WHAT IS THE FUTURE OF OUR FAVORITE RIVER?

Managing for the Effects of Climate Change on the American River Ecosystem

Julie Zimmerman, Lead Scientist, The Nature Conservancy


Photo: USBR

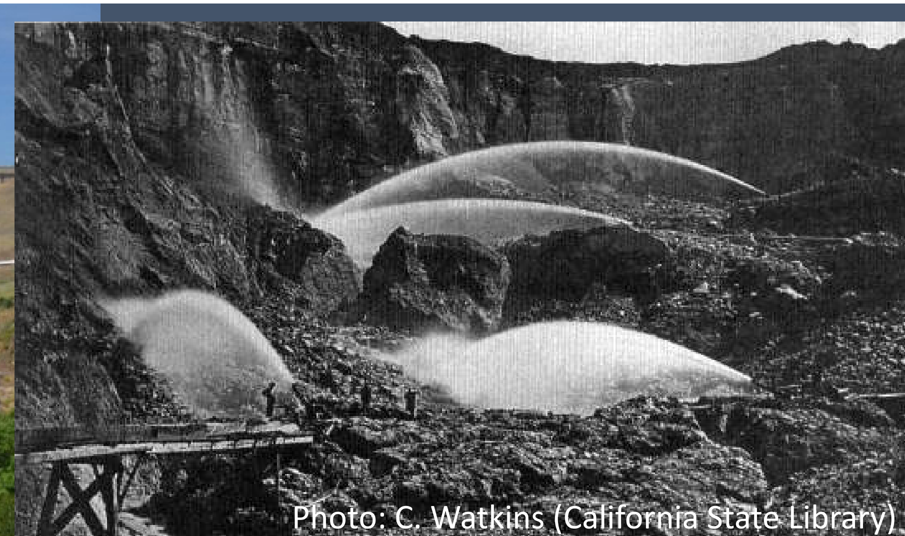
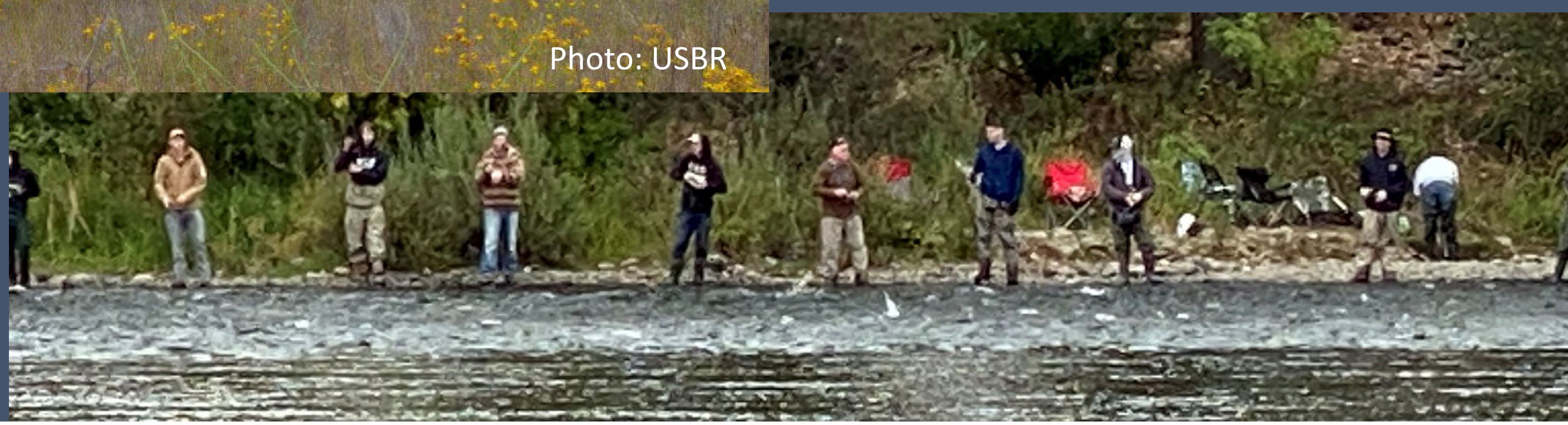


Photo: C. Watkins (California State Library)



CLIMATE CHANGE

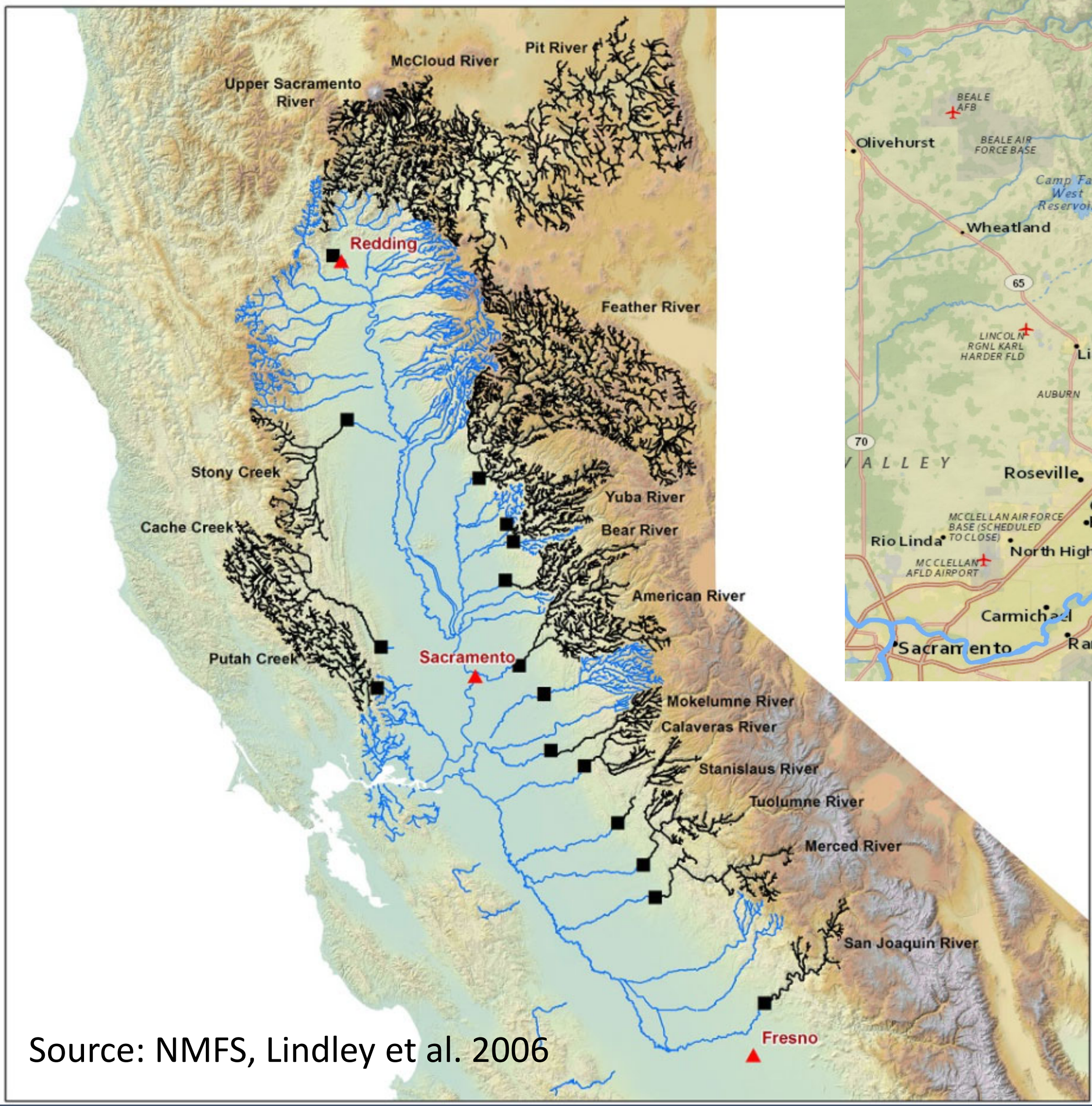
- Warmer temperatures
- Reduced snowpack
- Longer dry seasons
- Increase in floods and drought
- More intense wildfires

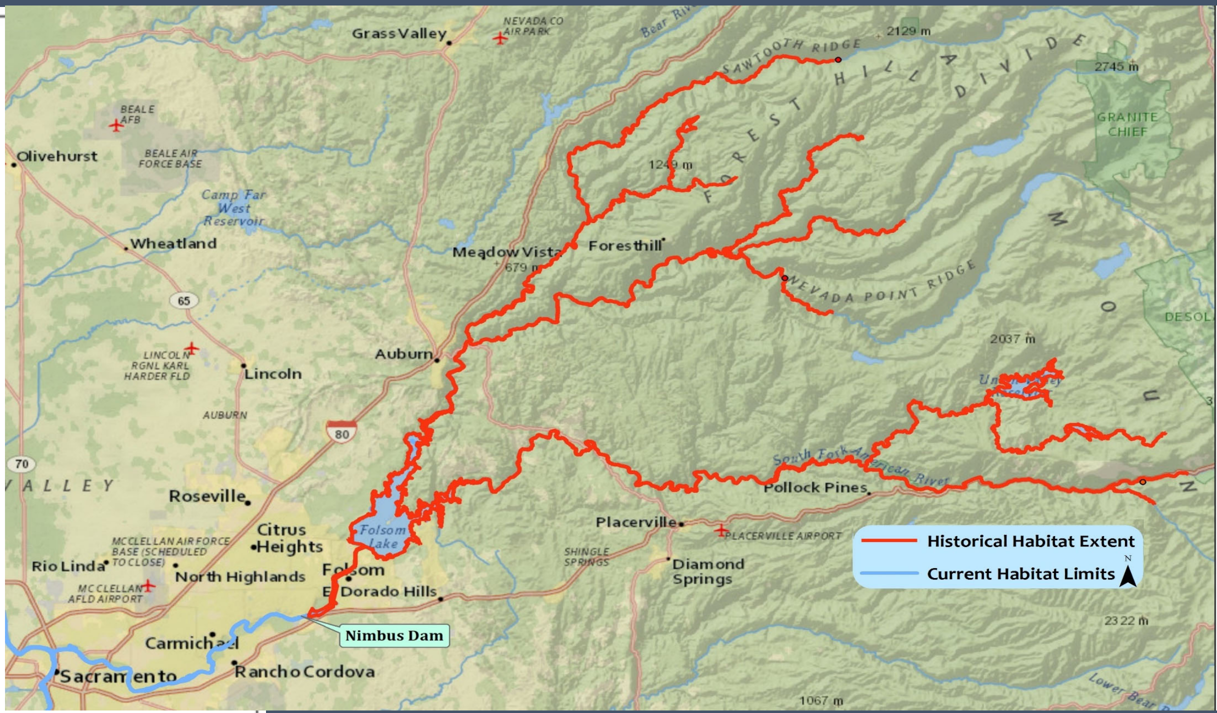
THANK YOU SPONSORS!

CLIMATE CHANGE INTERACTS WITH HUMAN MODIFICATIONS

- Habitat loss
- Water management (flow and temperature)
- Habitat condition
- Hatchery influences

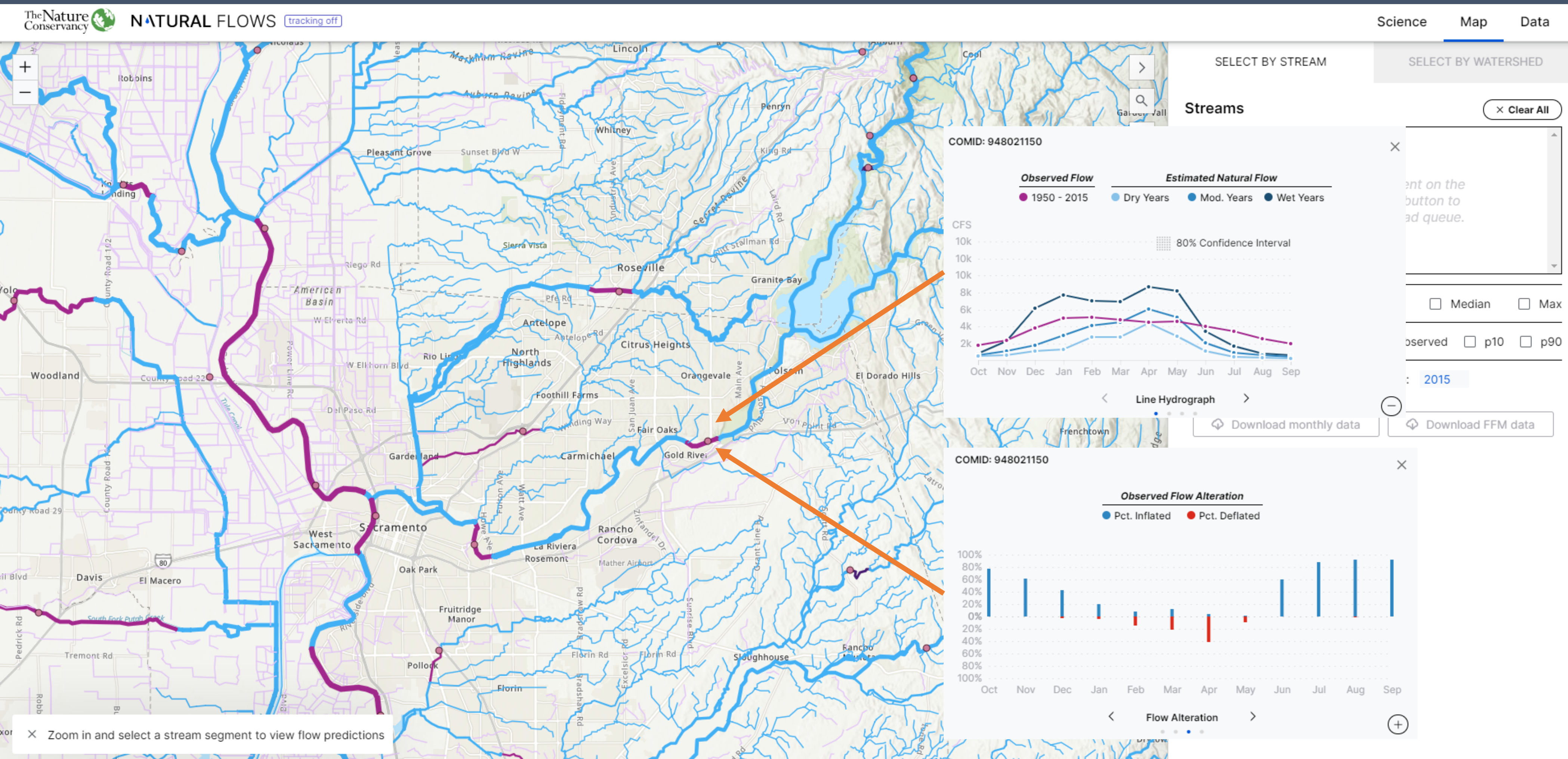
THANK YOU SPONSORS!

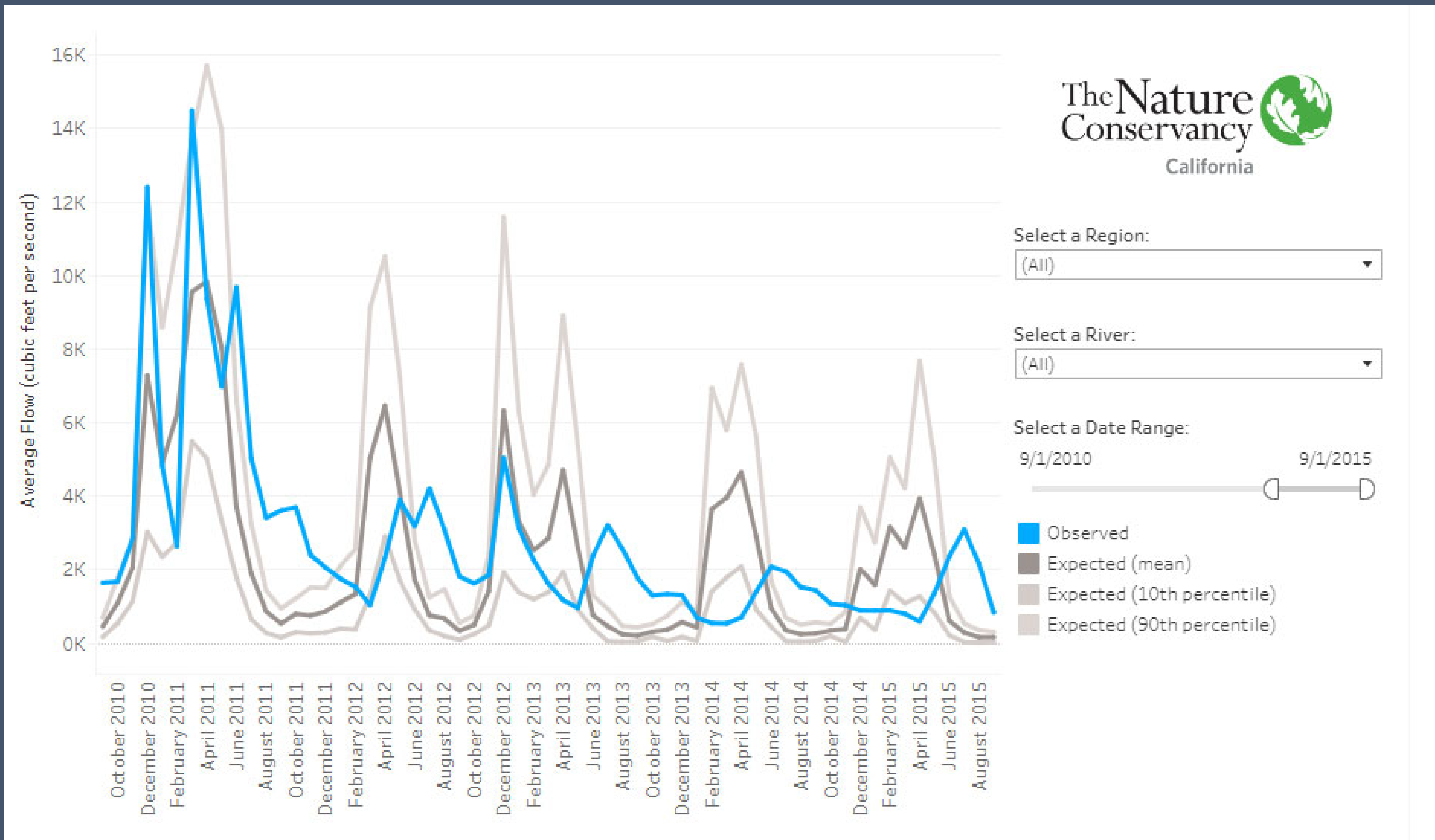




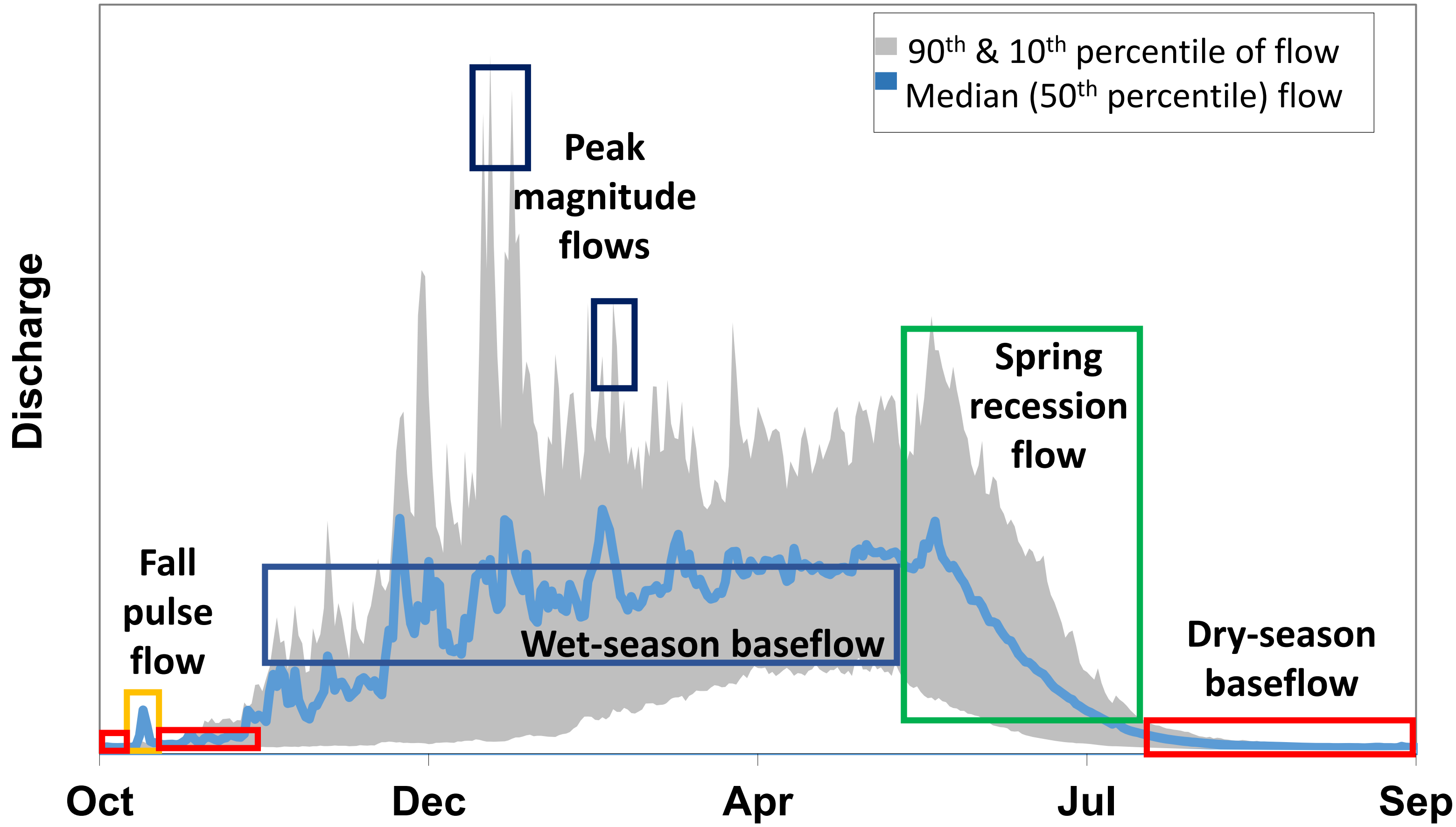
Historic habitat: > 125 miles
Current habitat: 23 miles

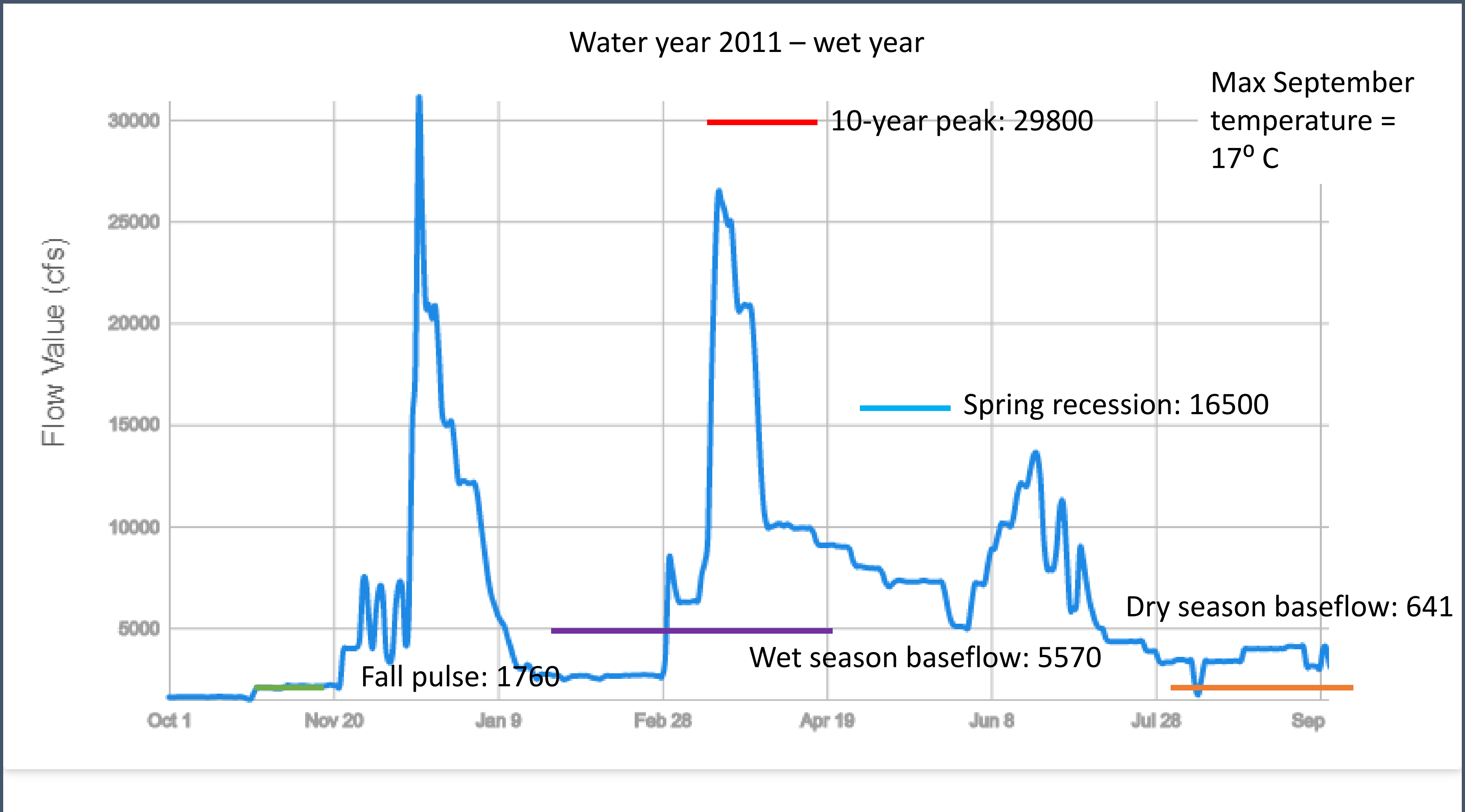
CA Natural Flows Web Tool: rivers.codefornature.org



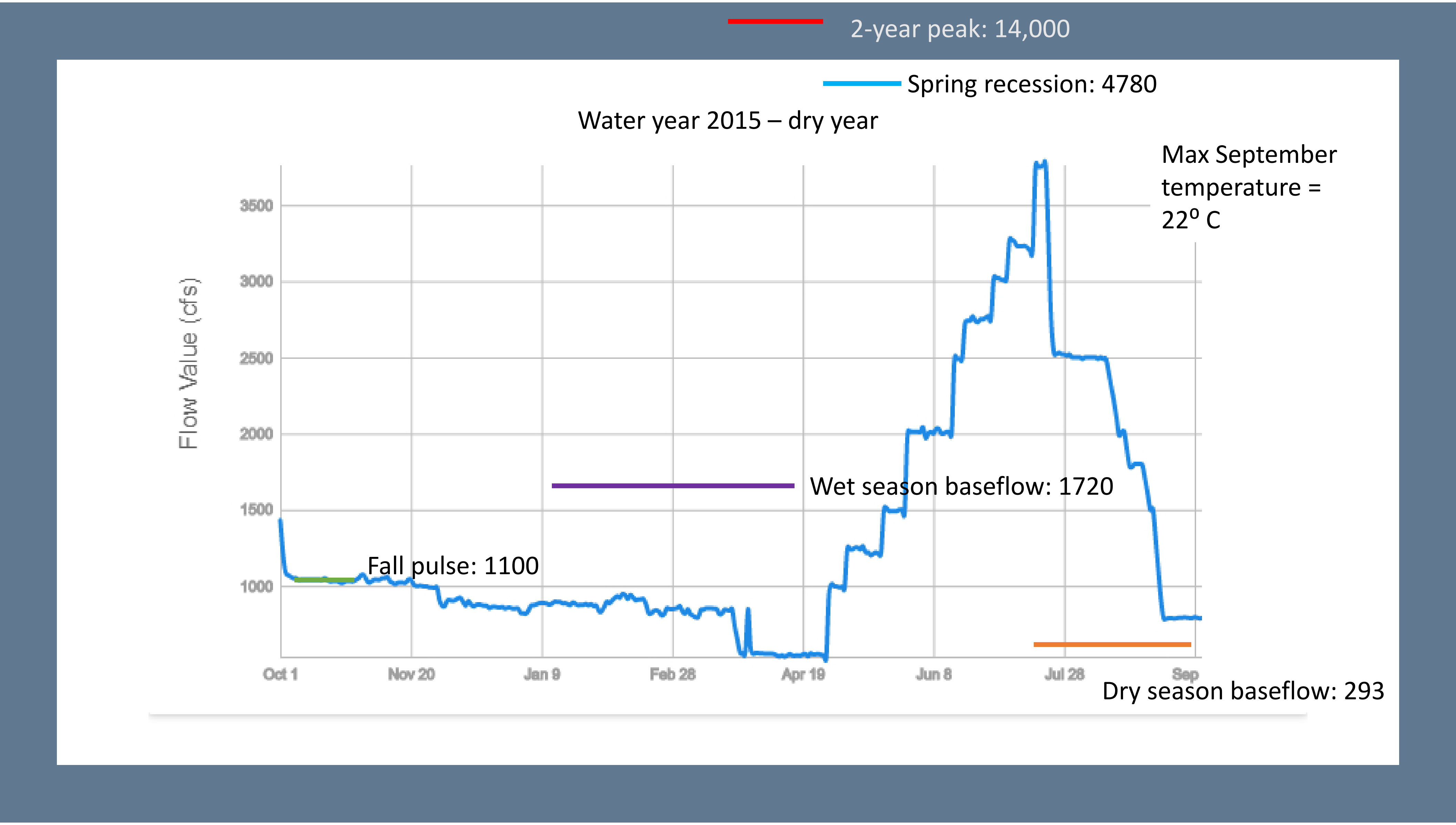

16K
14K
12K
10K
8K
6K
4K
2K
0K
Average Flow (cubic feet per second)
October 2010
December 2010
February 2011
April 2011
June 2011
August 2011
October 2011
December 2011
February 2012
April 2012
June 2012
August 2012
October 2012
December 2012
February 2013
April 2013
June 2013
August 2013
October 2013
December 2013
February 2014
April 2014
June 2014
August 2014
October 2014
December 2014
February 2015
April 2015
June 2015
August 2015
The Nature Conservancy
California
Select a Region:
(All)
Select a River:
(All)
Select a Date Range:
9/1/2010
9/1/2015
Observed
Expected (mean)
Expected (10th percentile)
Expected (90th percentile)

California Environmental Flows Framework (CEFF)
Functional flow components





Water year 2011 – wet year
Max September temperature = 17° C
10-year peak: 29800
Spring recession: 16500
Dry season baseflow: 641
Wet season baseflow: 5570
Fall pulse: 1760
Flow Value (cfs)
30000
25000
20000
15000
10000
5000
Oct 1
Nov 20
Jan 9
Feb 28
Apr 19
Jun 8
Jul 28
Sep

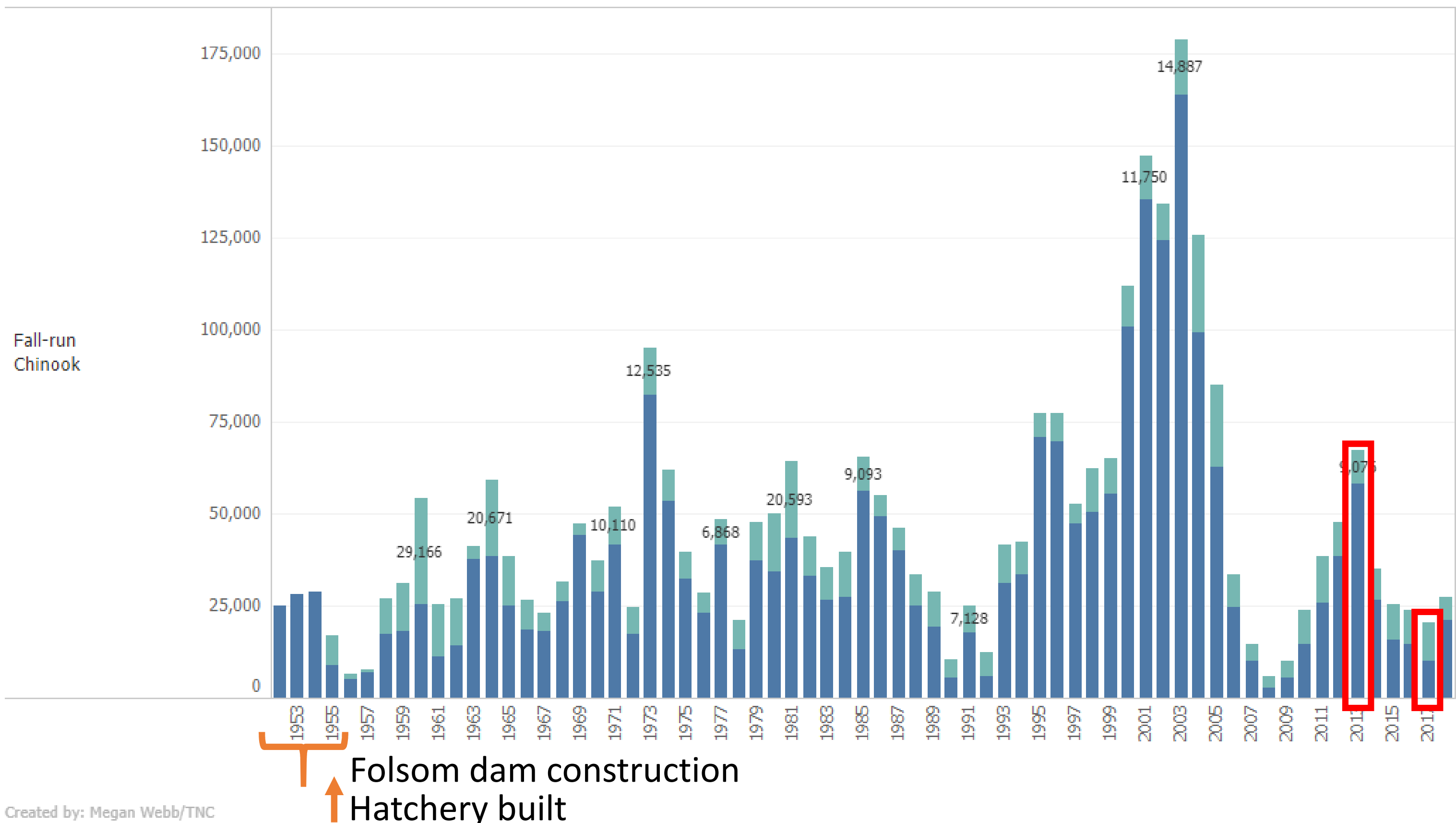

2-year peak: 14,000
Spring recession: 4780
Water year 2015 – dry year
Max September temperature = 22° C
3500
3000
2500
2000
1500
1000
Flow Value (cfs)
Wet season baseflow: 1720
Fall pulse: 1100
Oct 1
Nov 20
Jan 9
Feb 28
Apr 19
Jun 8
Jul 28
Sep
Dry season baseflow: 293



Fall-run escapement

American River

Source: “State of Salmon in California”: https://casalmon.org/



Select by Species:
- (All)
- Fall-run Chinook

Filter by Year:
1952 2018

Return Type:
- Hatchery
- In-River

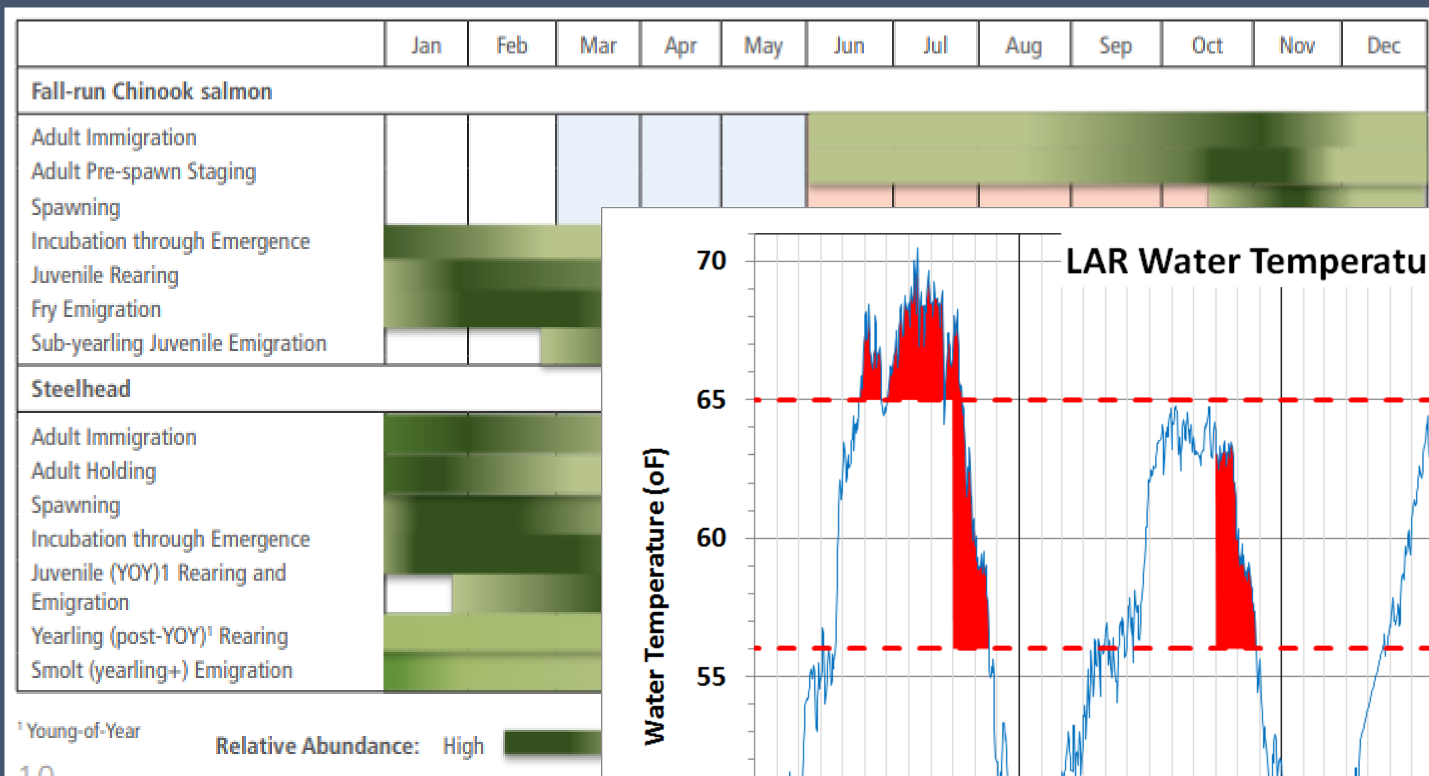
AFRP natural production target = 160,000

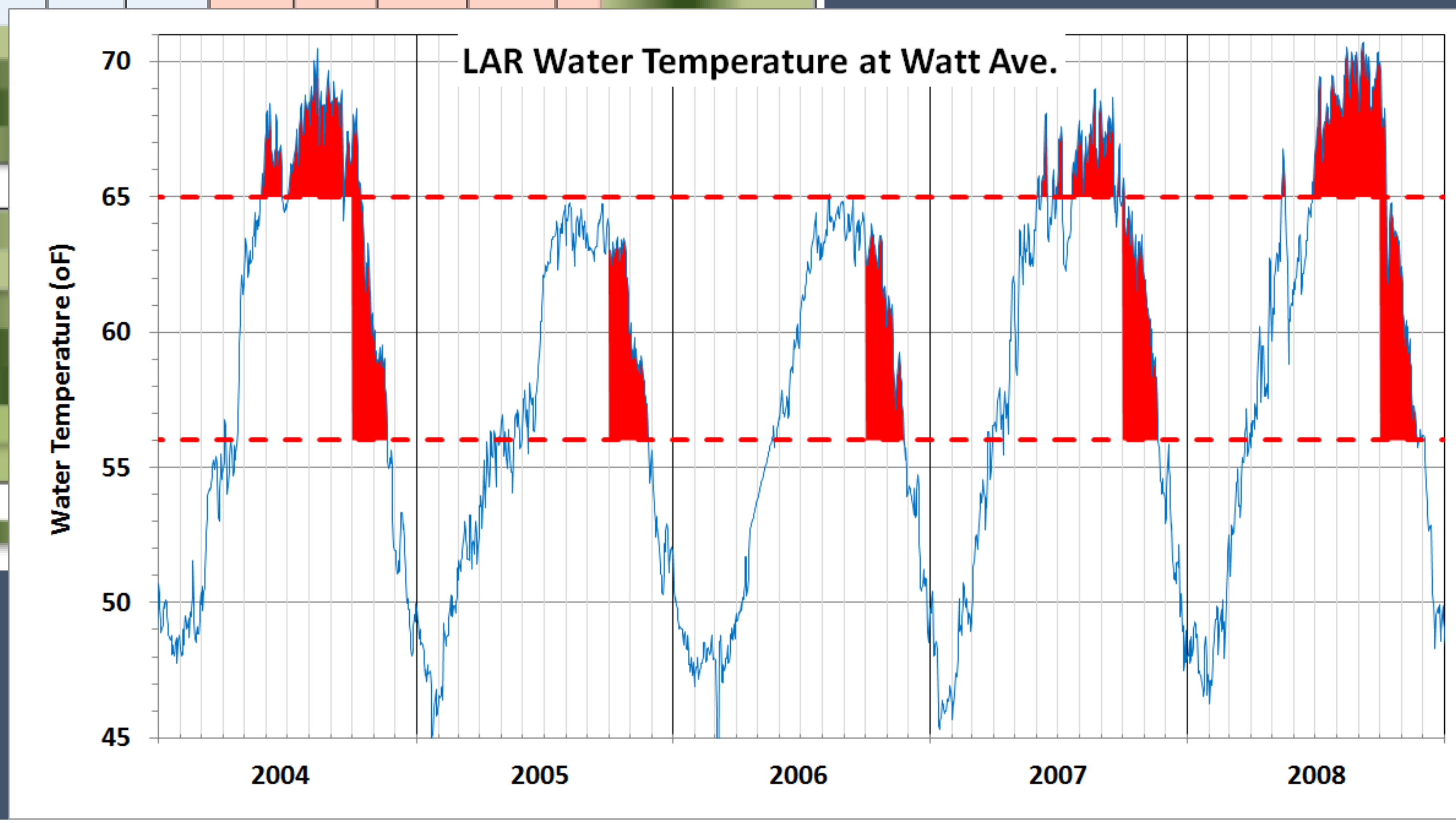
1992-2015 doubling period average = 98,419

(Source: AFRP)

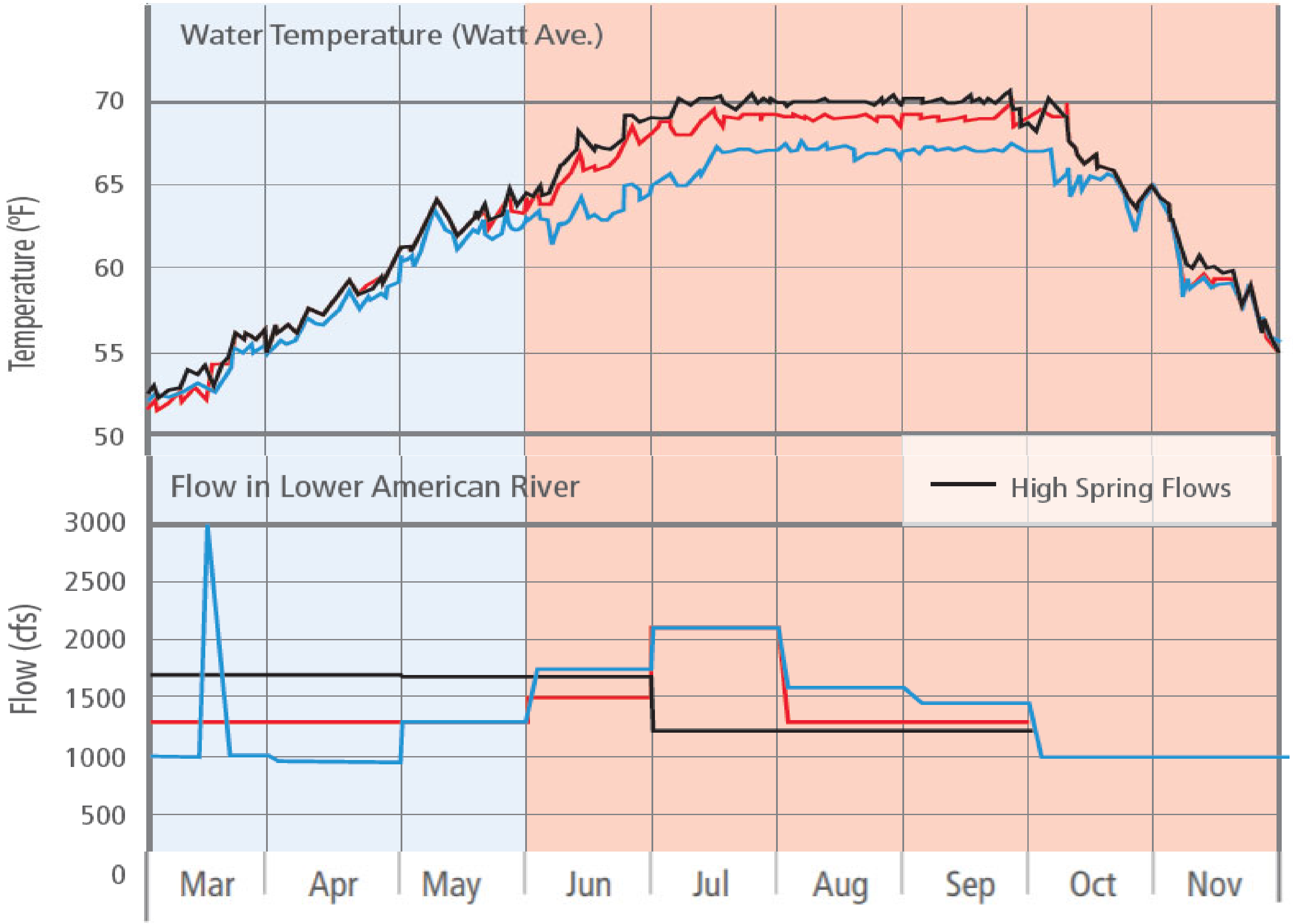
Created by: Megan Webb/TNC
Data sources: CDFW, NOAA Fisheries, federal, state and local agencies, watershed groups, and conservation organizations.

Modified Flow Management Standard (FMS)

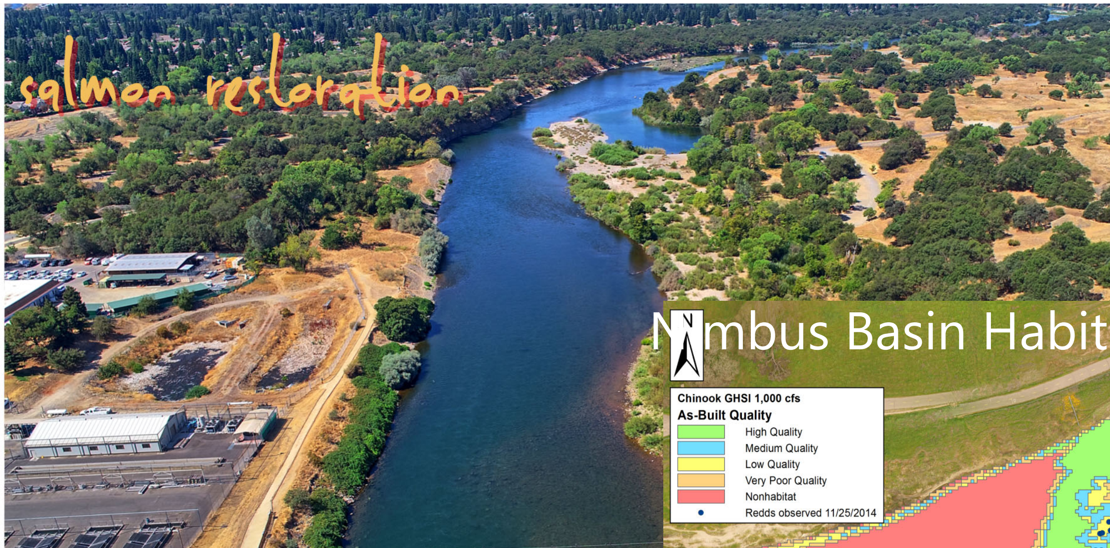


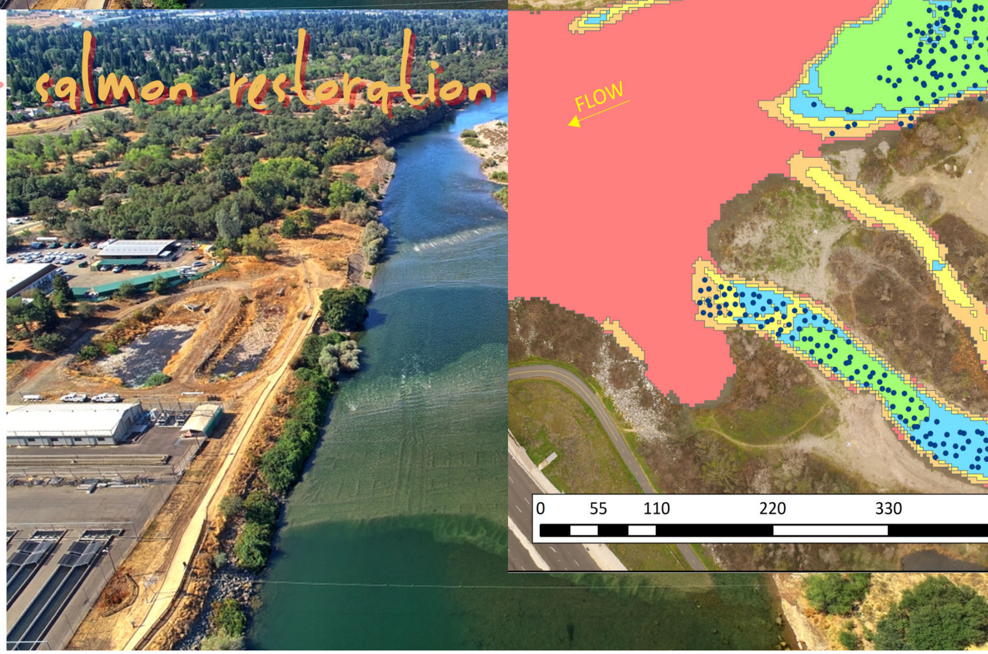


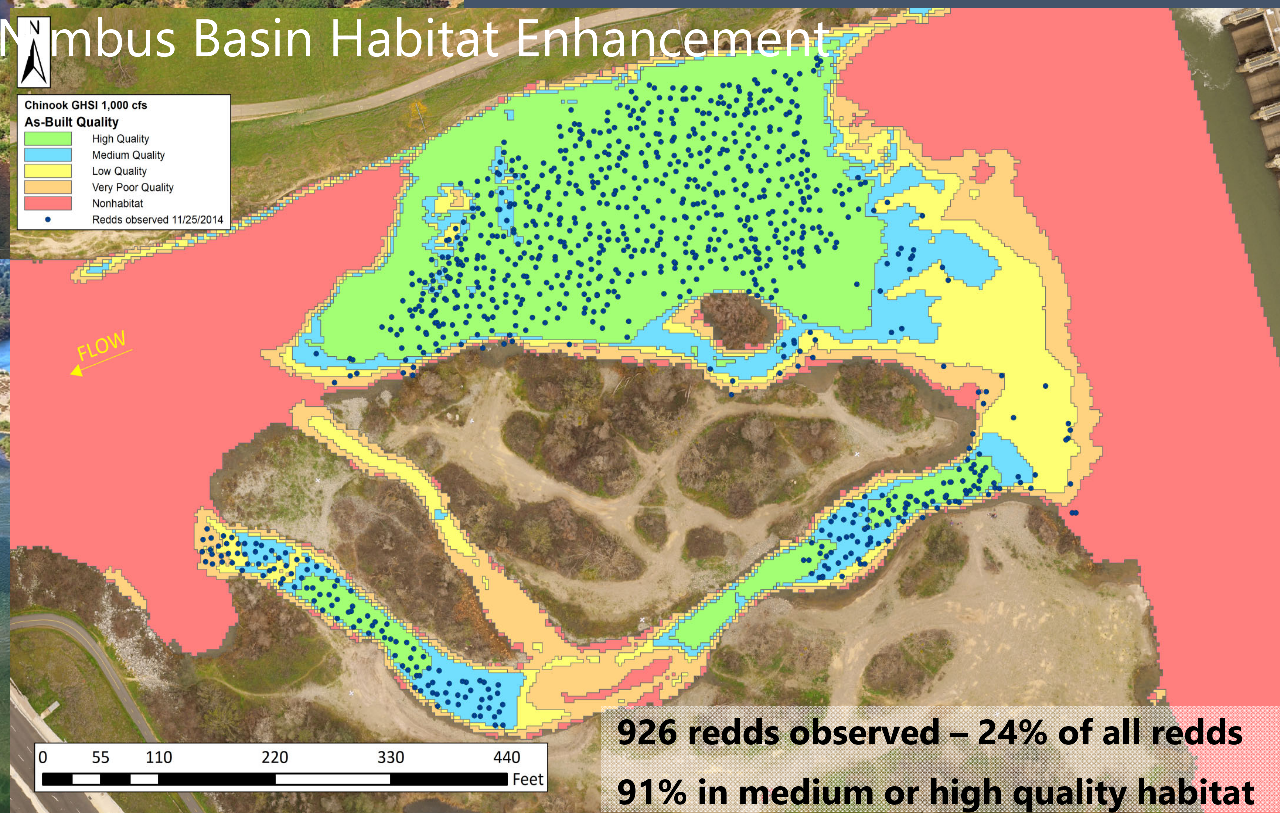
Simulated Dry Year Water Temperature

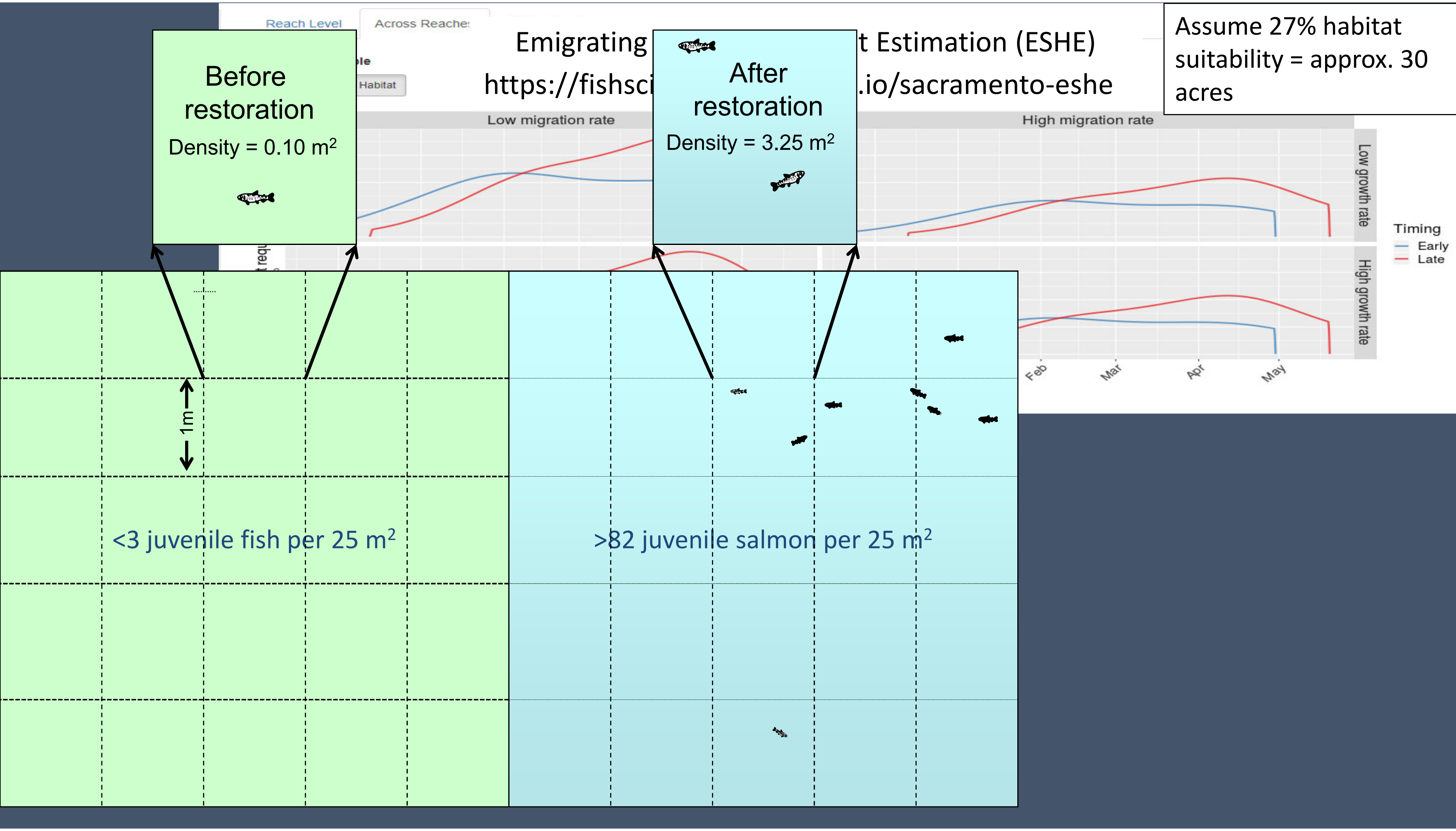


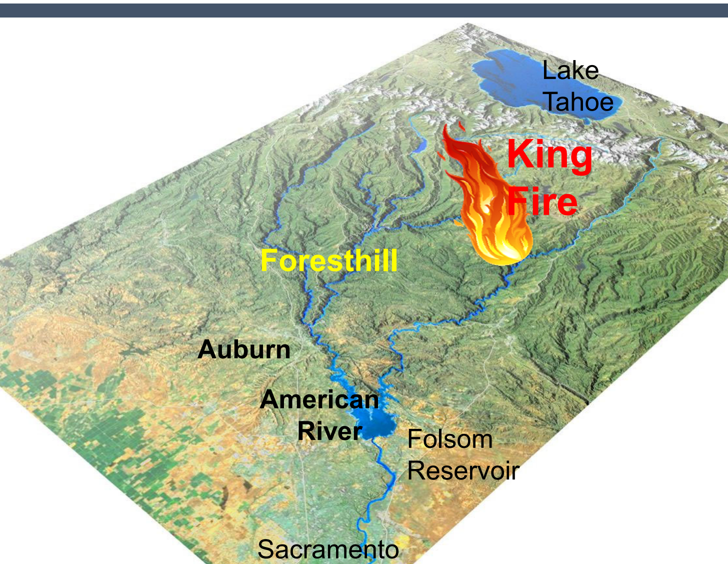
[redacted]


Before salmon restoration

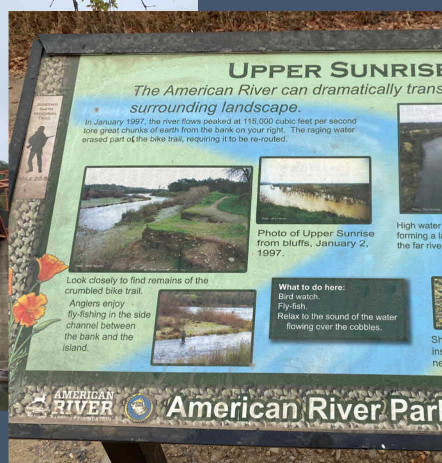

After salmon restoration


Nimbus Basin Habitat Enhancement
N
Chinook GHSI 1,000 cfs
As-Built Quality
High Quality
Medium Quality
Low Quality
Very Poor Quality
Nonhabitat
Redds observed 11/25/2014
FLOW
0 55 110 220 330 440
Feet
926 redds observed – 24% of all redds
91% in medium or high quality habitat


Reach Level
Across Reaches
Habitat
Emigrating
t Estimation (ESHE)
https://fishsci
.io/sacramento-eshe
Assume 27% habitat suitability = approx. 30 acres
Before restoration
Density = 0.10 m^2
After restoration
Density = 3.25 m^2
Low migration rate
High migration rate
Low growth rate
High growth rate
Timing
Early
Late
Feb
Mar
Apr
May
1m
<3 juvenile fish per 25 m^2
>82 juvenile salmon per 25 m^2



Egg mass photos: UC Davis
Watershed photos: PCWA


UPPER SUNRISE
The American River can dramatically transform the surrounding landscape.
In January 1997, the river flows peaked at 115,000 cubic feet per second tore great chunks of earth from the bank on your right. The raging water erased part of the bike trail, requiring it to be re-routed.
Jedediah Smith Memorial Trail
Mile 20.5
Photo of Upper Sunrise from bluffs, January 2, 1997.
Look closely to find remains of the crumbled bike trail.
Anglers enjoy fly-fishing in the side channel between the bank and the island.
What to do here:
Bird watch.
Fly-fish.
Relax to the sound of the water flowing over the cobbles.
American River
American River Park