

2013 Rim Fire Impacts on Tuolumne River Water Quality

California Cooperative Snow Surveys Program

Sixty-First Annual Meeting of Cooperators

November 3-5, 2015

Sonora, CA

Presenter: Carrie Loschke MID

Rainbow Pools
run-off March
21, 2014



Background

- August 2013 Rim Fire burned over 400 square miles of the Tuolumne River watershed
- Concern over post-Rim Fire impacts to watershed hydrology sediment characteristics and water quality
- October 22, 2013-MID Board in cooperation with TID and HHWP approves Agreement with United States Geological Survey (USGS) to monitor water quality and flow on the Tuolumne River at Don Pedro Reservoir

Objectives

- Monitor the water quality and sediment characteristics in the Tuolumne River Watershed
- Establish a database of post-fire flow sediment characteristics and water quality information
- Investigate trace metal delivery and cycling in Don Pedro Reservoir

Actions

2013/2014 Season

- December 2013-installation of stage and flow gauge and real-time water quality instruments at Wards Ferry Bridge

[USGS 11285500 Tuolumne R A Wards Ferry Br NR Groveland, CA](#)

Actions

2013/2014 Season

- March 2014-installation of science buoy and monitoring with concurrent depth sampling after storm events

Rough and ready ck.



Buoy & Instrument package



Lake Don Pedro

Moccasin Marina

11/3/2015



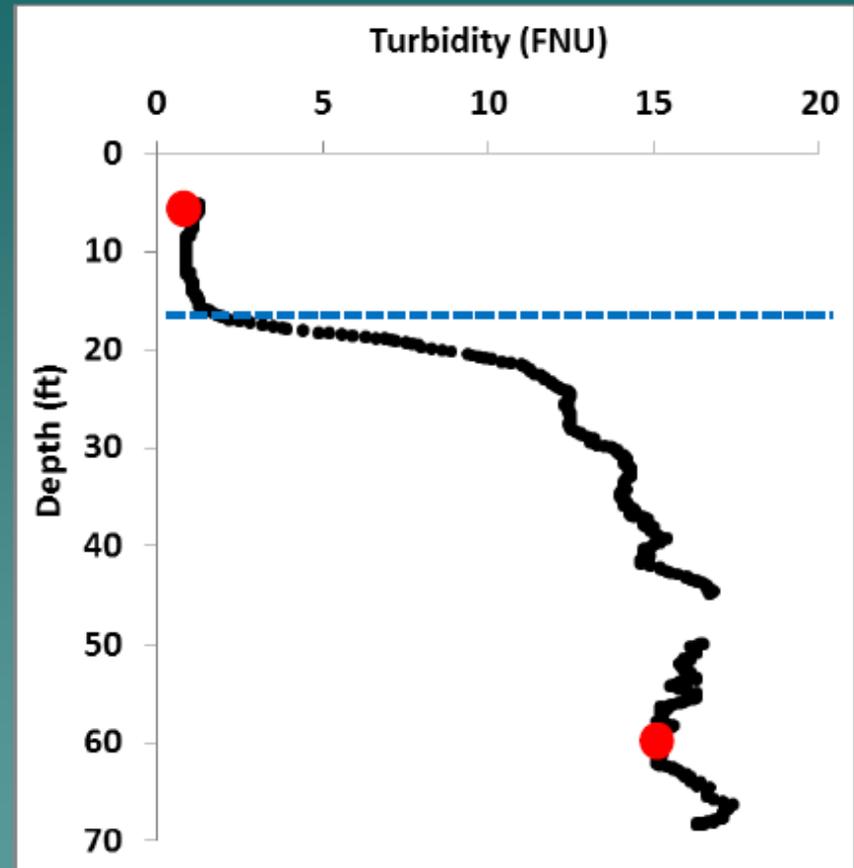
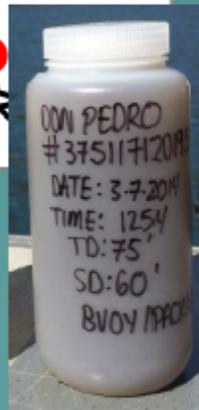
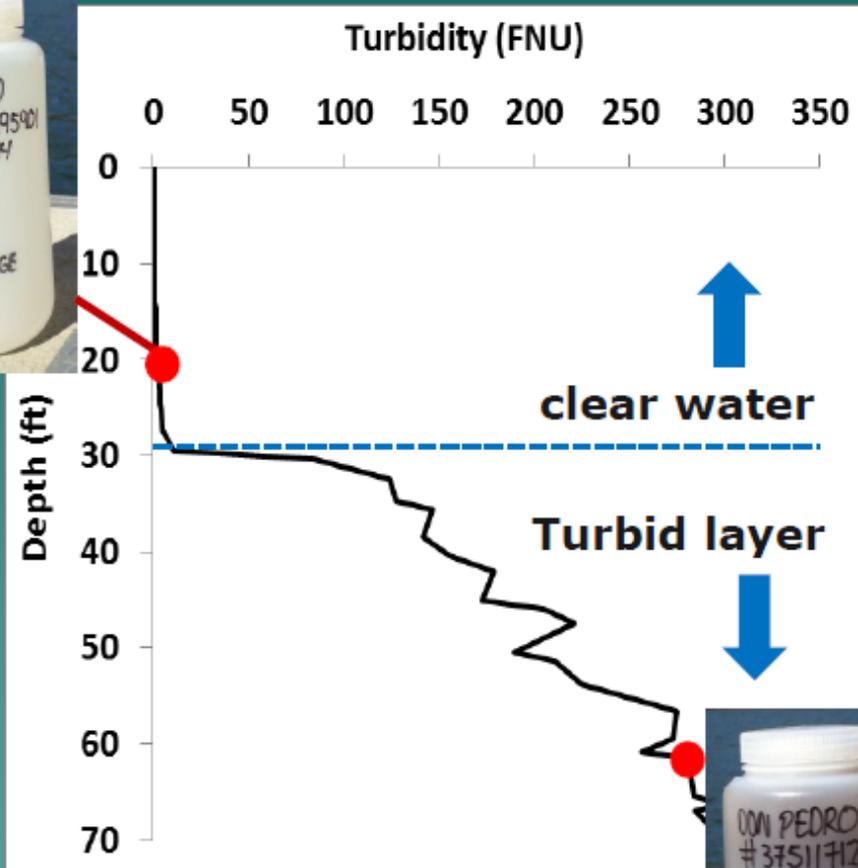
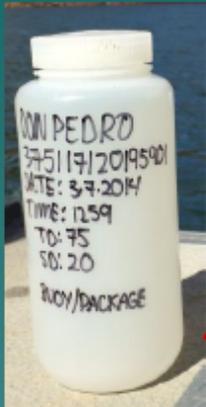
Depth samples were collected and analyzed for various constituents of concern (trace metals etc.)

FINDINGS

Storm Runoff and Sediment have entered Lake Don Pedro with stratification

March 7, 2014

March 28, 2014



Summary

2013/2014 monitoring

- Extreme drought dominated water year 2014 resulting in small and infrequent flows into Don Pedro
- Low flows resulted in river stratification at the buoy
- Discrete samples collected at lower depths indicated that inputs to water quality weren't always captured at the science buoy
- Initial metal samples of sediments showed no "red flags" at this time. All within acceptable water quality objectives

Actions

2014/2015 Monitoring

- Continued real-time monitoring at Wards Ferry Bridge site and modified the sampling plan from the 2013/2014 season.
- Removed the science buoy
- Primary focus on tracking dense underflows through reservoir profiling with in-situ water quality sensors



Methods

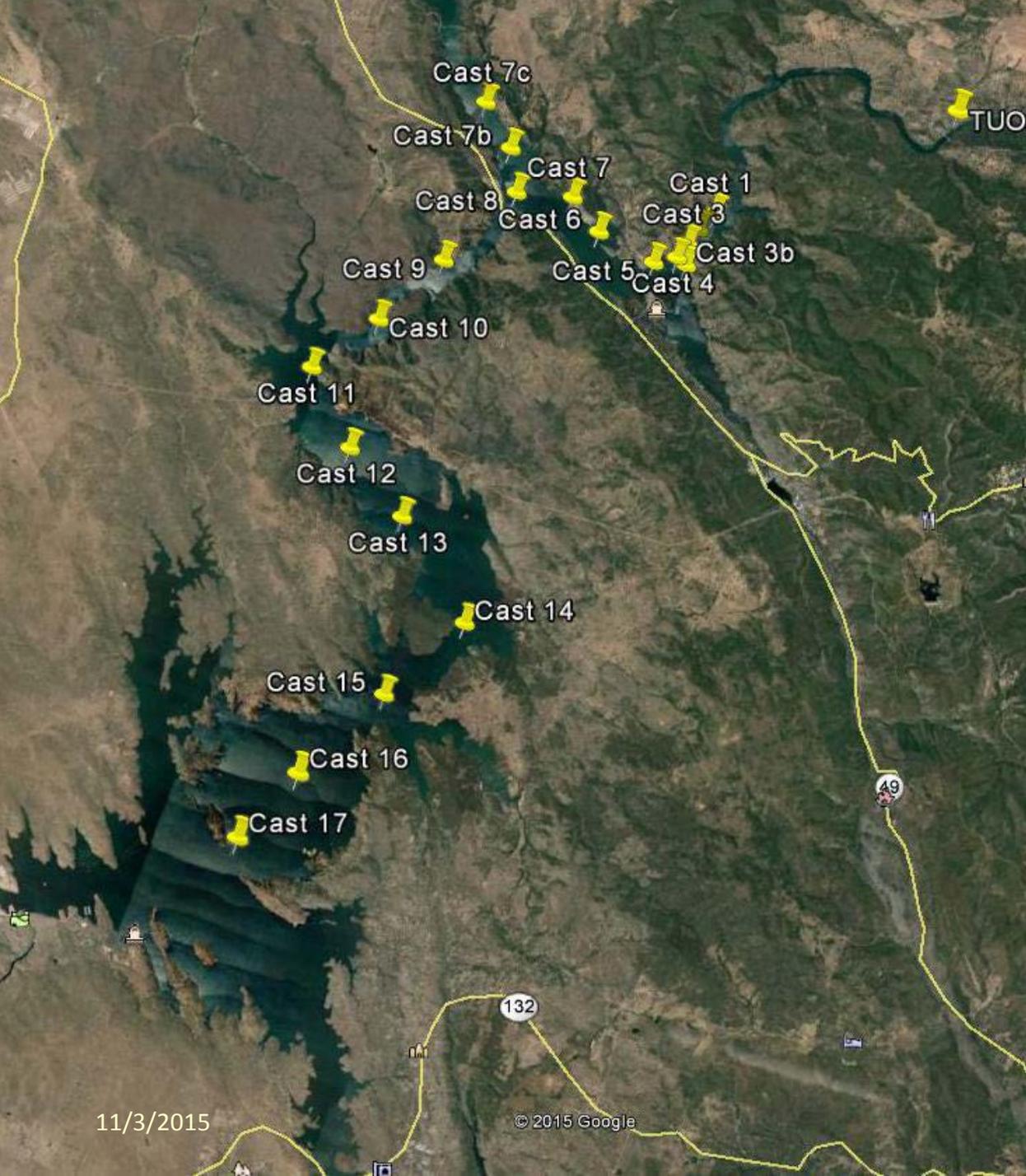
Profiles collected with RBR multi-parameter profiling sonde (depth, temperature, conductivity, turbidity, and dissolved oxygen).
Cross-sections measured at sampling sites.

Cast locations

February 11 – Locations 1-12 only

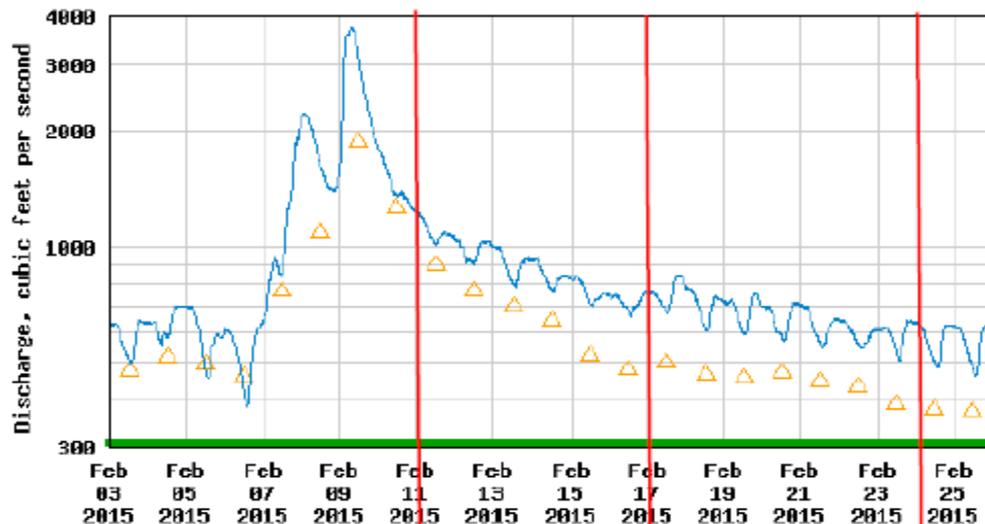
February 17 – Locations 1-15
(including 3b, 7b, 7c)

February 24 – Locations 1, 3, 5, 7-17
(not including 3b, 7b, 7c)



Cast	x (km)
1	0
2	0.5
3	0.9
4	1.2
5	1.6
6	2.8
7	3.6
8	4.8
9	6.7
10	8.5
11	10.5
12	12.1
13	13.8
14	16.5
15	18.5
16	20.8
17	22.5

USGS 11285500 TUOLUMNE R A WARDS FERRY BR NR GROVELAND CA



Largest flow since Rim fire occurred in early February 2015

Flow and turbidity at Wards Ferry streamgauge for February event

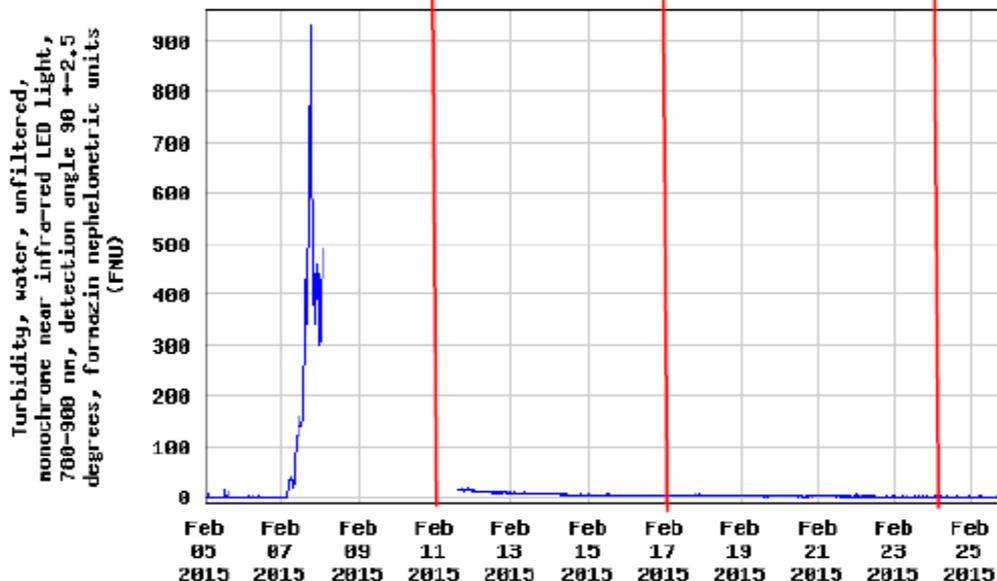
Red lines indicate dates of water quality profiling in the reservoir

Feb 11 ~ 2 days after peak

Feb 17 ~ 8 days after peak

Feb 24 ~ 15 days after peak

USGS 11285500 TUOLUMNE R A WARDS FERRY BR NR GROVELAND CA



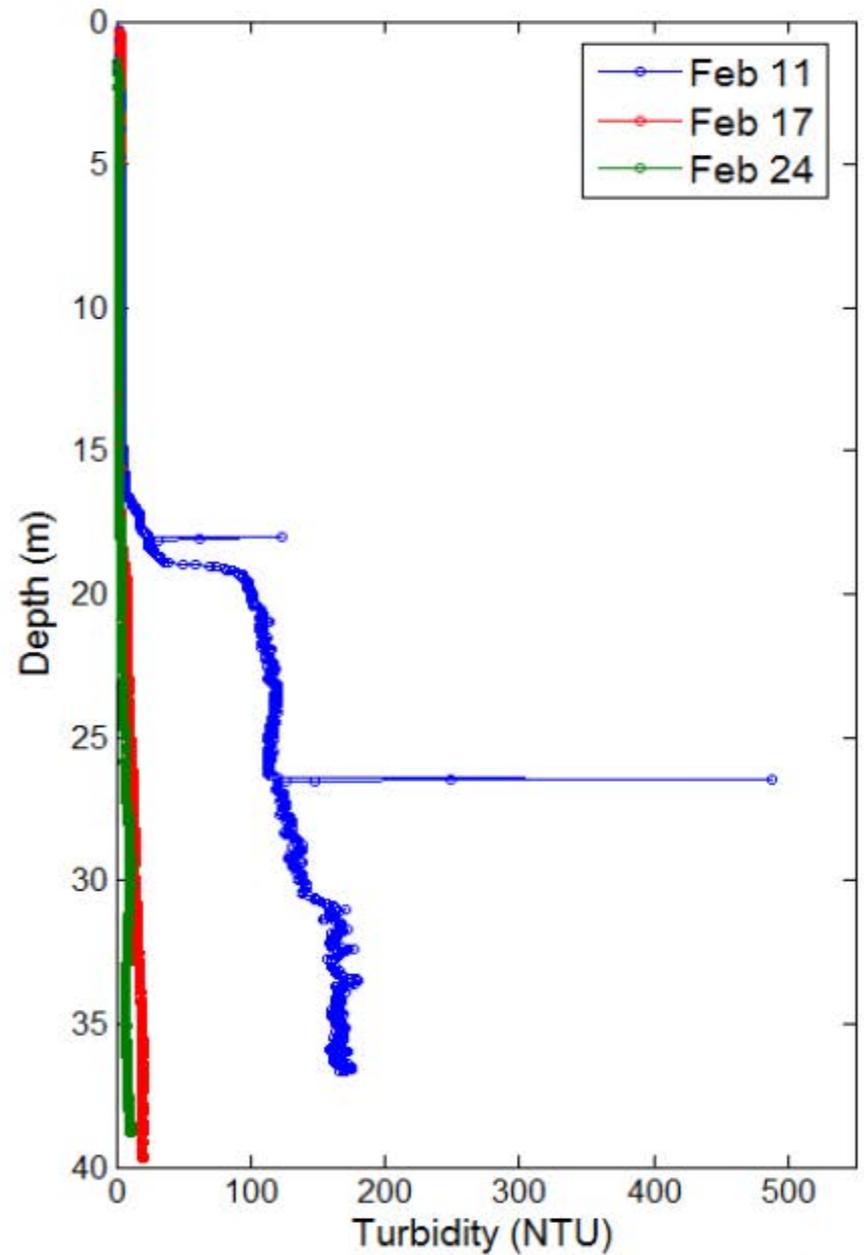
----- Provisional Data Subject to Revision -----



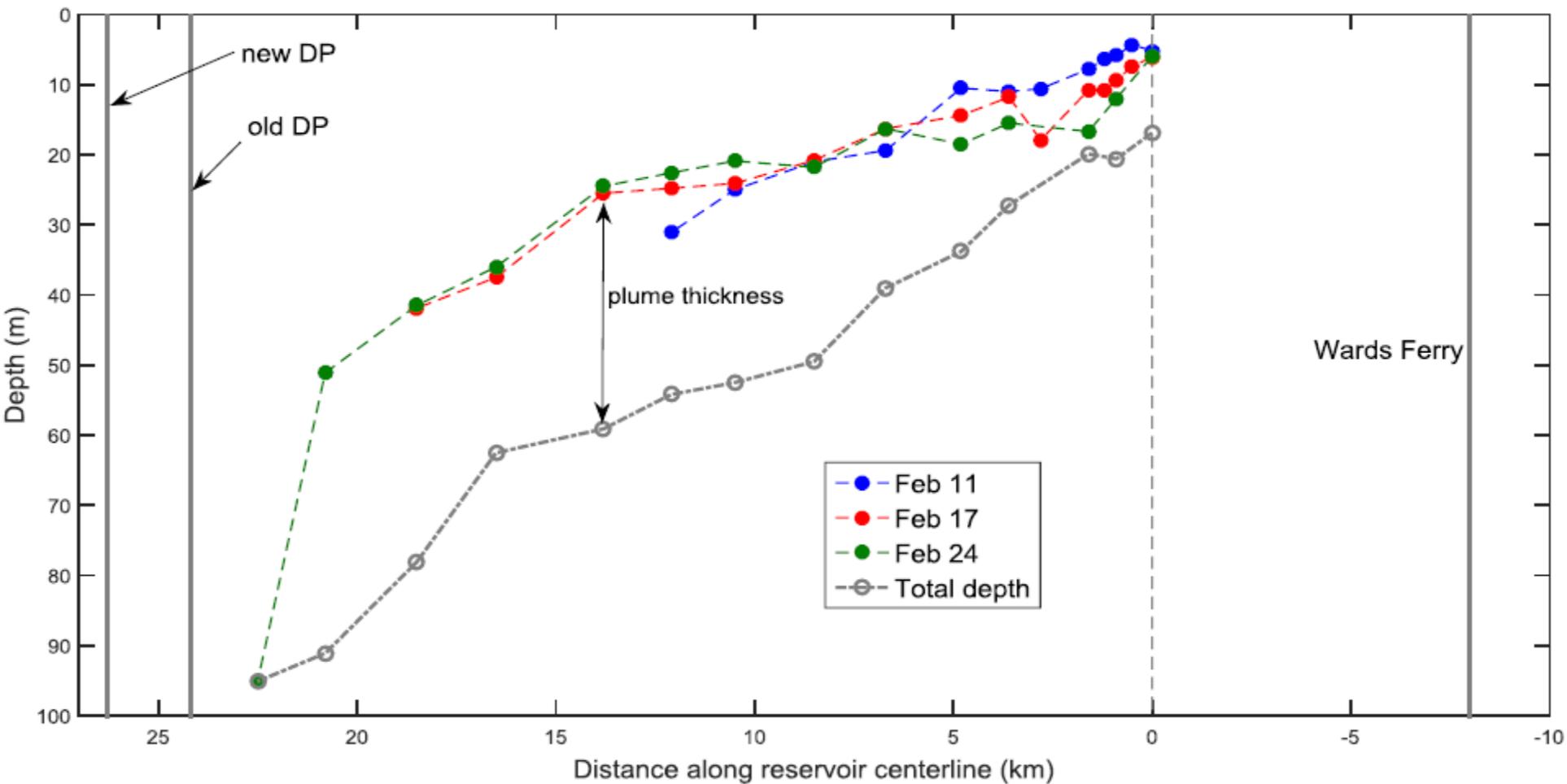
Cast 9

$x = 6.7 \text{ km}$

Sampled all 3 dates; depths
below 37 m weren't sampled on
Feb 11



Turbid plume thickness



Sediment samples collected October 26, 2015



Summary

2014/2015 monitoring

- Extreme drought dominated water year 2015(again)resulting in small and infrequent flows into Don Pedro
- The plume traveled further into the reservoir than expected, though not much to base our assumptions on
- We need to get out on the reservoir earlier after a runoff event to capture the highest concentrations of sediment; travel time from Wards Ferry was short and the plume moved rapidly (at least 20km in 3 day)
- Sediment collected from the reservoir bed will be analyzed for constituents similar to those found in ash samples collected from the Rim Fire. Is there a nexus between the two?

What's Next?

What about El Nino?

Any Impacts from the drought?

Will we continue monitoring in 2016?

Will we find anything?

Will there be a snow pack this year?

Questions?