Winter-run Chinook Salmon: Reintroduction Above Shasta Dam

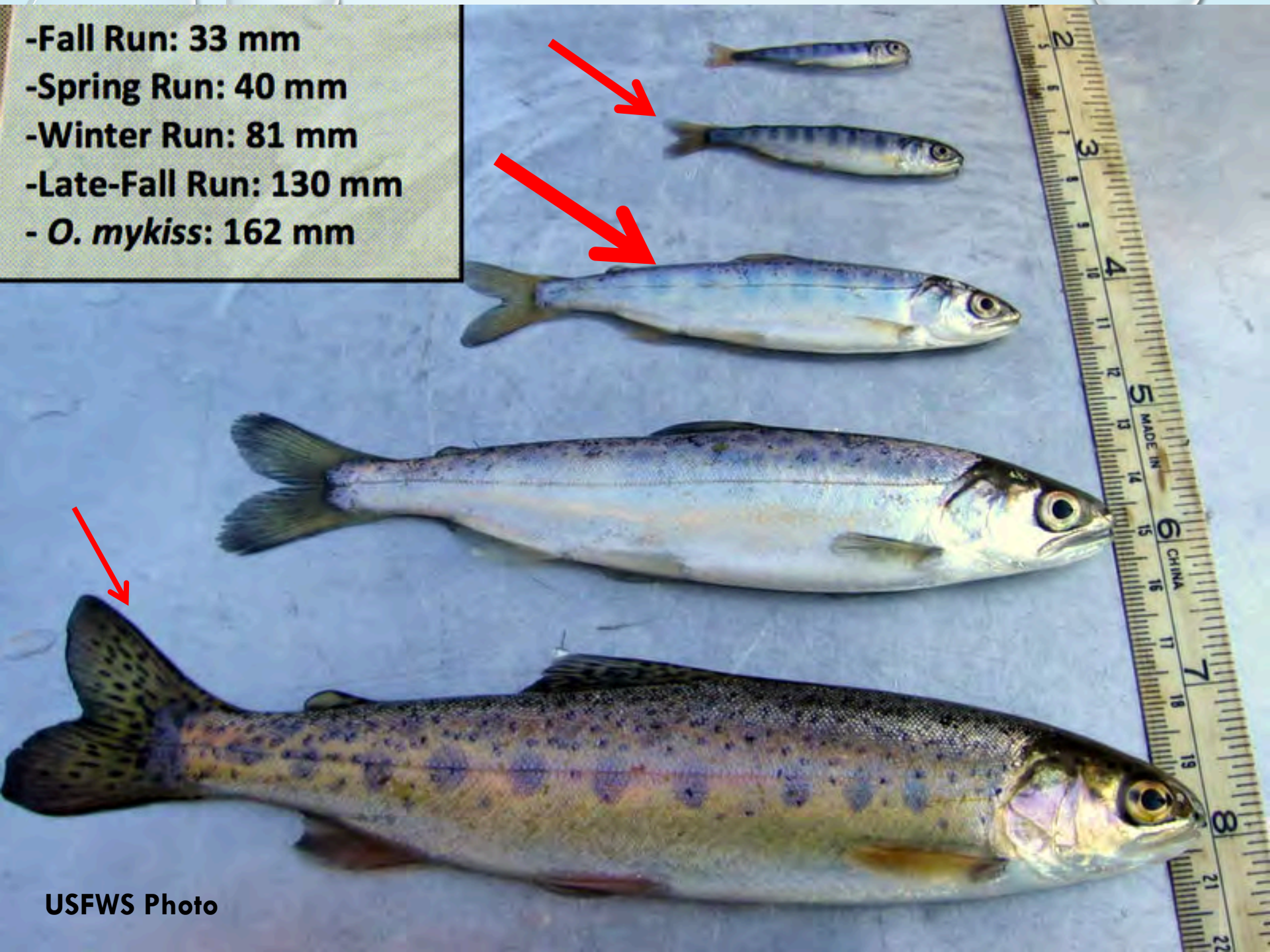
NATIONAL MARINE FISHERIES SERVICE

CENTRAL VALLEY AREA OFFICE

NOAA FISHERIES SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PILOT PROJECT PURPOSE

Evaluate feasibility of passage for ESA-listed Chinook over Shasta Dam to make a well informed decision about initiating a long-term fish passage program.

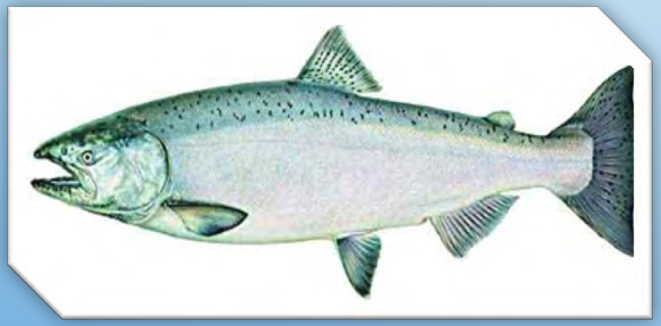

-Fall Run: 33 mm
-Spring Run: 40 mm
-Winter Run: 81 mm
-Late-Fall Run: 130 mm
- O. mykiss: 162 mm
USFWS Photo

Locations where Central Valley dams block access to anadromous salmonid spawning and rearing habitat

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

SHASTA REINTRODUCTION – BACKGROUND

- In 2014 NMFS issued a Recovery Plan for Central Valley salmon and steelhead
- For listed salmon and steelhead in Central Valley, recovery criteria cannot be met without re-establishing populations into historical habitats.
- McCloud population designated as **"*primary*"** (top priority for reintroduction) for SR winter-run Chinook Salmon.

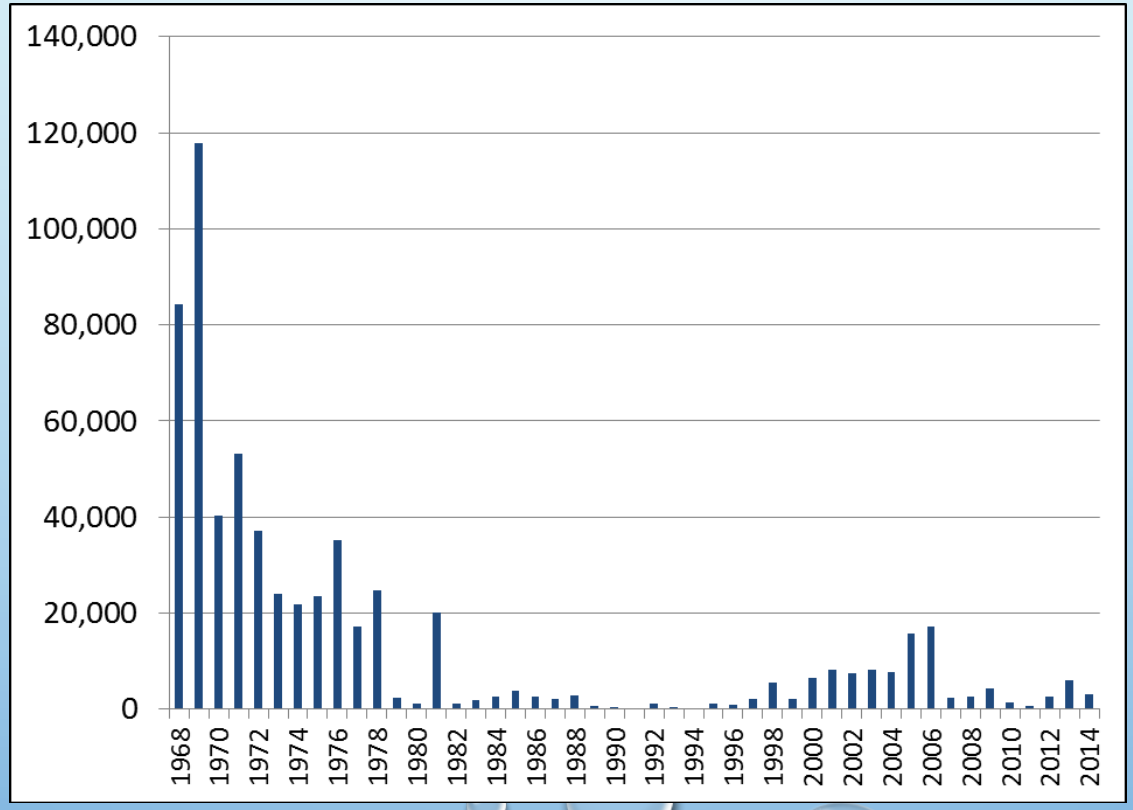


WINTER-RUN CHINOOK OVERVIEW

- Winter-run Chinook historically occupied upper Sacramento River tributaries which drained large areas of fractured basalt and lava: McCloud, upper Sacramento, and Pit Rivers, and NF Battle Creek.
- Inflow of cold water from springs made these tributaries suitable spawning habitat in the summer.
- Winter-run were cut off from historical habitats following completion of Shasta Dam in 1945 and early 1900's hydro-dams in Battle Creek.
- Introgression of all upstream populations occurred following dam completion. One population persists below Shasta Dam.

RECENT STATUS/RISK

- Winter-run declined to very low numbers in the early 1990s and the ESU was subsequently listed as endangered by California (1993) and NMFS (1994).



WINTER-RUN CHINOOK SALMON

Persistence of winter-run Chinook is entirely dependent upon cold water releases from Shasta Dam (and secondarily on Livingston Stone NFH).

All Eggs in One Basket

- 95% mortality in 2014/2015 due to increased water temperatures (low cold water volumes in Shasta R).
- Approximately 1,123 winter-run Chinook salmon from the 2014 cohort returned as spawning adults in 2017.
- Most of these were likely progeny for Livingston Stone NFH.

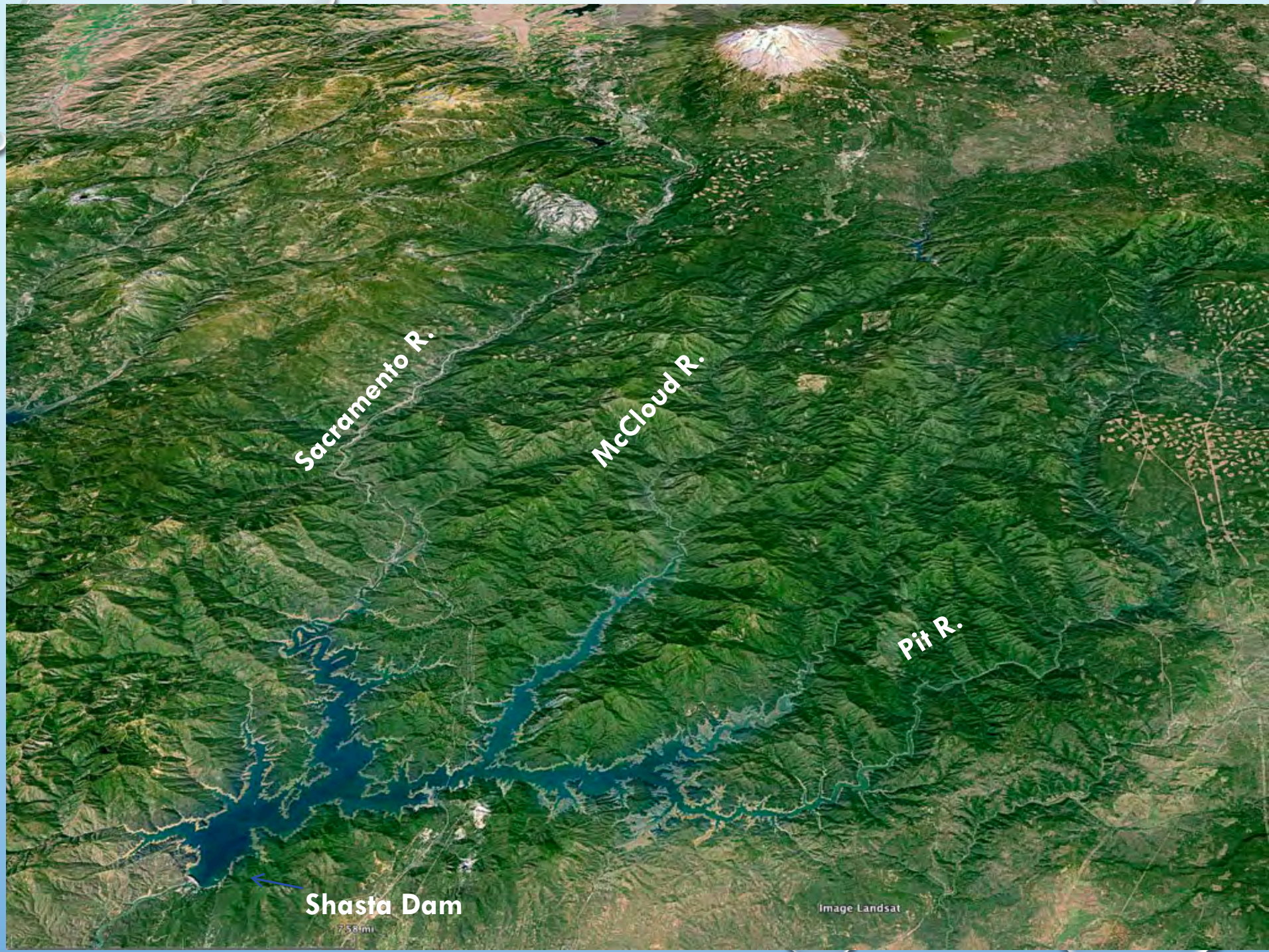
Lindley et al. 2007

Mean August air temp > 25 °C

Historical distribution of spring-run Chinook salmon

SHASTA REINTRODUCTION –BACKGROUND

- In 2009 NMFS issued a jeopardy biological opinion (BO) on Reclamation's operation of the Central Valley Project.
- In the BO, NMFS developed RPA V which requires fish passage programs at Shasta and Folsom Dams as well as a passage assessment of dams on Stanislaus River.
- The BO outlined a series of near-term and long-term actions. Near-term actions include:
  - Creation of an Interagency Fish Passage Steering Committee
  - Upstream habitat evaluation
  - Development of fish passage pilot plan followed by implementation


Sacramento R.
McCloud R.
Pit R.
Shasta Dam
Image Landsat

The McCloud River

McCloud maintains some of the best salmonid habitat in California (≈ 23 mi. in McCloud and 37 mi.≈ in Up. Sac.). Based on instream habitat conditions and water quality and quantity there is a high probability for success. Little development and the watershed is relatively resistant to impacts from drought.

WINTER-RUN CHINOOK FEMALE SPAWNER CAPACITY

River	River Length (miles	Thermally Optimal Length (miles)	Estimated Spawner Capacity (Number of Females)		
			6 m^2 Spawning Territory	10 m^2 Spawning Territory	20 m^2 Spawning Territory
Sacramento	**37.0**	**9.0**	**224**	**134**	**68**
McCloud	**23.2**	**11.6**	**3,382**	**2,029**	**1,014**

STEPWISE EVALUATION

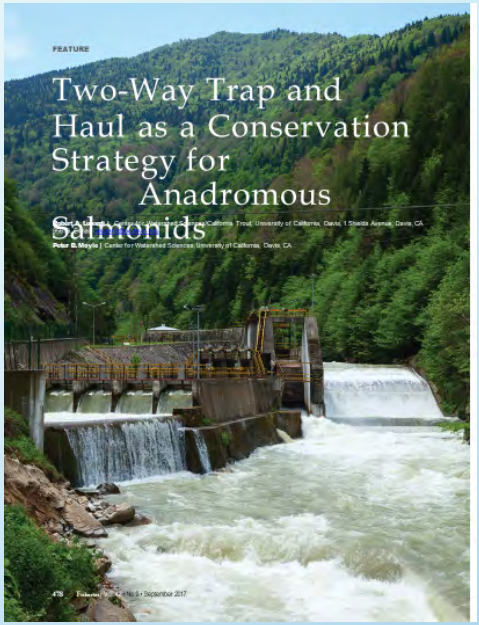
Near Term - Pilot Fish Passage Program

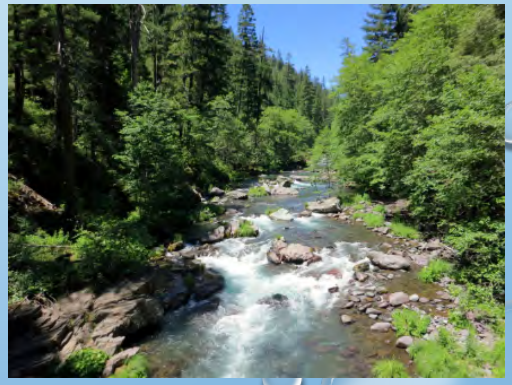
- Habitat Assessment
- Biological Productivity
- Technical Feasibility

  Pilot Juvenile Collectors

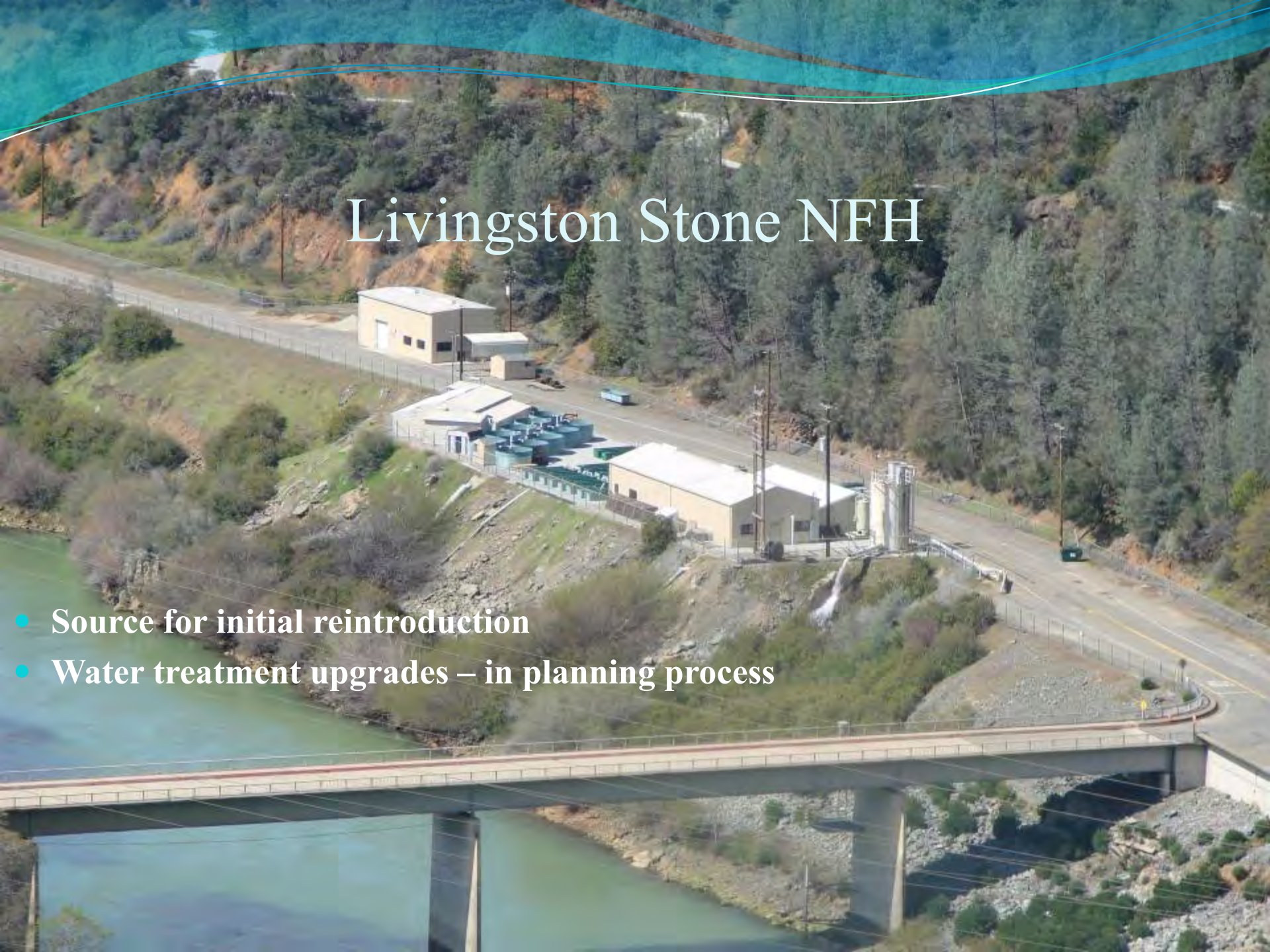
  - Head-of-reservoir
  - In-river
- Final feasibility determination: go or no-go

Long Term - Fish Passage Program



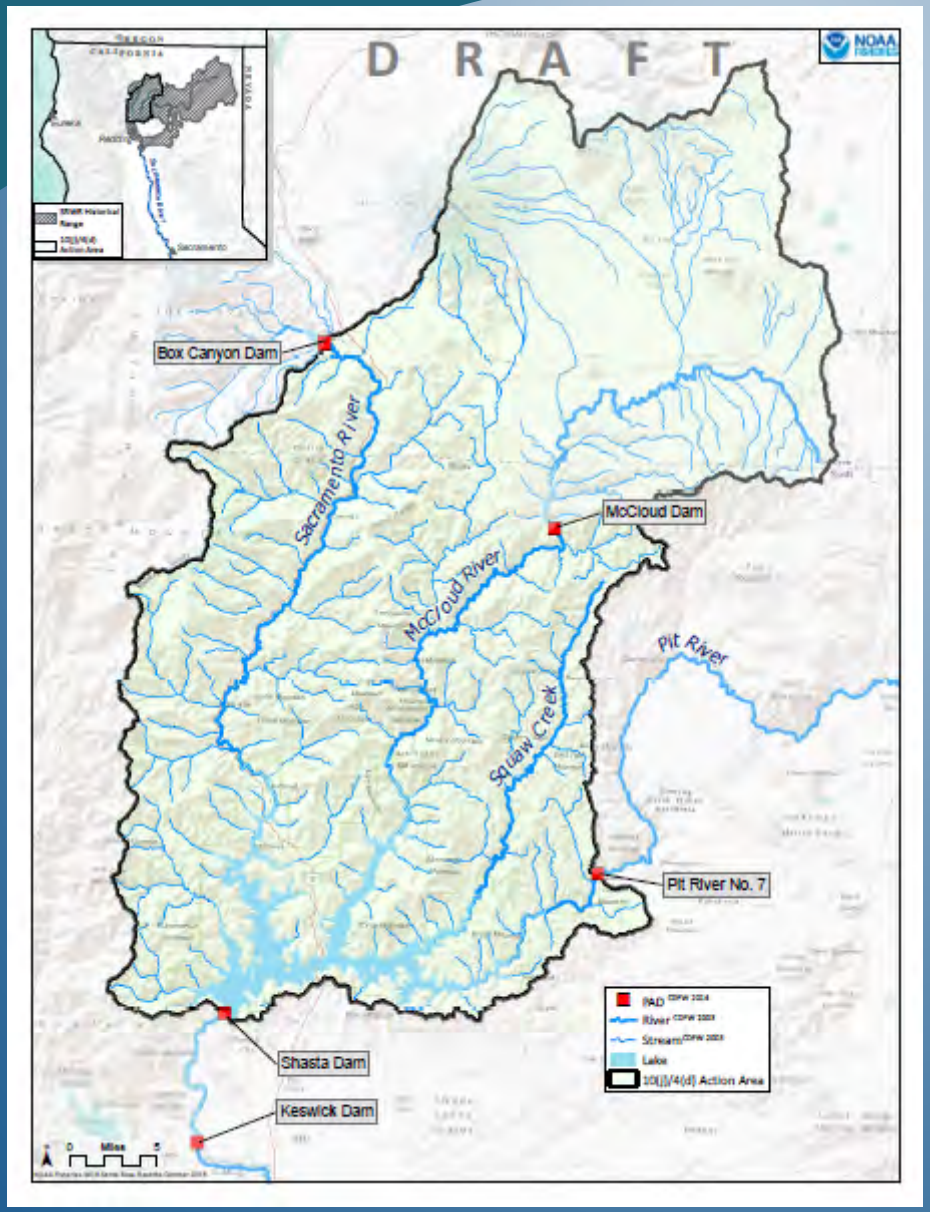


Livingston Stone NFH



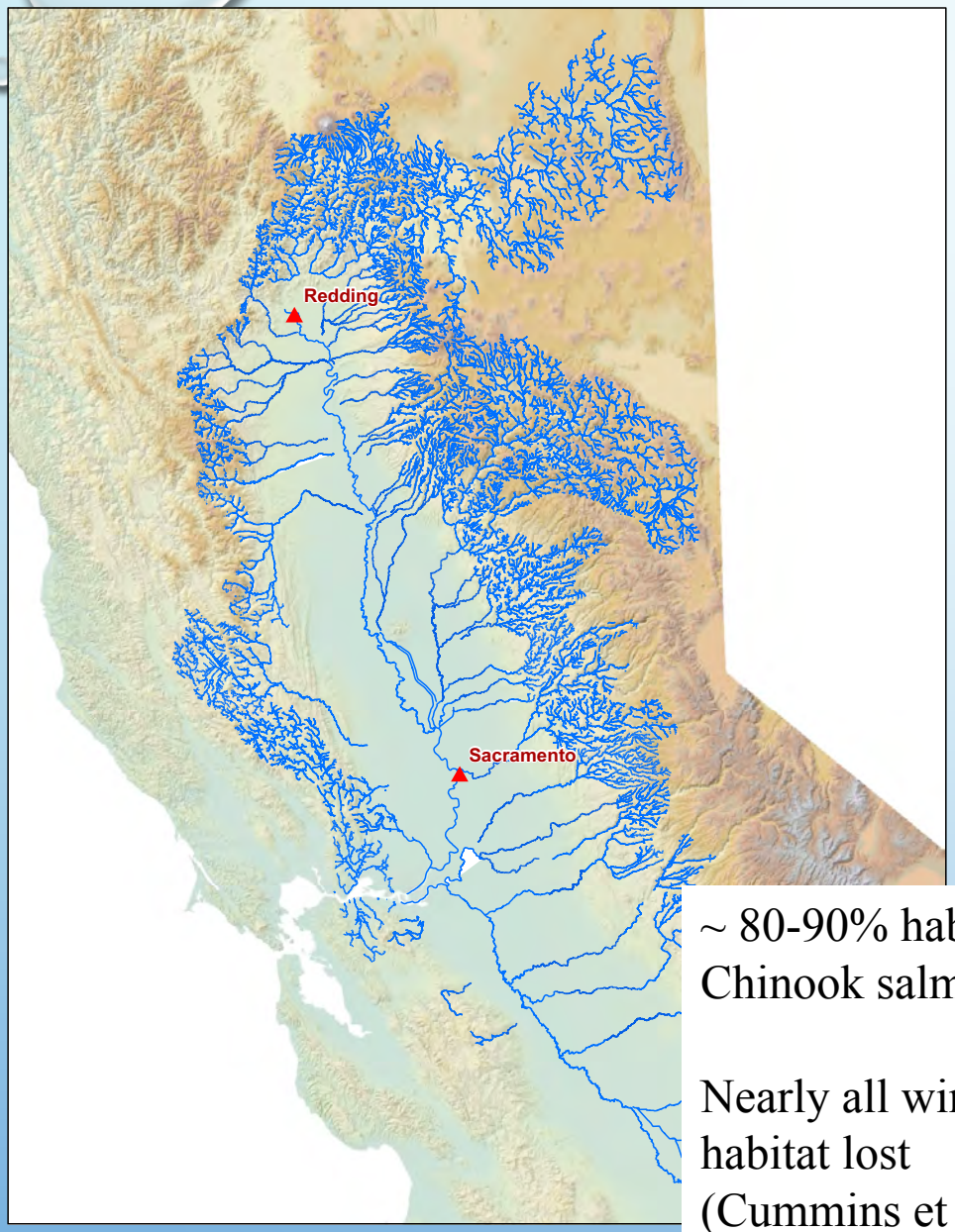
- **Source for initial reintroduction**
- **Water treatment upgrades – in planning process**

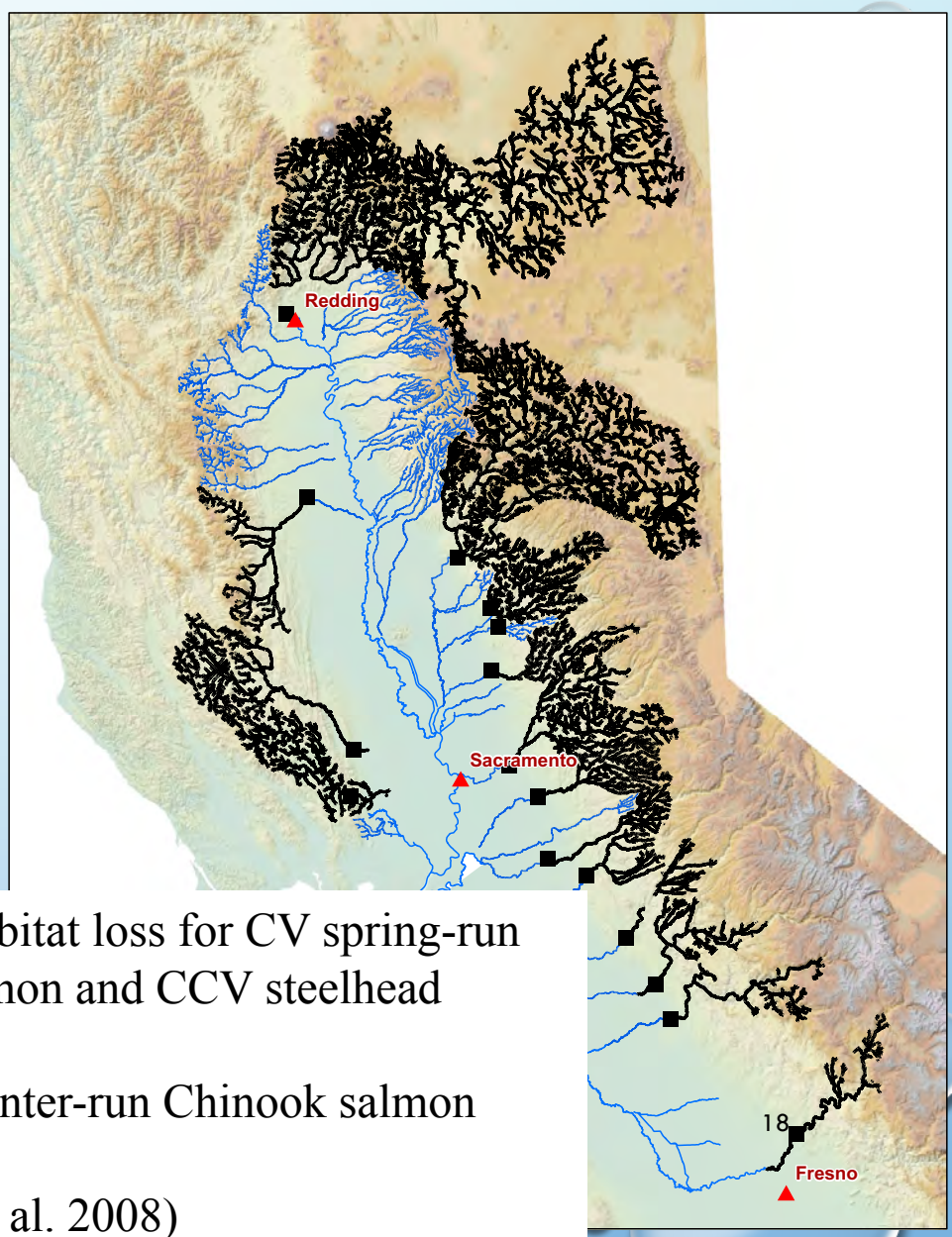
Proposed 10(j) experimental population



Then

Now





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

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

Drought Impacts – Release Temps from Keswick Dam