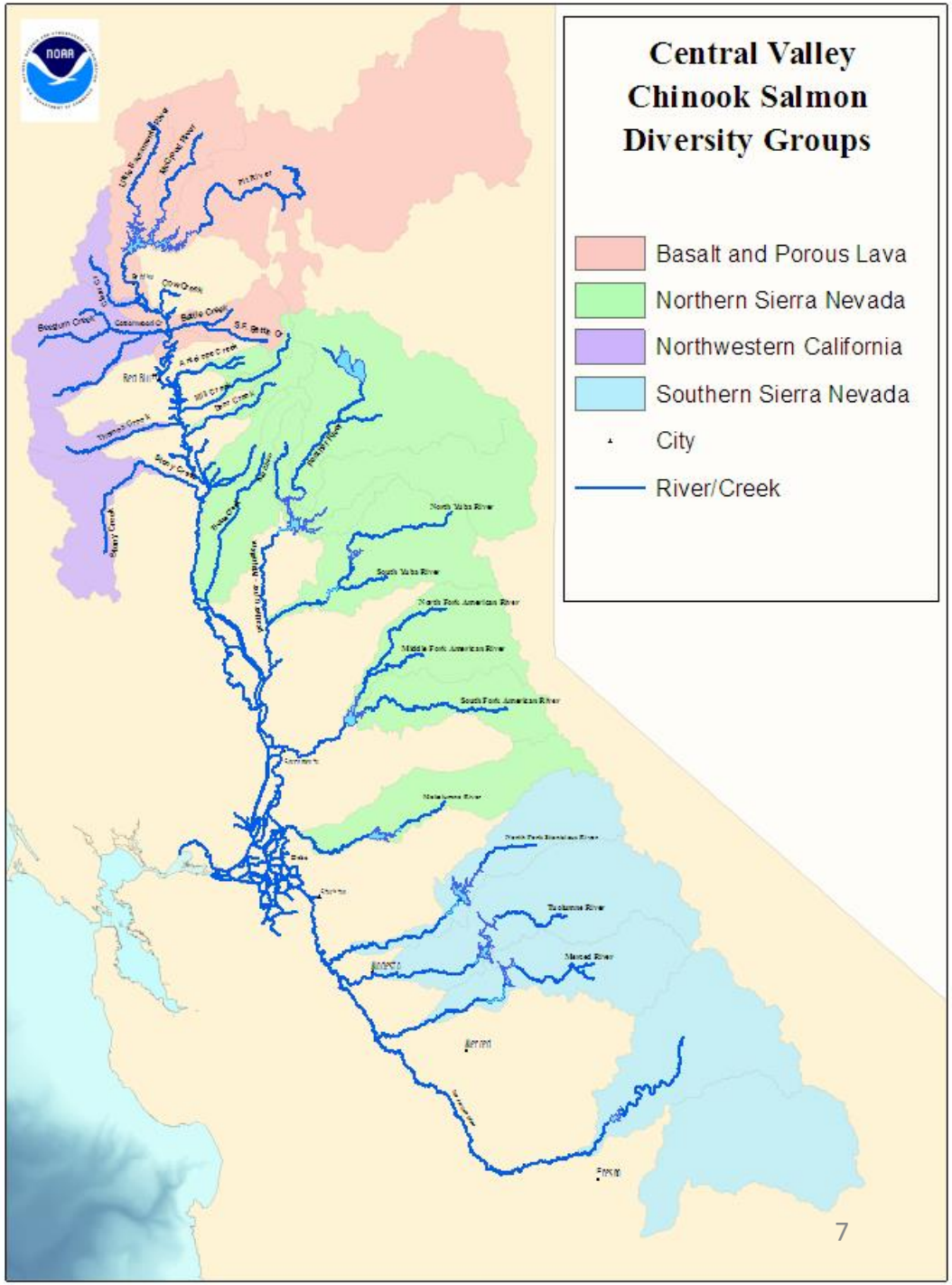
ABSTRACT

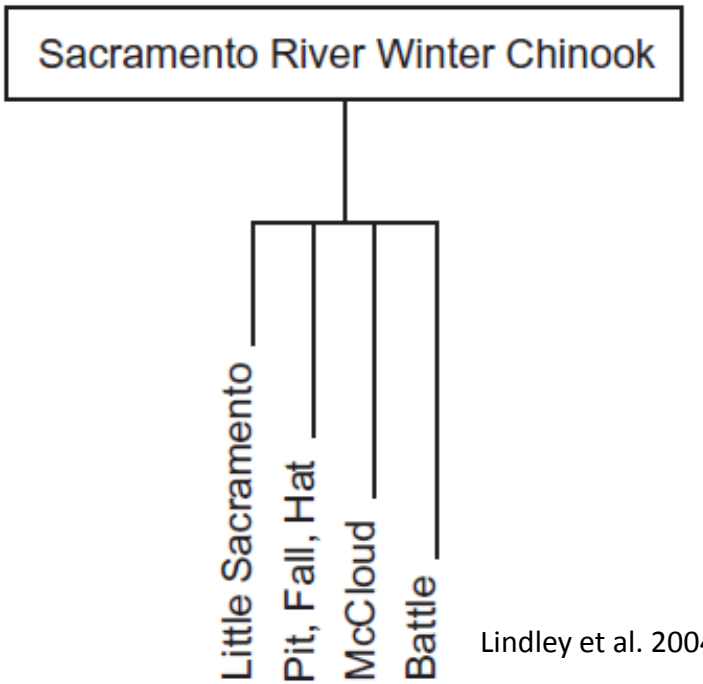
Protected evolutionarily significant units (ESUs) of salmonids require objective and measurable criteria for guiding their recovery. In this report, we develop a method for assessing population viability and two ways to integrate these population-level assessments into an assessment of ESU viability. Population viability is assessed with quantitative extinction models or criteria relating to population size, population growth rate, the occurrence of catastrophic declines, and the degree of hatchery influence. ESU viability is assessed by examining the number and distribution of viable populations across the landscape and their proximity to sources of catastrophic disturbance.

Central Valley spring-run and winter-run Chinook salmon ESUs are not currently viable, according to the criteria-based assessment. In both ESUs, extant populations may be at low risk of extinction, but these populations represent a small portion of the historical ESUs, and are vulnerable to catastrophic disturbance. The winter-run Chinook salmon ESU, in the extreme case, is represented by a single population that spawns outside of its historical spawning range. We are unable to assess the status of the Central Valley

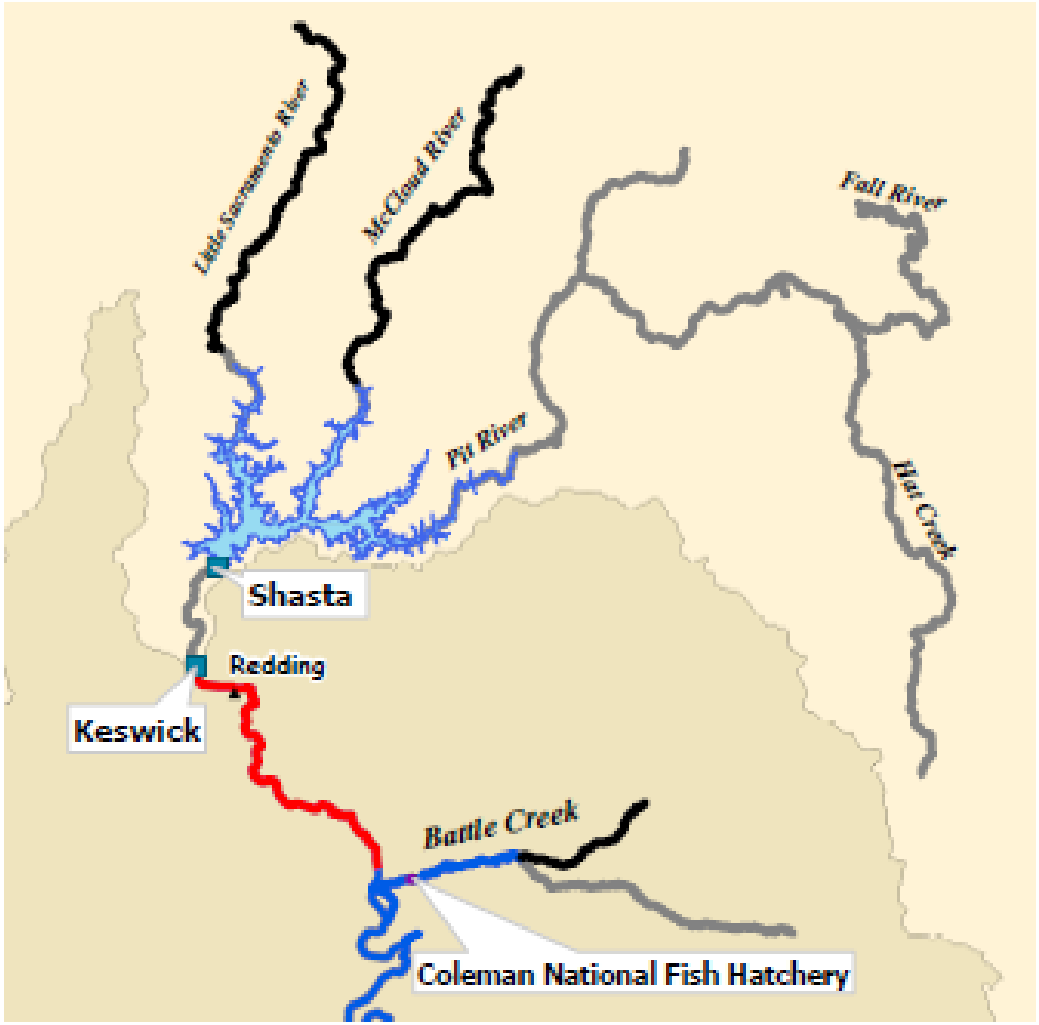


Recovery: At least 2 viable populations per diversity group

Winter-run Chinook Salmon

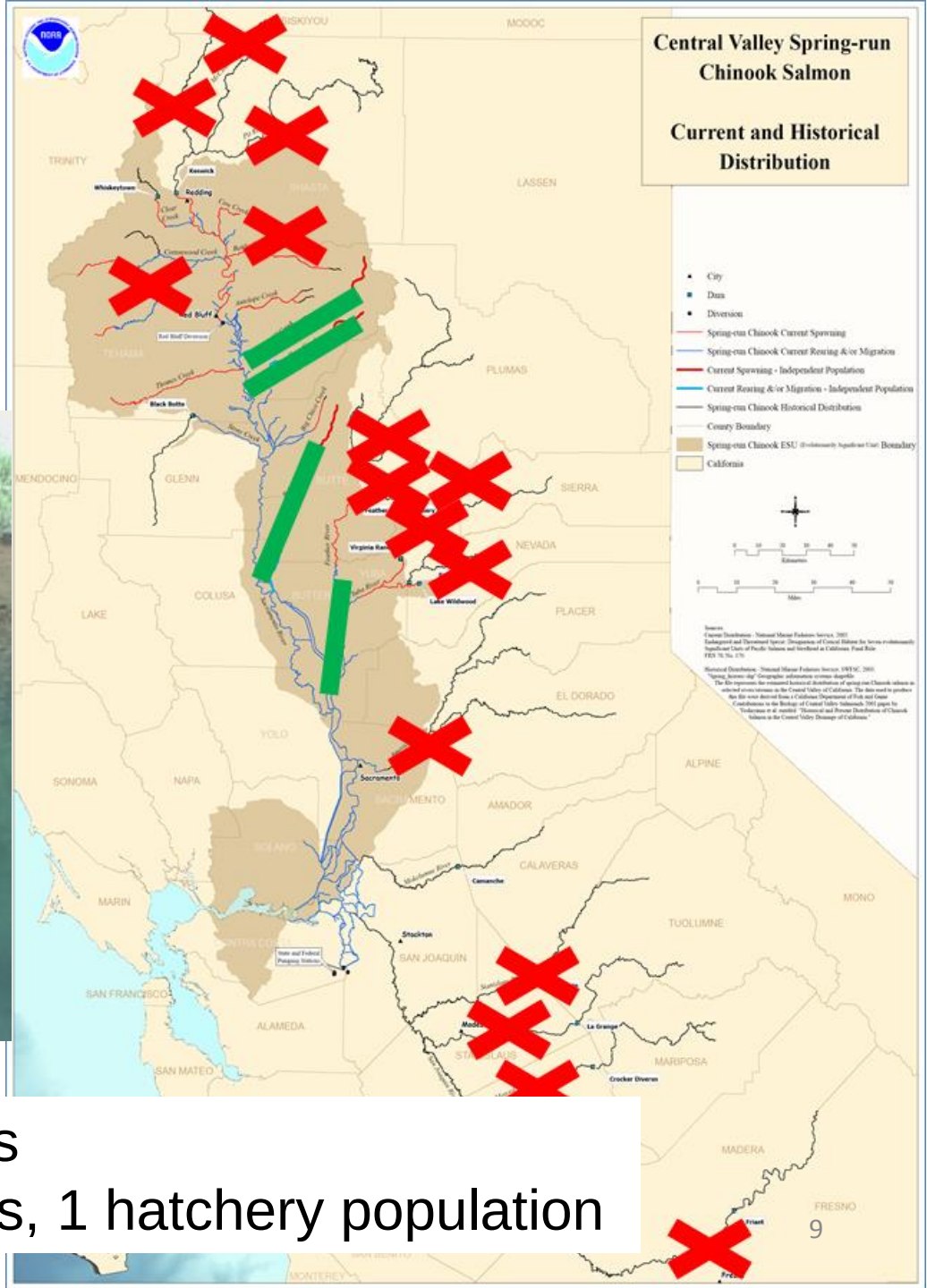


Lindley et al. 2004



Diversity Group	Current Core 1 Populations	# of Viable Pop's Needed	Target Pop's for Reintroduction
Basalt	Sacramento River	3	McCloud River Battle Creek

Spring-run Chinook Salmon



- Historically: ~18 populations
- Currently: 3 wild populations, 1 hatchery population

Issues with Reintroductions in the CV

- System reoperations may be required;
- Tendency to maintain status quo;
- Feasibility of volitional passage ;
- Costs and sustainability of non-volitional passage;
- Donor source populations;
- Use of hatchery stocks to initiate reintroductions;
- ESA liability that follows fish (angler concerns, land management, etc.)

Regulatory Components of a Reintroduction