Drought Operations Will Cause Additional Unreasonable Impacts on Fish and Wildlife in 2015

Natural Resources Defense Council
The Bay Institute

May 20, 2015

Main points

1. Loss of temperature control in 2014 caused 95% mortality of winter run Chinook salmon and similar mortality of fall run Chinook salmon
2. Reclamation's temperature model is flawed and underestimates temperature impacts to salmon
3. Modeling submitted to the SWRCB demonstrates that Shasta Reservoir releases exceed releases for temperature control and are likely to result in significant mortality of salmon in 2015
4. SWRCB should have limited SRS deliveries in April and May consistent with the Drought Contingency Plan, which would have improved temperature control and EOS storage
5. SWRCB should limit Shasta releases in summer in order to protect salmon

Geographic Range Severely Constrained

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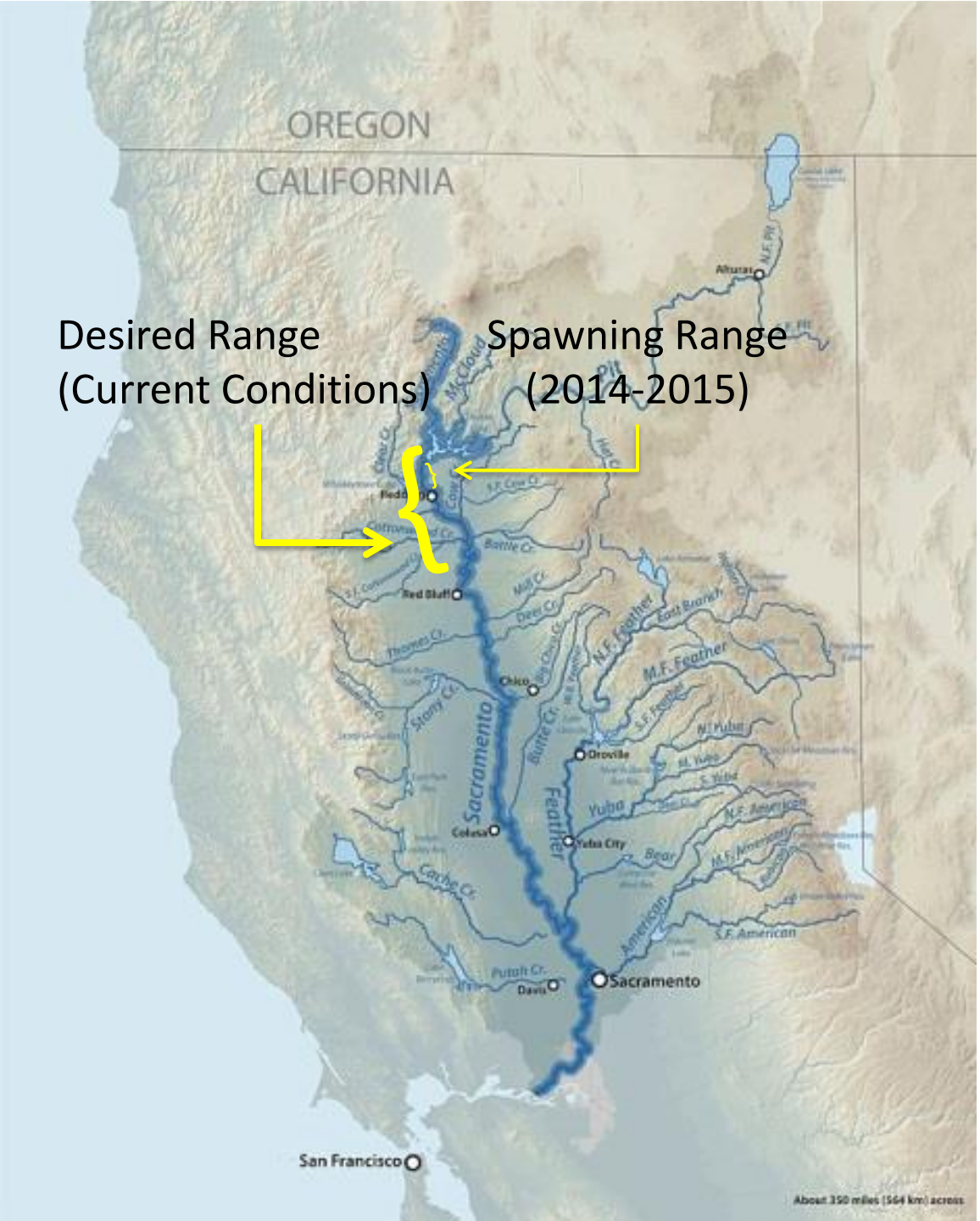

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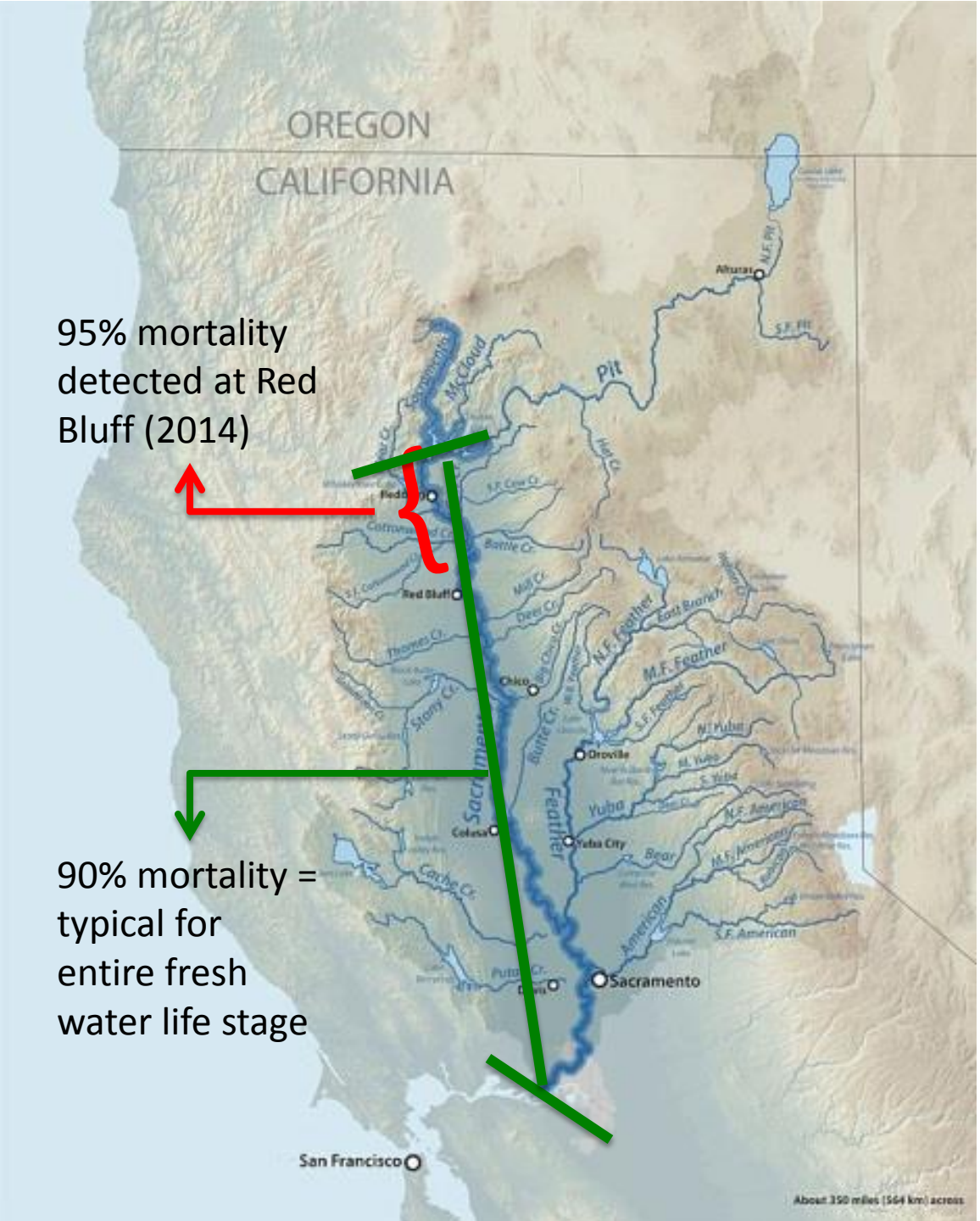


High Freshwater Survival Rates are Crucial to Chinook salmon Productivity

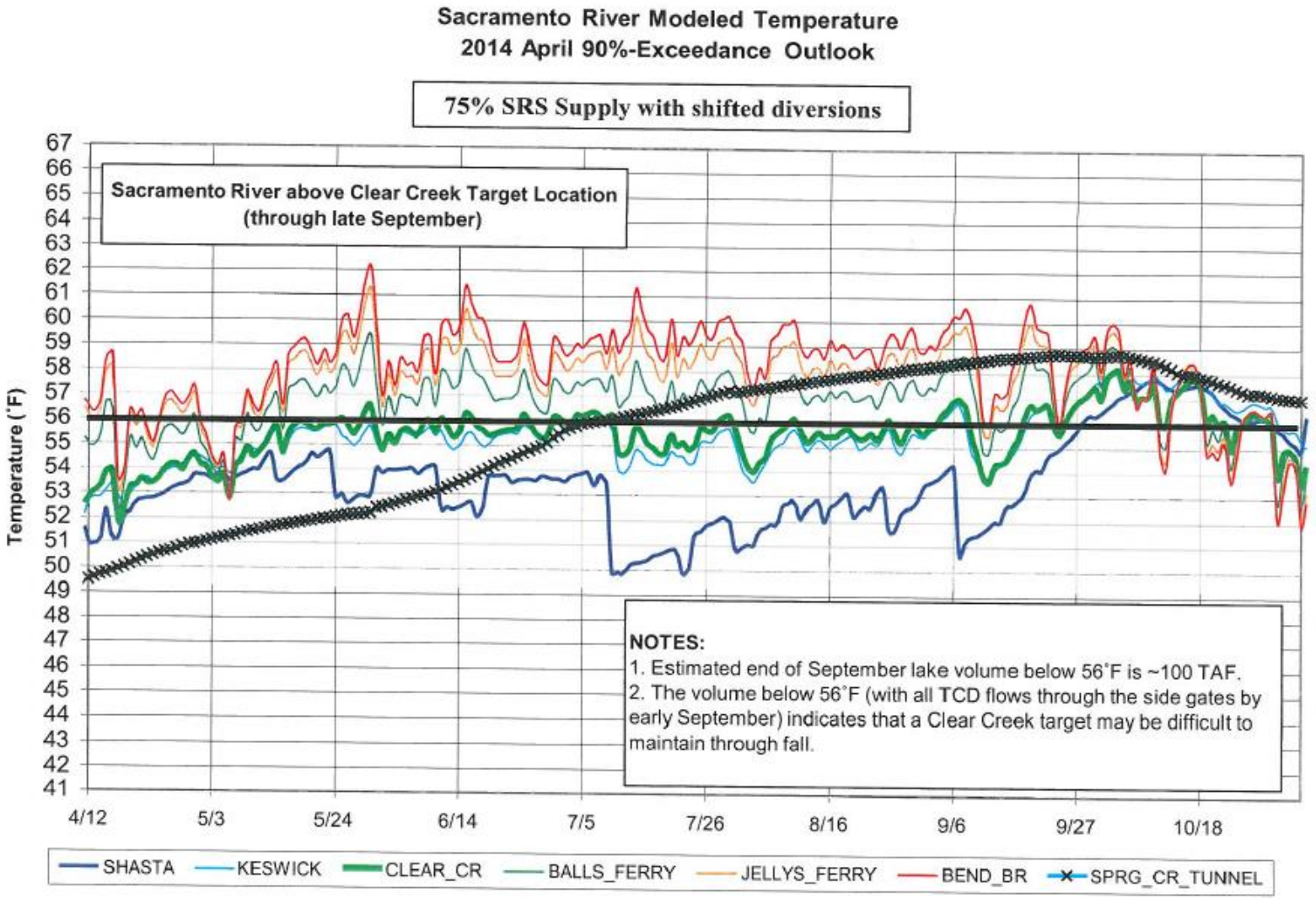
Current Temperature Management for Eggs Leads to Poor Egg and Juvenile Survival

Temperature	Egg Incubation Conditions	
	Direct Mortality (%/week)	Indirect Effect on Juveniles
<53.6°F	0	Optimal
54°F	>0%	Sub-optimal
55°F		
56°F		
57°F	2.4%	Detrimental
58°F	5%	
59°F	9.6%	
60°F	33.3%	
61°F	52.8%	
62°F	93.2%	

Source: EPA 2003, 2001 *and others*.

2014 Retrospective on Shasta Operations and the Unreasonable Impacts on Salmon that Resulted

2014 Modeled Temperatures



2014 Actual Temperatures

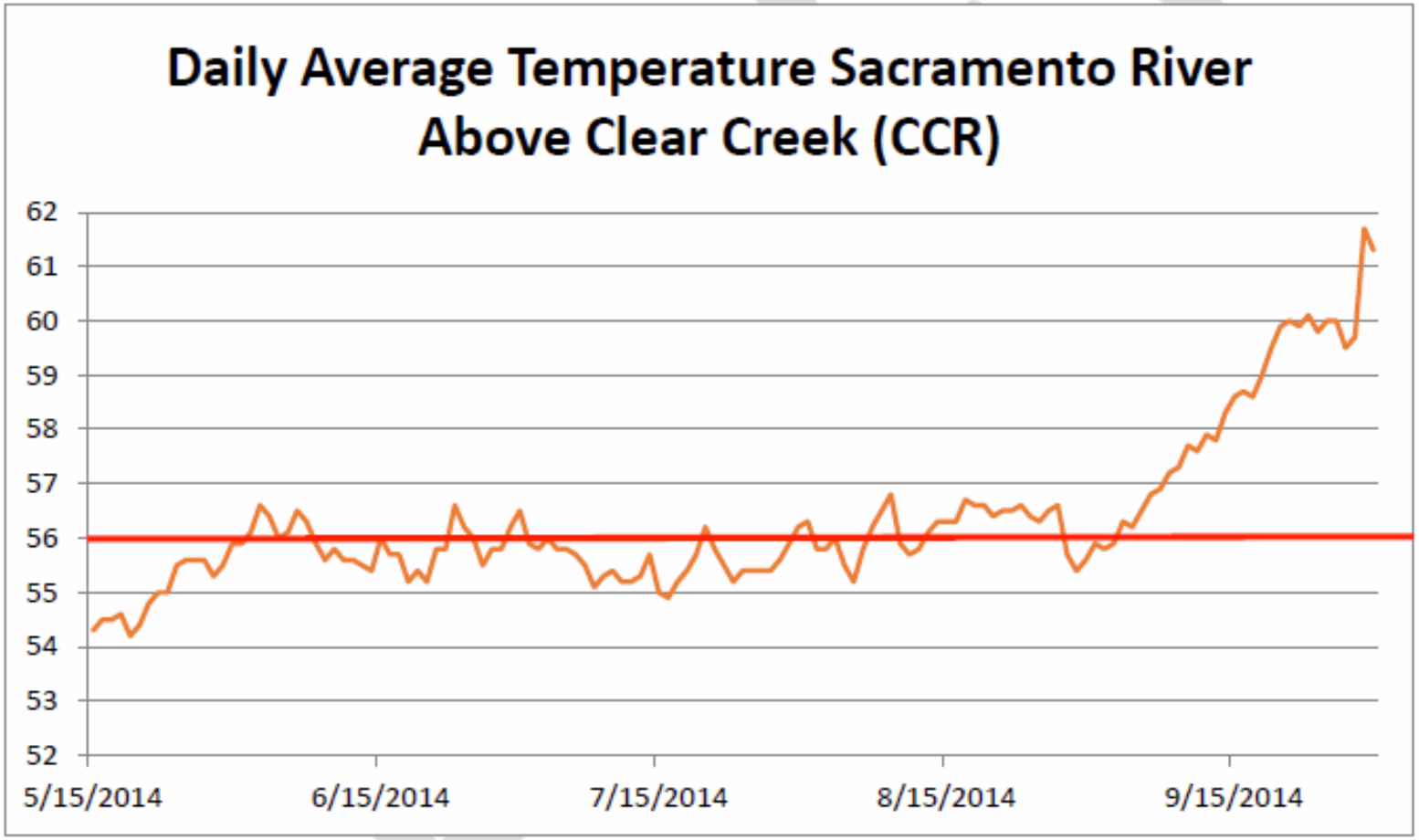
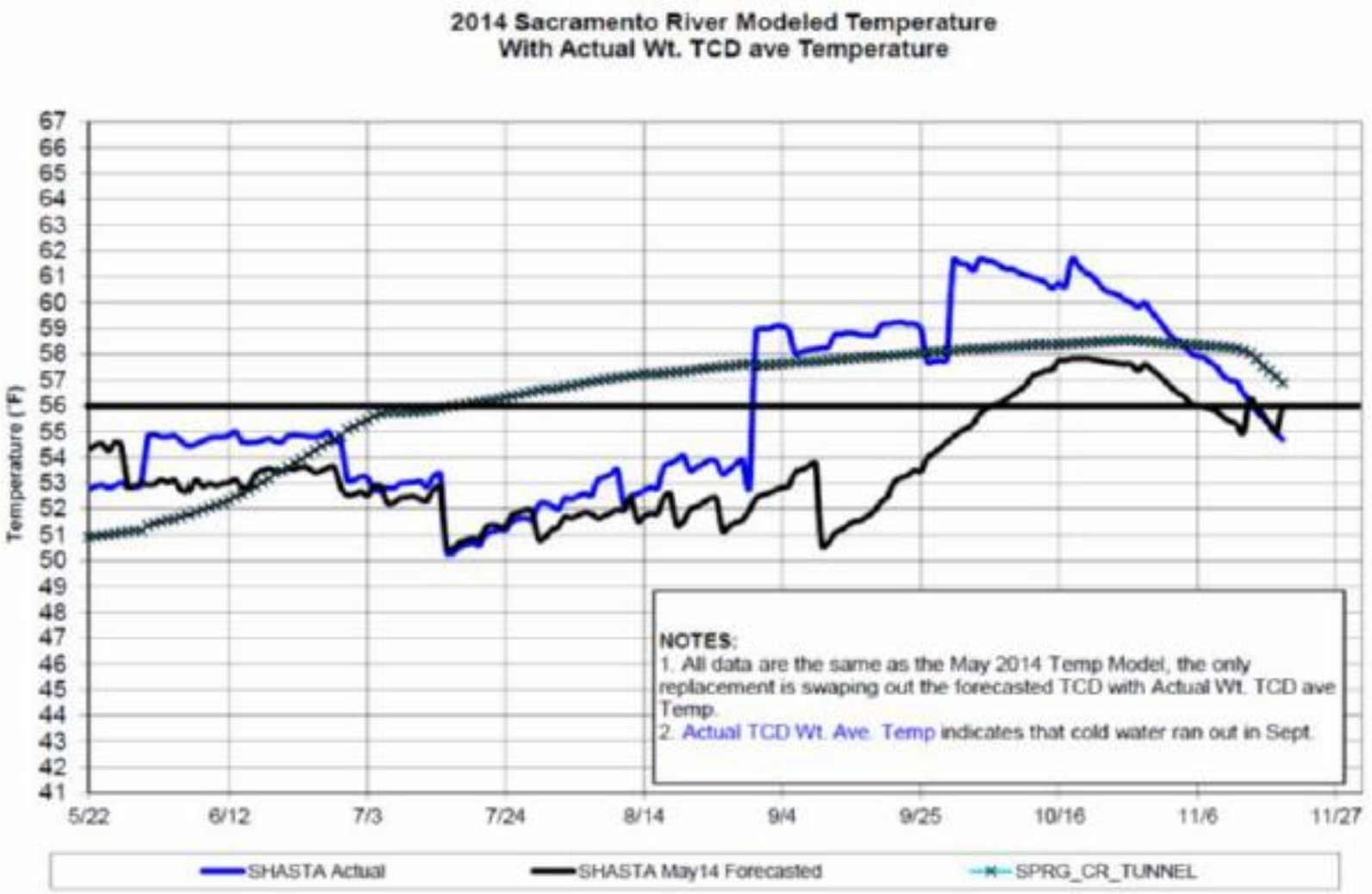


Figure 3. Daily average temperature Sacramento River at the CDEC Temperature Monitoring Station at the Clear Creek Temperature Compliance Point (CCR), May 15 through September 30, 2014.

Source: USBR March 17, 2015 (Initial Hindcast of Temperature Performance)

Modeled vs Actual Water Temperatures

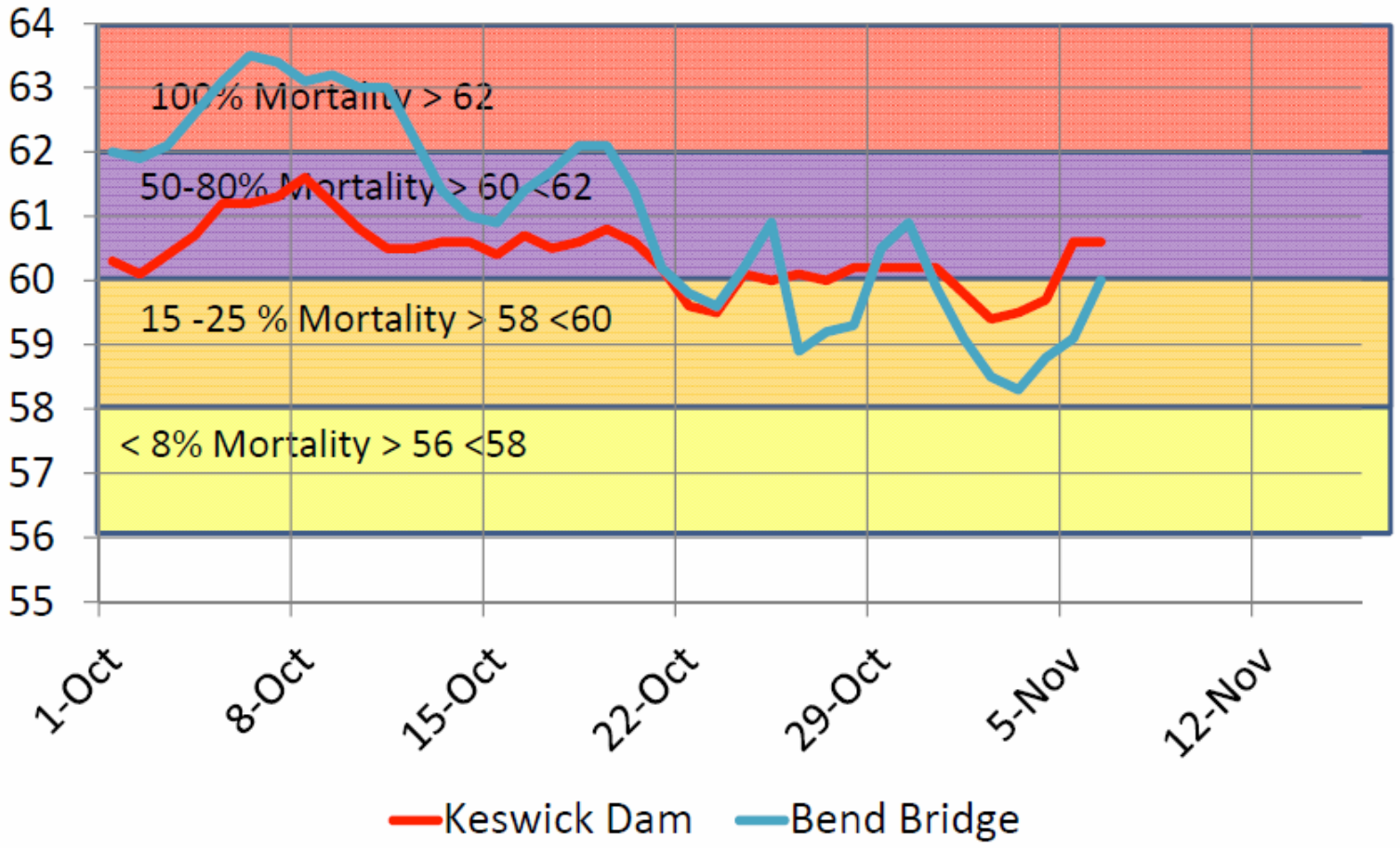


Source: USBR temperature hindcast (Fig. 2)

USBR's Temperature Model is Flawed

- Jan 29, 2015 letter from NMFS to Reclamation:
  - "In addition, throughout much of the summer of 2014, actual water temperatures, as monitored through the California Data Exchange Center, were upwards of 4°F higher than Sacramento River temperature modeling results." (page 4)
  - "As the Biological Review and NMFS' juvenile production estimate (JPE) letter describe, the egg and fry life history stages of winter-run in brood year 2014 experienced approximately 95% temperature-related mortality last year - far greater than what was predicted by last year's forecast."

2014 Fall-run Egg Temperature Mortality – Sacramento River



Source: Fish agency presentation to SWRCB Nov. 18, 2014

Estimated 2014 Fall Run Chinook Salmon Mortality below Keswick Dam

Fall Run FY 14 Sac River Survival		
		Source
Escapement above Red Bluff Diversion Dam	97,321	*Grandtab*
Natural escapement	78,371	*Grandtab (Excludes fish taken into the Coleman hatchery)*
Female ratio	0.46	*Poytress et al 2014 (FWS)*
Females	36,051	
Eggs per female	5,407	*Poytress et al 2014 (FWS)*
Total Eggs	194,925,919	
Estimated Passage at RBDD	3,552,344	*FWS 2015 (Gruber)*
Percentage Survival (egg to fry at RBDD)	**1.82%**	

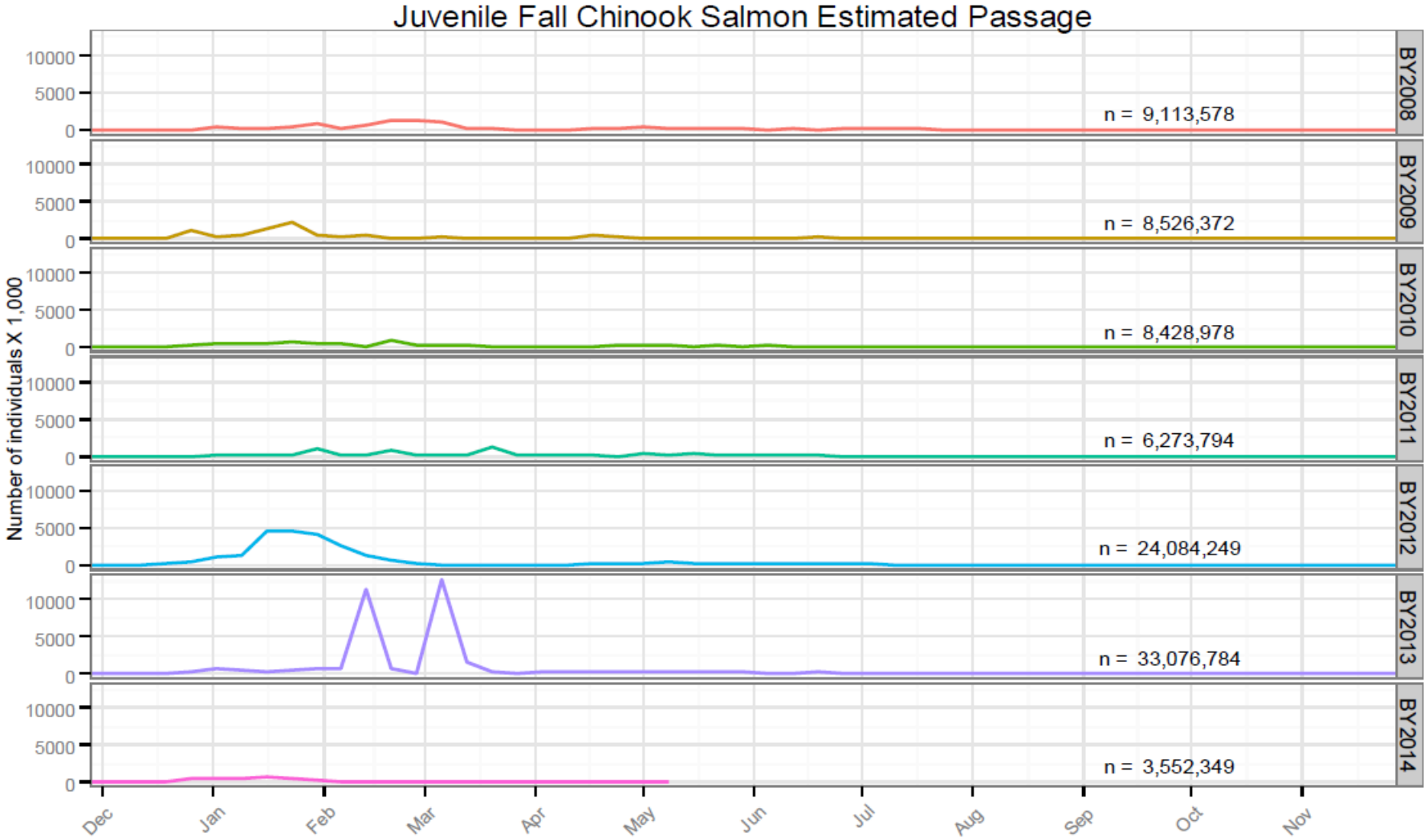


Figure 4. Weekly estimated passage of unmarked juvenile fall Chinook salmon at Red Bluff Diversion Dam (RK391) by brood-year (BY). Fish were sampled using rotary-screw traps for the period December 1, 2008 to present .

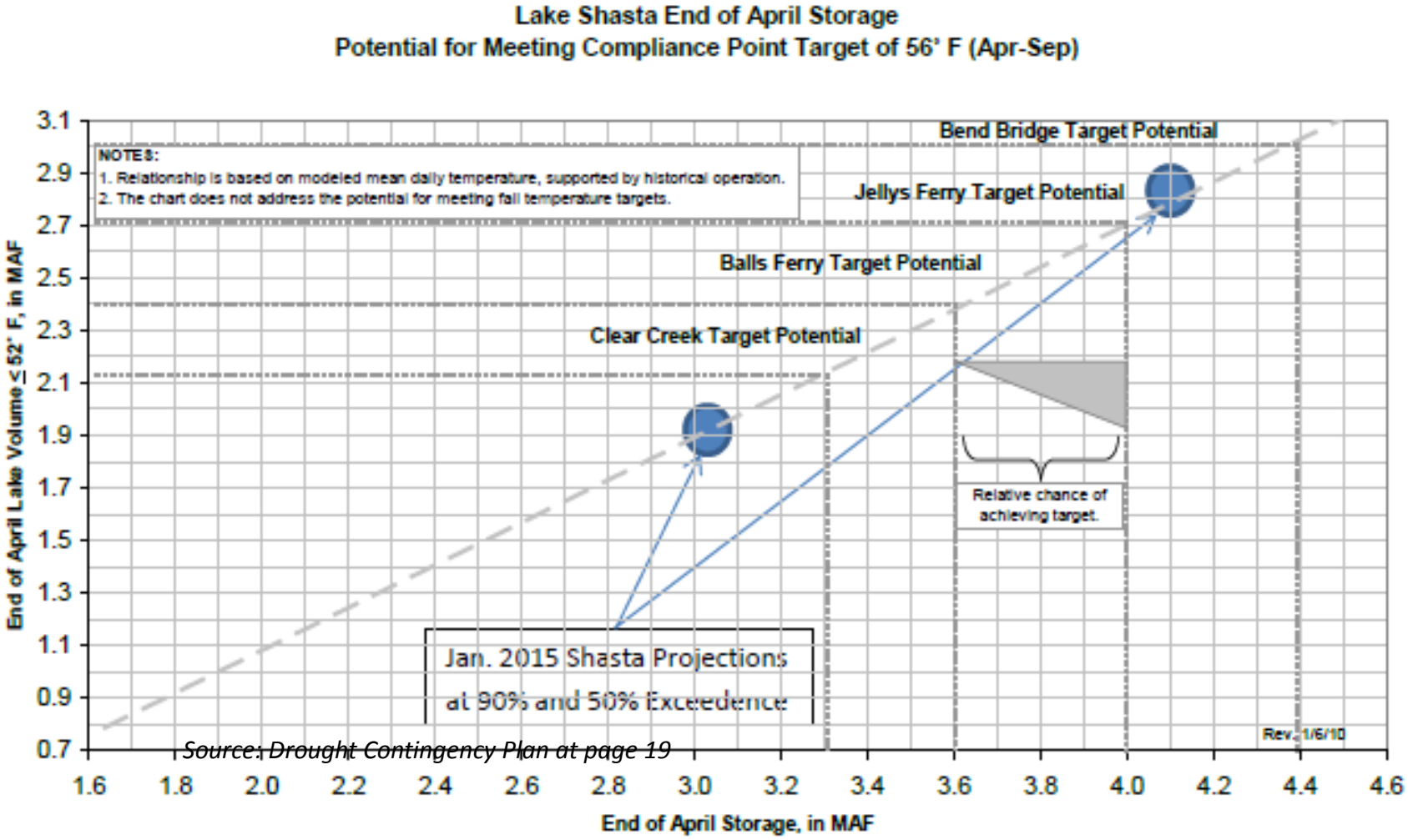
Source: USFWS 2015

2015 Operations:
A Repeat of 2014?

D-1641 Standards Waived in 2015

- TUCP waives Delta outflow standards
  - Cuts critical year delta outflows by nearly 50%;
  - Delta outflow standards now are limited to water quality standards for farms and cities
  - SWRCB estimates this reallocates 1.2MAF from Delta ecosystem
  - Jeopardizing the continued existence of Delta smelt and reduced abundance of other native fisheries
  - Long term degradation of the health of the estuary (increased populations of invasive species, harmful algal blooms and other water quality problems)

Shasta Storage and Temperature Control



Source: Drought Contingency Plan at page 19

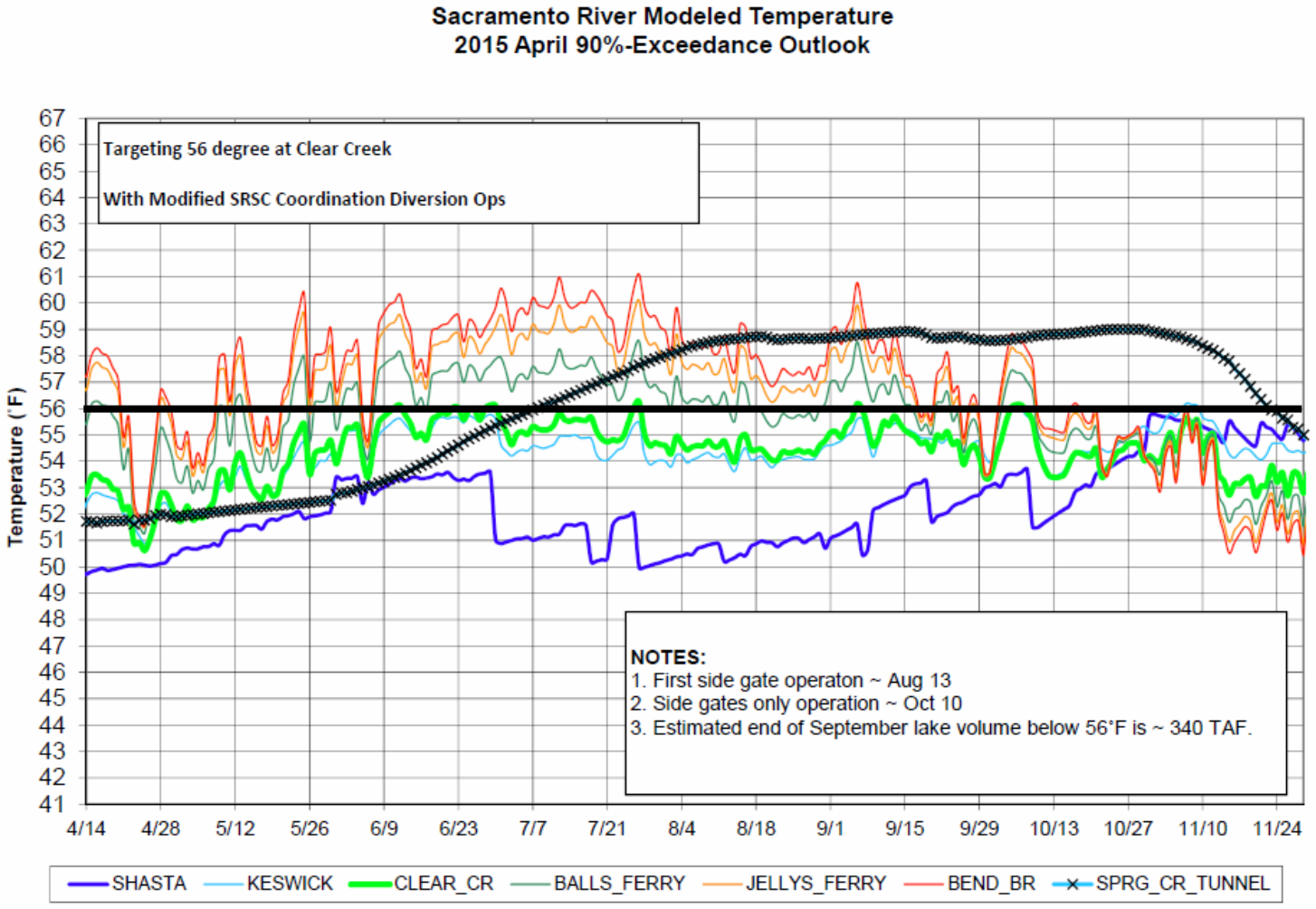
End of April Storage: 2.66 MAF

Reservoir Releases for Temperature Control Versus USBR Proposal

Month	6b(2) Salmonid Plan	6b(3) SWRCB Scenario	May 4 Proposed Operations
	Keswick (cfs)	Keswick (cfs)	Keswick (cfs)
April	3250	3250	4300
May	5000	6000	7500
June	8000	8500	8500
July	8000	9000	9000
August	8000	8500	8500
September	6000	6000	6500
October	5500	5500	5000
November	5000	3389	4000
December	3250	3250	4000

Releases in highlighted months exceed that necessary for temperature control (6b(2)).

April 2015 Temperature Model



Source: USBR, April 24, 2015

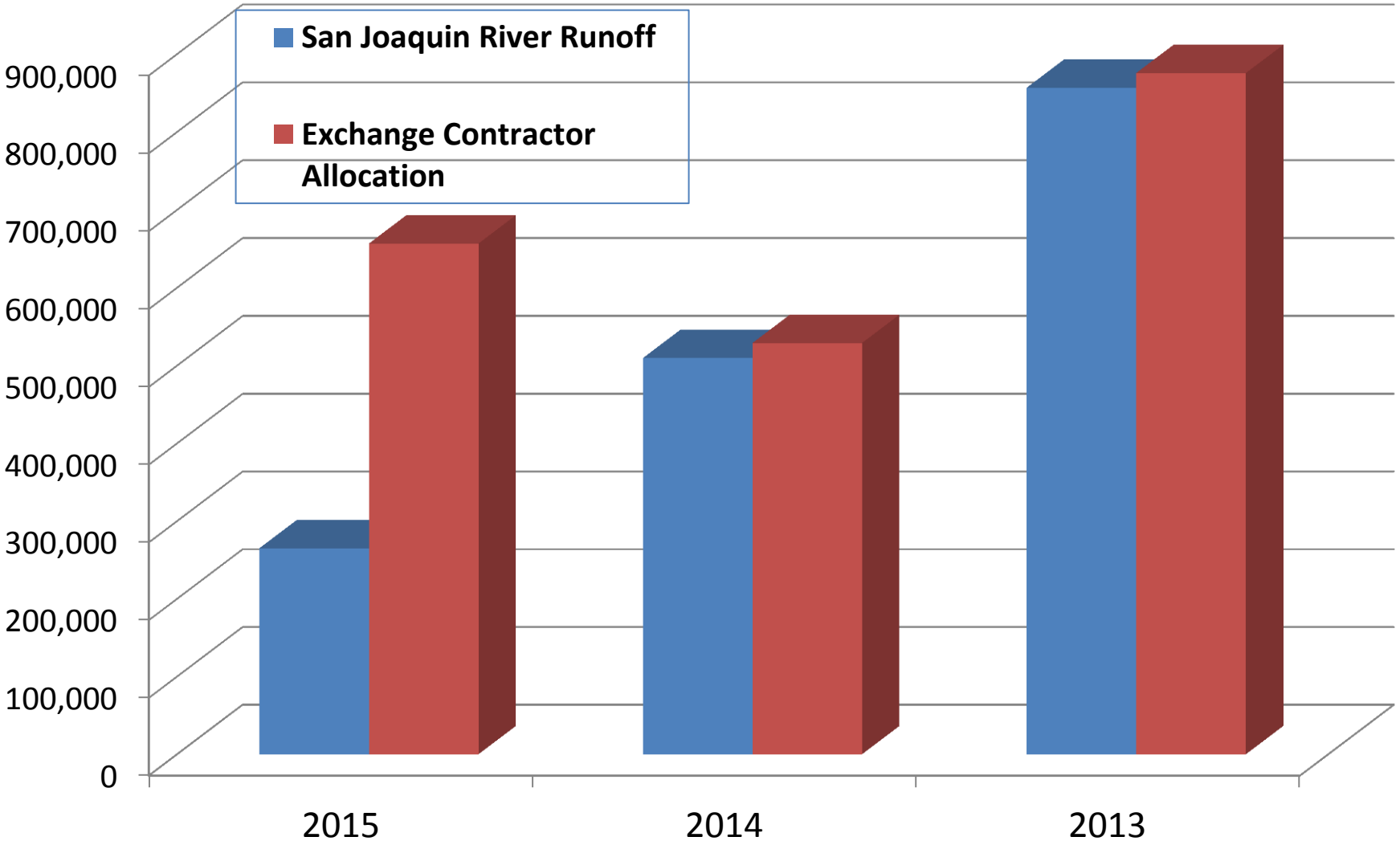
TUCP Maintains Senior Contractor Deliveries at Expense of Salmon

RECLAMATION
Managing Water in the West
U.S. Department of the Interior
Bureau of Reclamation

Central Valley Project (CVP) Water Quantities w/2015 Allocation

Contractors	Maximum per Contract or Agreement (acre-feet)	M&I Historical Use (1) (acre-feet)	Agricultural Use (2) (acre-feet)	Projected 2015 Allocation by %	Projected 2015 Allocation by acre-feet
North of the Delta					
American River M&I	313,750	181,047		25% of historical use, but not less than minimum PHS (9)	45,262
Sacramento River					
Water Service	468,990				
Agriculture			447,728	0%	0
M&I		21,262		25% of historical use, but not less than minimum PHS (9)	5,470
Water Rights (3)	2,115,620			75% (10)	1,586,715
Refuge - Level 2 (4)	151,250			75% (10)	113,438
South of the Delta					
Water Service	2,112,898				
Agriculture			1,945,633	0%	0
M&I		167,265		25% of historical use, but not less than minimum PHS (9)	41,816
Water Rights	875,623			75% (10)	656,717
Refuge - Level 2 (4)	271,001			75% (10)	203,251
Contra Costa In Delta	195,000	170,000		25% of historical use, but not less than minimum PHS (9)	50,528
New Melones East Side (5)	155,000	42,214	112,786	0%	0
East-Side Water Rights (6)	600,000				333,000
Friant					
Class 1	800,000	63,721	736,279	25% of historical use, but not less than minimum PHS (9)	16,263
Class 2	1,401,475			0%	0
Buchanan Unit	24,000				24,000
Hidden Unit	24,000				24,000
Total Contracted Water (7) (8)	**9,508,607**				**3,100,459**

Comparison of San Joaquin River Runoff and Exchange Contractor CVP Allocations



Notes: (1) Allocation and runoff data for 2015 is tentative; (2) CVP allocations excludes water deliveries to other parties on the San Joaquin River with holding contracts or infiltration losses in the San Joaquin River.

Conclusion

- In order to reduce or avoid unreasonable impacts to salmon in 2015, the Board should modify Shasta operations to reduce releases and shift timing of diversions from summer to fall months, when flows are needed for temperature control.