

Discussion of CA Water Fix CalSim II Modeling of 1932-1933
Jeffrey Weaver, PE Testimony

EXHIBIT ARWA-102

My Experience

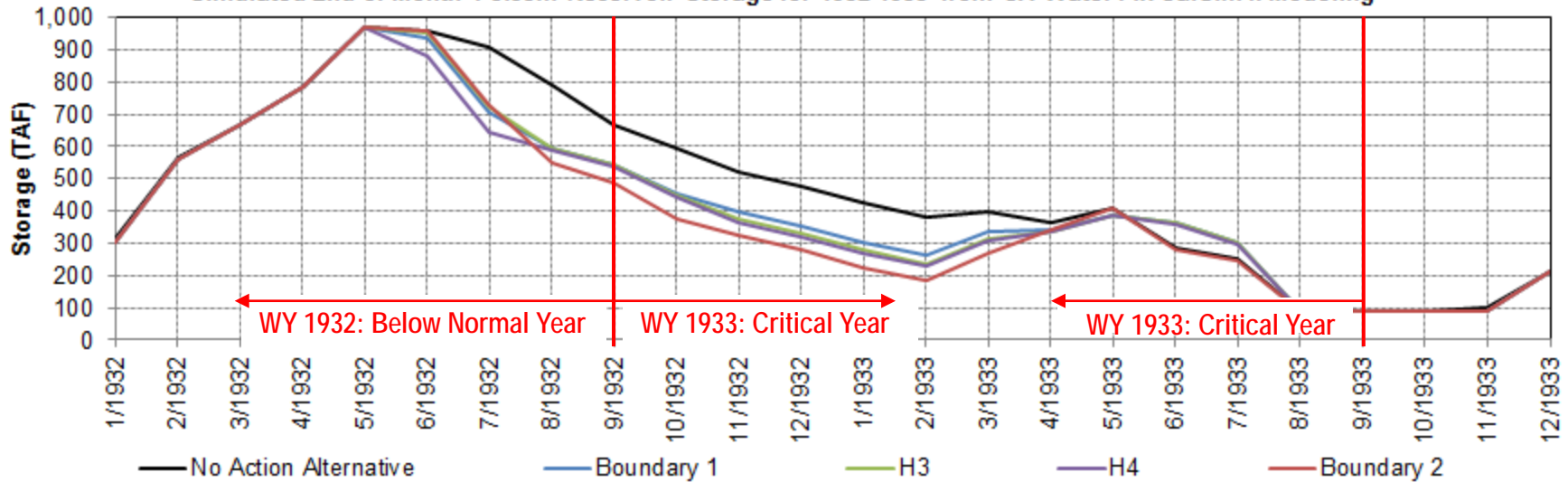
- I have 17 years of modeling experience
- I have been involved with multiple CalSim II projects, working for, among others:
 - CA DWR
 - Bureau of Reclamation
 - U.S. Army Corps of Engineers
 - Regional water districts and water agencies
- I have been involved with several American River modeling projects
 - Water Forum Flow Management Standard (FMS)
 - U.S. Army Corps of Engineers Folsom Dam Water Control Manual Update
- I developed the CalSim II representation of Folsom Reservoir operations for minimum flows in lower American River used by DWR and Reclamation as part of my work on the Folsom Water Control Manual Update.
- I further updated the CalSim II representation of Folsom Reservoir operations for minimum flows in lower American River as part of my work on the Water Forum FMS.

Reviewed CA Water Fix CalSim II Models

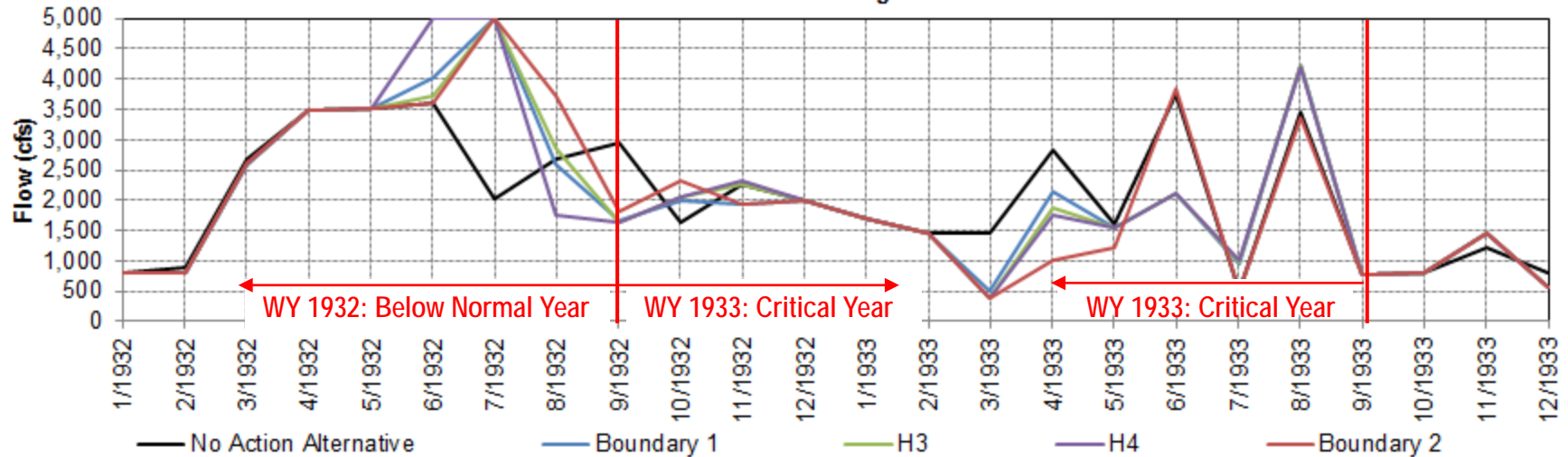
- I downloaded the five CA Water Fix CalSim II models from SWRCB ftp site on June 13, 2016
 - No Action Alternative (NAA)
 - Boundary 1 Alternative (Boundary 1)
 - Alternative 4A H3 (H3)
 - Alternative 4A H4 (H4)
 - Boundary 2
- My initial review focused on the operations of Folsom Reservoir and the American River below Nimbus Dam for critically-dry years
- As a result of my initial review, I focused on the period of January 1932 through December 1933.

Overview of Period of Examination

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

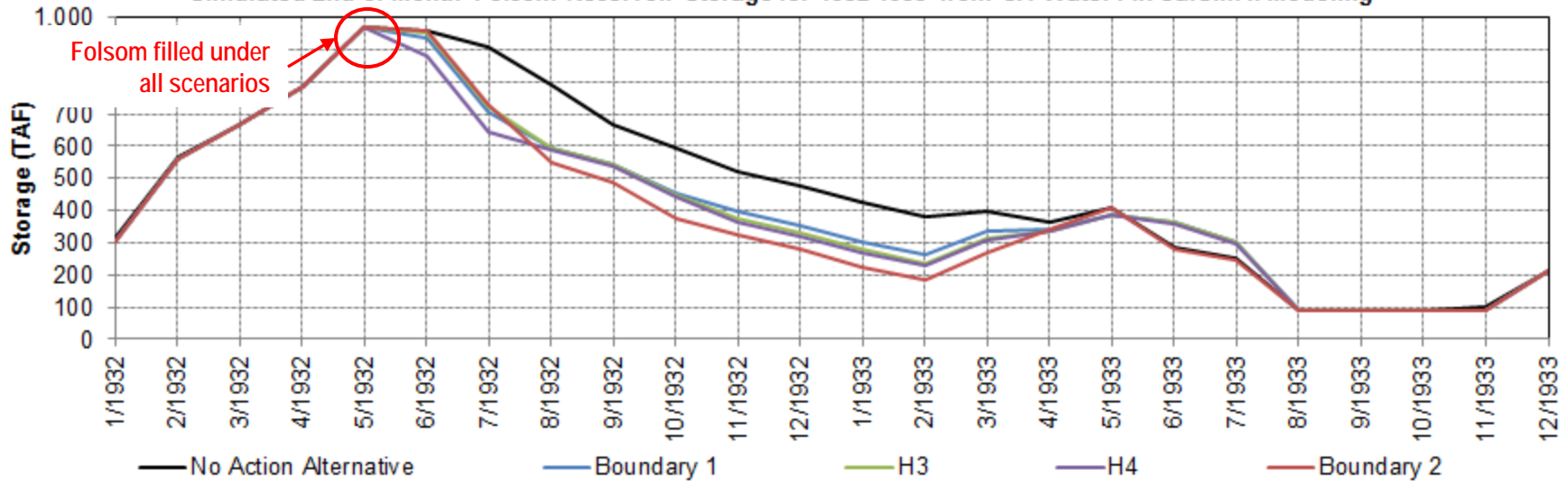


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

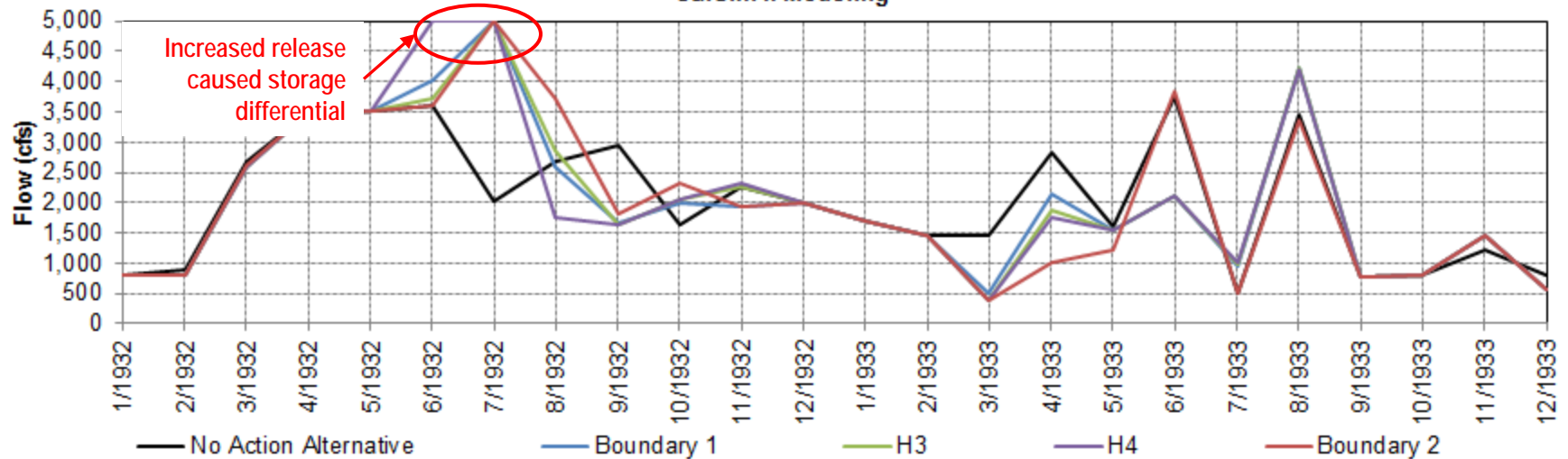


May 1932-August 1932

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

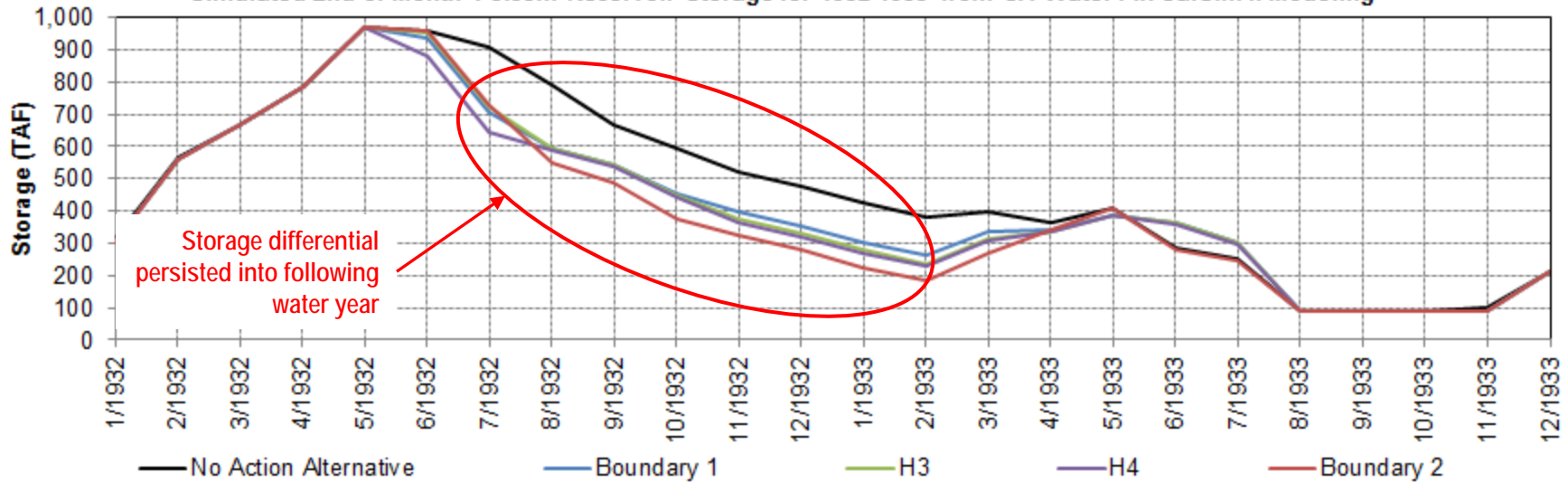


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

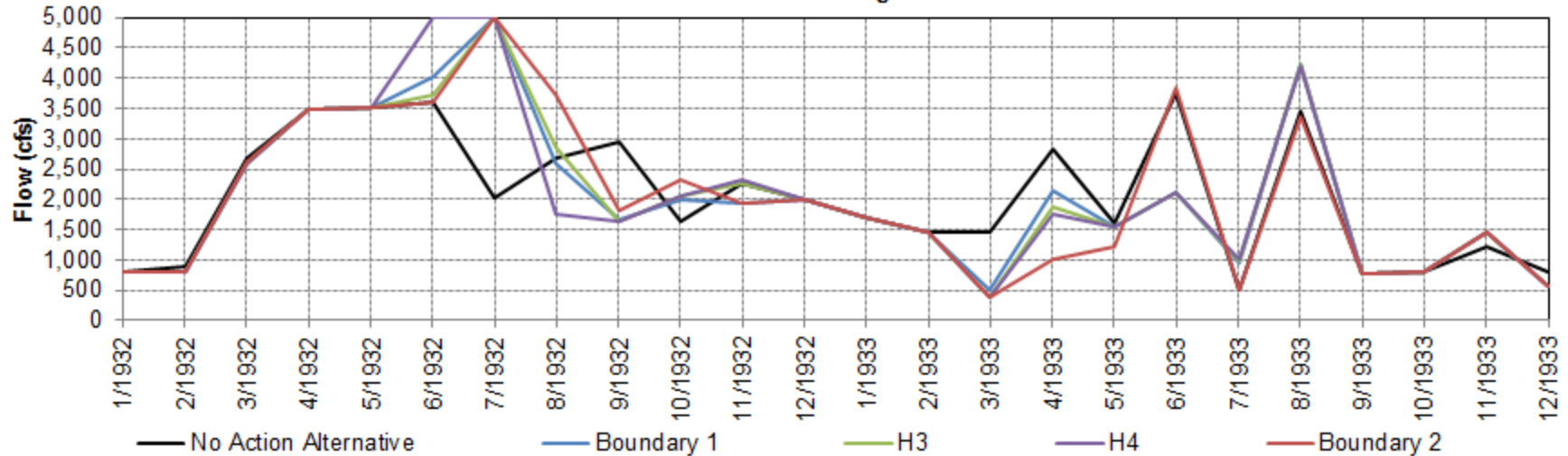


September 1932- February 1933

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

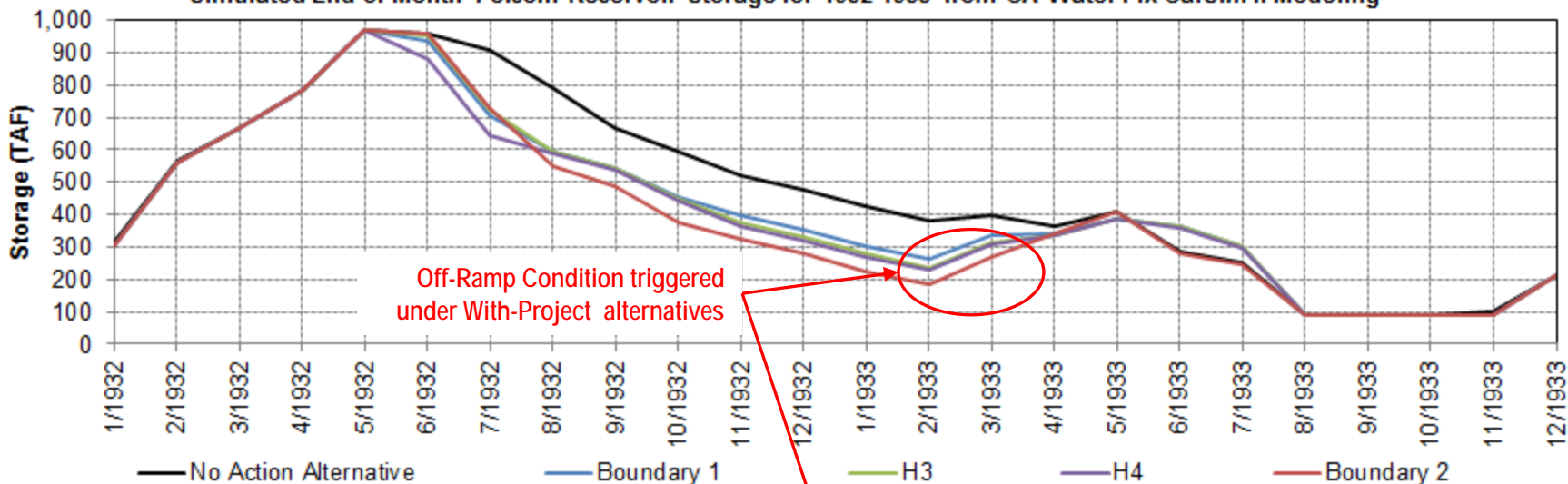


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

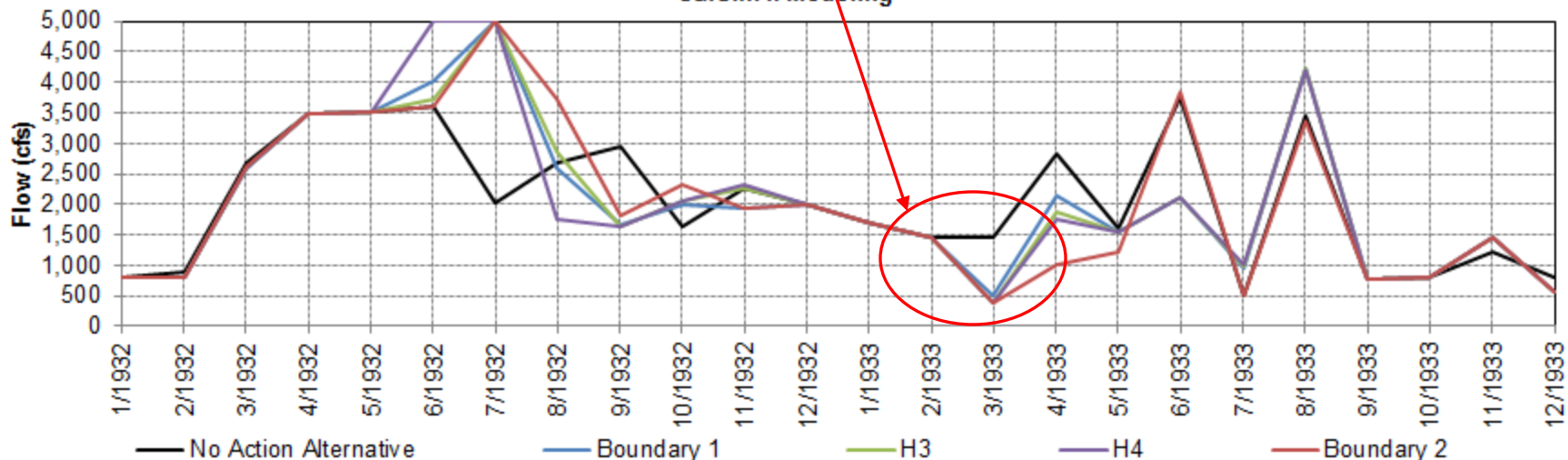


February - March 1933 – Lower American River Flow Off-Ramp Triggered

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling



Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

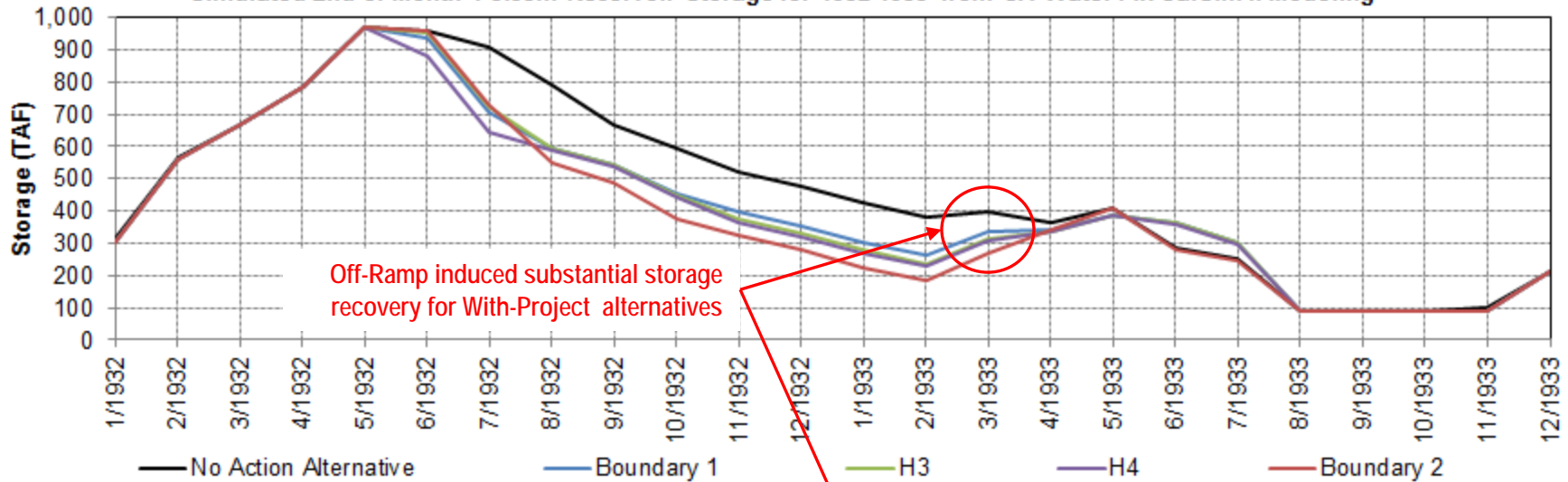


February - March 1933 Lower American River Flow Off-Ramp

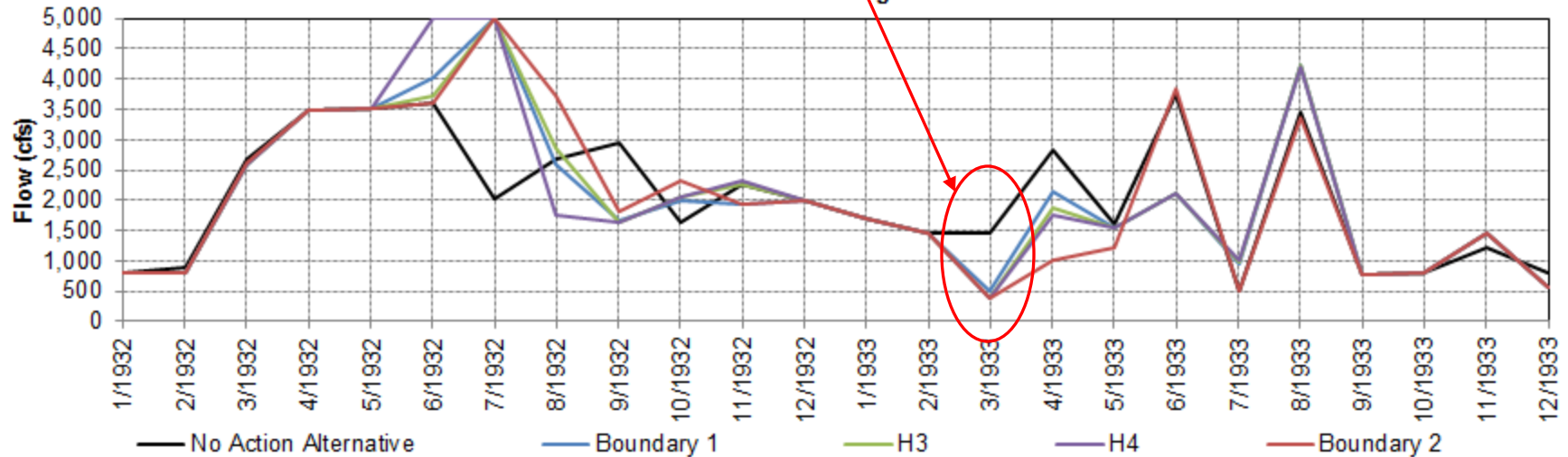
- Under Water Forum's 2006 Flow Management Standard, incorporated into NMFS 2009 BiOp:
 - If Folsom Reservoir storage is forecasted to fall below 200 TAF within the next 12 months:
 - Minimum Release Requirement for January 1 through September 15 allowed to drop to as low as 250 cfs.
 - Minimum Release Requirement for September 16 through December 31 allowed to drop as low as 500 cfs.
 - CA Water Fix models incorporate a "step-function" where MRRs drop to minimum allowable levels upon a Folsom Reservoir storage forecast less than 200 TAF.
 - In the CA Water Fix modeling of the With-Project alternatives, Nimbus releases drop to near minimums when the off-ramp occurs in March 1933.
 - The Water Forum technical team recognized this as a shortcoming and refined the modeling approach for off-ramps.
 - The Water Forum approach consists of a mitigated reduction in MRR to ensure storage throughout the Folsom Reservoir forecast period remains at or above 200 TAF.

March 1933 – Storage Recovery

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

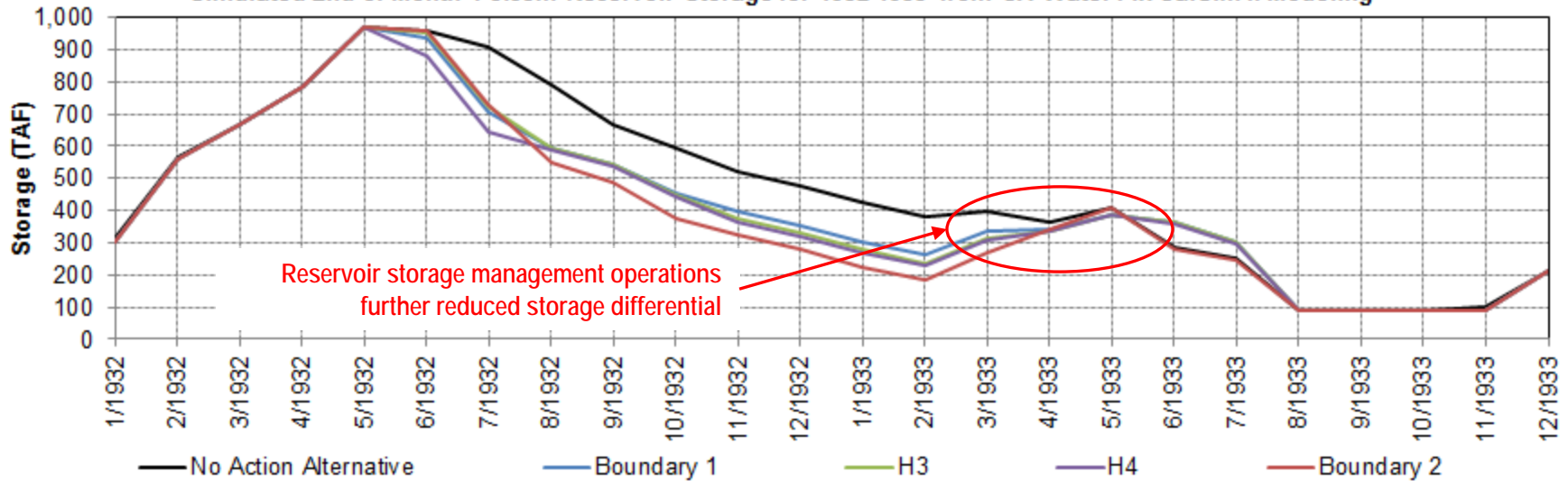


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

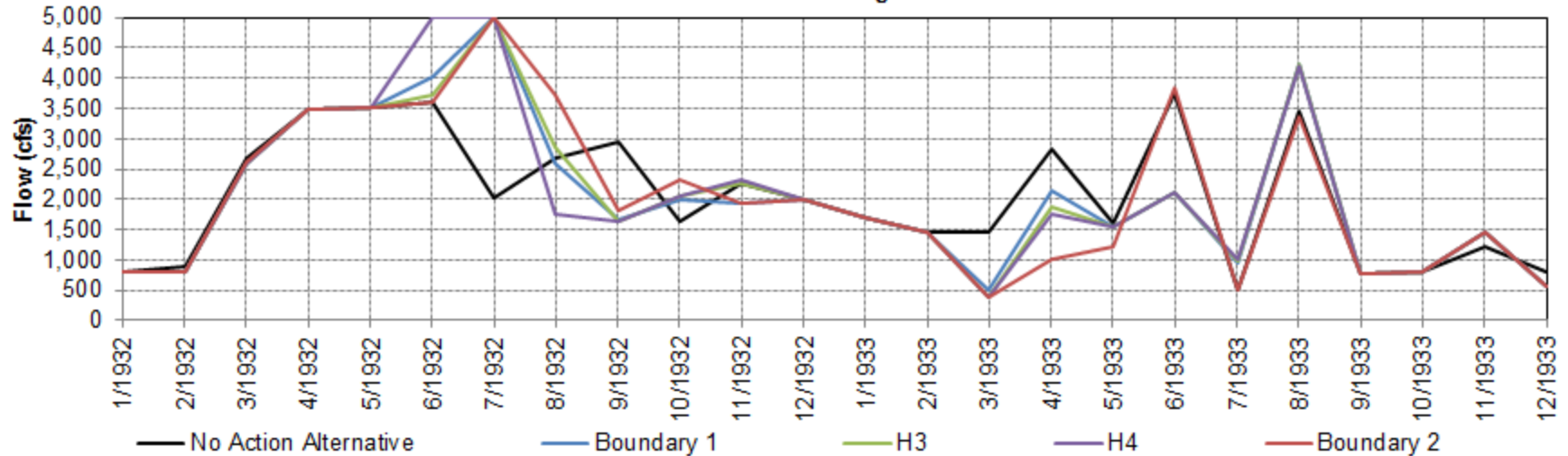


April-May 1933

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

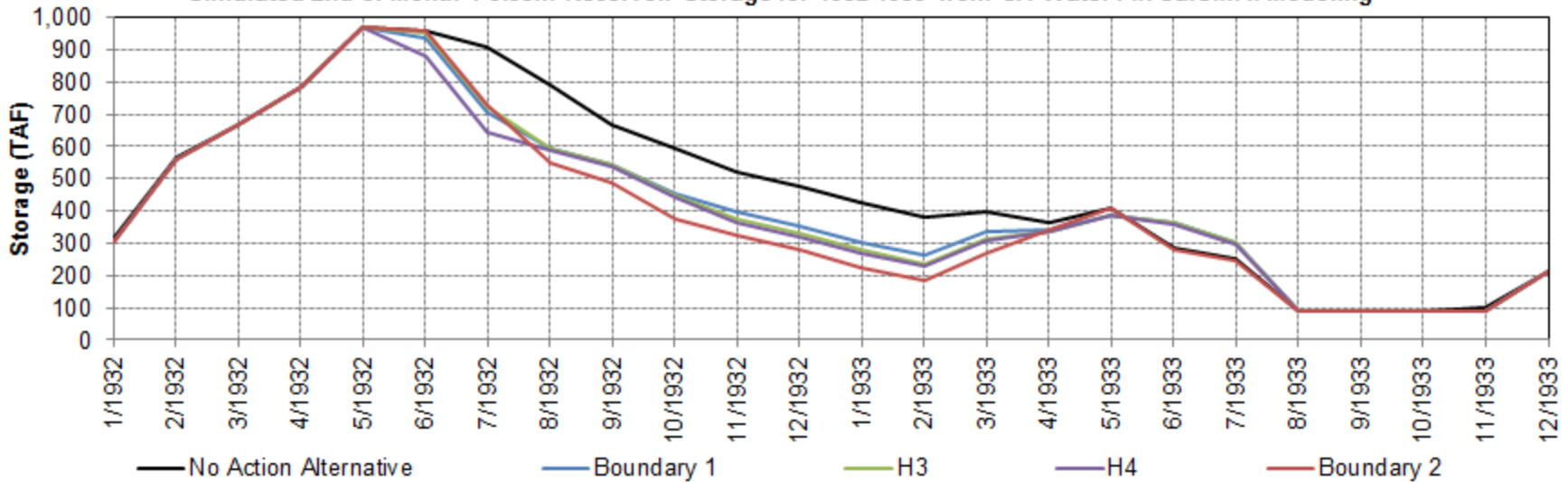


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

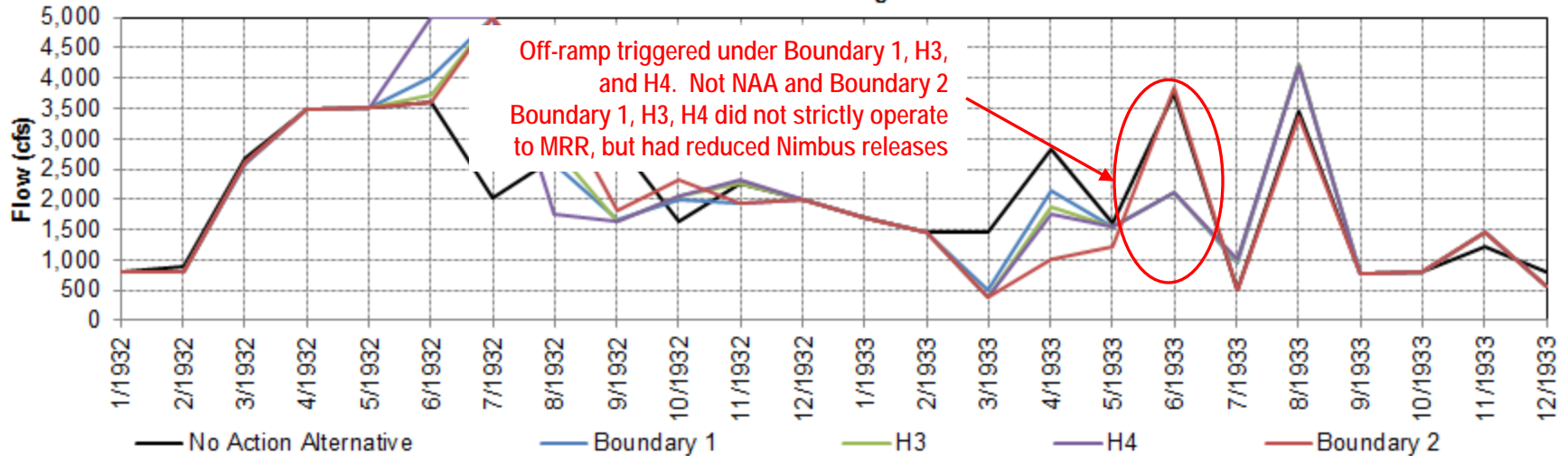


June 1933

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

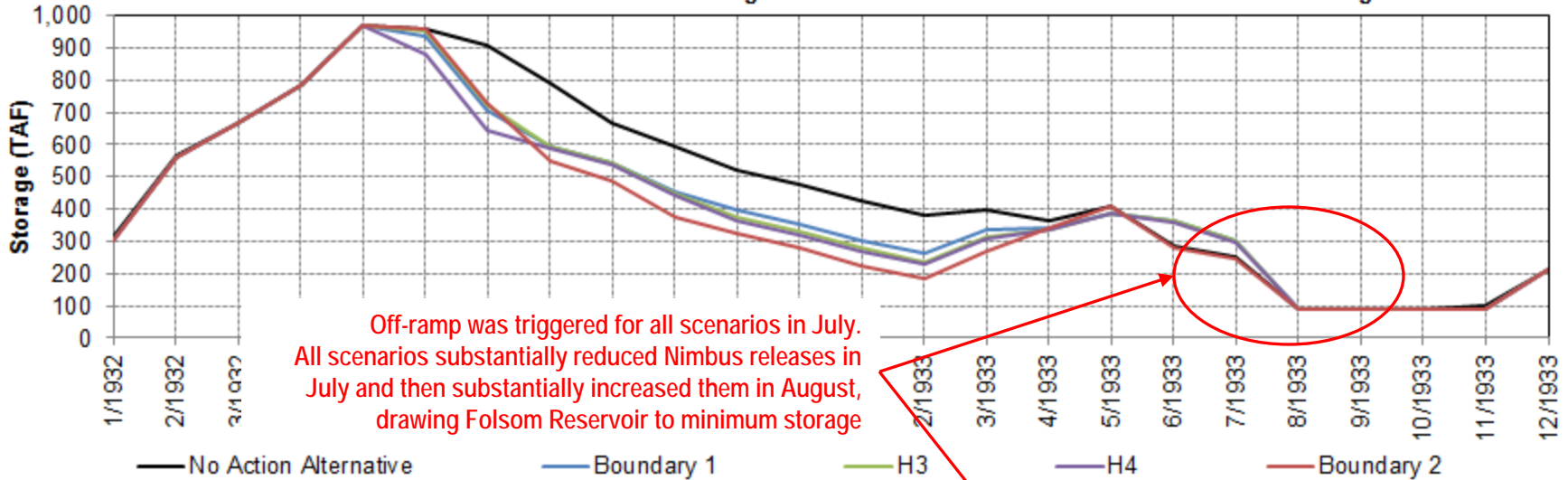


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

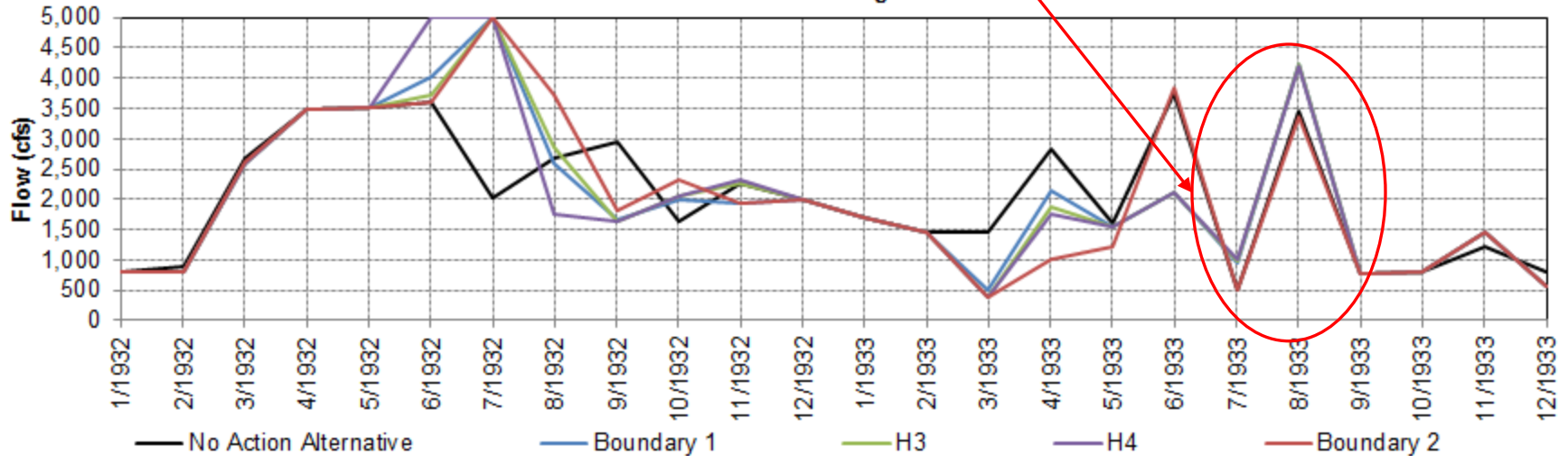


July-August 1933

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling

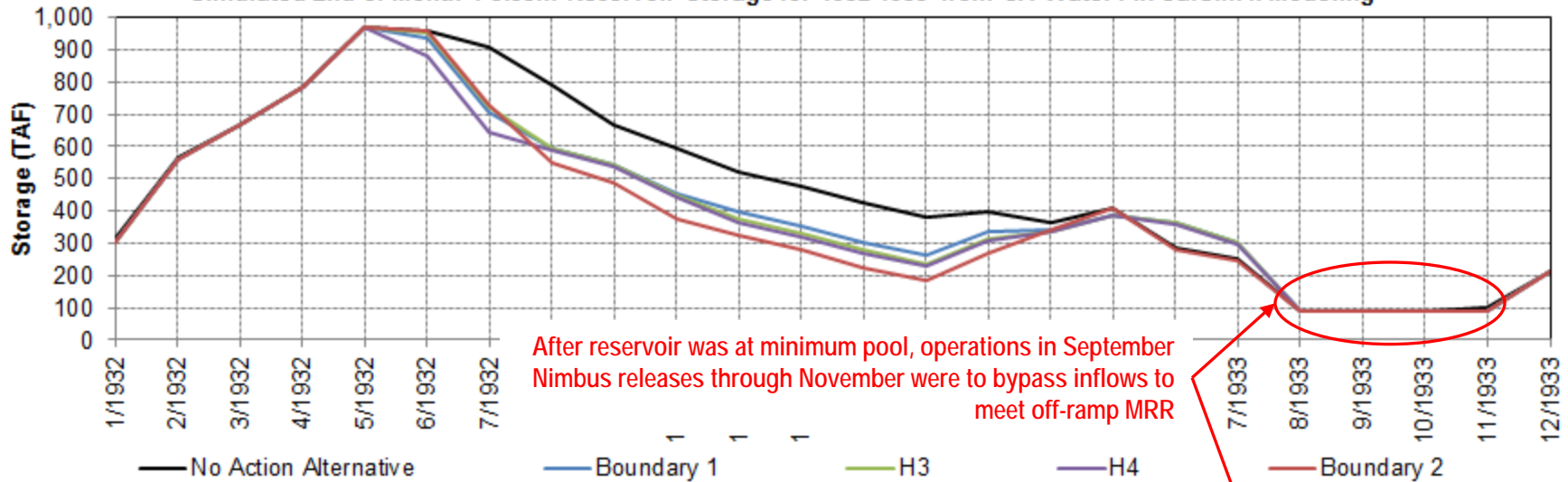


Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling

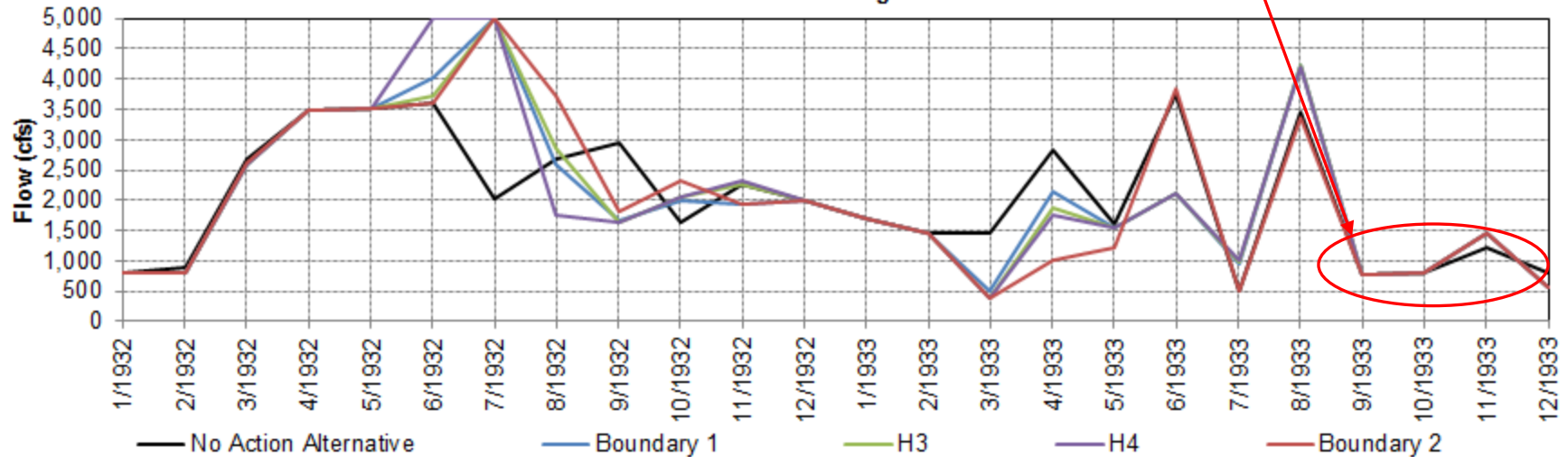


September 1933

Simulated End-of-Month Folsom Reservoir Storage for 1932-1933 from CA Water Fix CalSim II Modeling



Simulated Monthly Average American River Flow below Nimbus Dam for 1932-1933 from CA Water Fix CalSim II Modeling



Summary

- Excessive releases in June and July of 1932 under CA Water Fix With-Project alternatives created a substantial storage deficit compared to No Action Alternative.
- The storage deficit persisted through the end of a below-normal year into the following critically dry year.
- A large portion of the storage recovery under the With-Project alternatives in the following March through May 1933 was a result of an inappropriate implementation of the off-ramp condition.
- Inappropriately large releases in August 1933 under all alternatives resulted in Folsom Reservoir storage being drawn down to the minimum allowable storage at the end of August 1933.
- After being drawn down to the minimum allowable storage in August 1933, Folsom Reservoir storage remained at minimum allowable levels into the fall.