

CORRELATION BETWEEN RED DOG AND SONORA RAINFALL (January 9-11,1862)---Using Lift Factors derived from Feb. 1986 Storm

INTRODUCTION: This is an investigation designed to test the relationship between the rainfall amounts that fell at Sonora and Red Dog during the three-day storm of January 9 – 11, 1862. The derivation of a three day estimate (**14.38 inches**) for Red Dog can be found in our report: **Revising January 9 – 11, 1862 Rainfall Estimate For Red Dog**. The derivation of a three day estimate (**11.46 inches**) for Sonora comes from our main report: **IS THERE AN ECHO? Dr. Snell's 1861-62 Sonora Rainfall Measurements ARE VALID!**

TEST DESIGN: Except for minor variations, it is essentially the same test that was used in our 2013 Final Report. What we call orographic lift factors were derived from the major flood producing storm of February 1986. The heaviest three day precipitation (lift factor) values from this storm at several points along the route were used to lift both Red Dog and Sonora's 9,10 and 11, 1862 rainfall totals to the same elevation as Blue Canyon (5,280 feet). The February 1986 storm was selected over January 1997 because its heaviest three day value for Blue Canyon came closest to matching the (three day Blue Canyon) estimates of 20 and 21 inches for January 1862 made by The California Department of Water Resources. This report: **DWR ANALYSIS OF 1862 PRECIPITATION AND RUNOFF** was dated February 23, 1999. In the final analysis we chose the February 1986 storm because the available evidence indicated that it came closest to duplicating the conditions that prevailed during the January 9-11, 1862 storm.

Note: Before conducting the test, two intermediate points were added -- Placerville (elevation 1850 feet) and Iowa Hill (elevation 3100 feet). This was done mainly to explain the orographic lifting process.

One final item before testing begins, we need to adjust the observation time of Blue Canyon's heaviest three day February 1986 rainfall total from midnight to 8AM. Now the precipitation observation time at Blue Canyon matches Iowa Hill and Placerville. This was relatively easy to accomplish since Blue Canyon measures the rainfall in hourly increments. The adjusted three day Blue Canyon total for February 1986: 19.69 inches.

ADJUSTING RED DOG AND SONORA THREE DAY JANUARY 9-11,
1862 RAINFALL TO BLUE CANYON'S ELEVATION USING LIFT
FACTORS DERIVED FROM FEBRUARY 1986 STORM

Route "A": Red Dog – Iowa Hill –Blue Canyon

Red Dog: 14.38 in.---elevation 2800 feet
Iowa Hill: .87 in. (lift factor between Red Dog and Iowa Hill)
Blue Canyon: 7.05 in. (lift factor from Iowa Hill to Blue Canyon)
22.30 in.

Orographic Lift Factor Computations:

Red Dog to Iowa Hill
Placerville to Iowa Hill
Iowa Hill to Blue Canyon

Step No. 1: The lift factor between Placerville and Iowa Hill
Iowa Hill (heaviest three day Feb.1986 rainfall): 12.64 in.
Placerville (" " "): - 9.04 in.
3.6 in.

Step No. 2
Iowa Hill (elevation: 3100ft.)
Placerville (" : - 1850 ft.)
1250 ft.

Step No. 3: Calculate the amount of three day orographic rain per 100
ft. increase in elevation between Placerville and Iowa Hill.
Divide 3.6 in. by 12.5 (100 foot increments) rounded off equals **.29 in.**

Step No. 4: Calculate the lift factor between Red Dog and Iowa Hill.
.29 in. x 3 (100s) = **.87 in.**

Step No. 5: The lift factor between Iowa Hill and Blue Canyon
Blue Canyon (heaviest three day Feb. 1986 rainfall): 19.69 in.
Iowa Hill (" " "): - 12.64 in.
7.05 in.

Note: In our Final Report dated April 2013 we listed the elevation of
the Placerville precipitation reporting point for February 1986 as 1890

feet. The latest print out from the National Records Center in Asheville, North Carolina indicates that the February 1986 elevation should read 1850 feet.

We corrected this error in our calculations that involved lifting Red Dog to the elevation of Iowa Hill. However, the difference of 40 feet in the two readings does not affect the Sonora calculations we made in our 2013 Report. Because we were unable to find anyone that knew where Dr. Snell lived in Sonora, we could not ascertain the elevation of his rain gauge. It makes sense to assume that he was making the rainfall measurements at his residence because in 1862 he was 80 years old. Since there is a street named after him, we also think it makes sense to assume that he lived somewhere along that street.

The internet map of Sonora indicates that the street named after Perez Snell is ~ 2,000 feet long. Rob Gordon of the Tuolumne County Historical Society was able to send us the elevation of the high point (1892 feet) and the elevation of the low point (1794 feet) along Snell street (or road). The average of these two elevation points is 1843 feet. We had assumed in our Final Report of 2013 that the elevation of the rain gauges at Sonora and Placerville were for all practical purposes the same. So the 40 foot difference in the Placerville rain gauge elevation was not a factor. If anything the 1850 foot elevation measurement at Placerville gives our assumption more credibility.

Route "B": Sonora – Placerville – Iowa Hill -- Blue Canyon

Sonora (same as Placerville):	11.46 in.
Placerville to Iowa Hill	: 3.6 in.
Iowa Hill to Blue Canyon	: <u>7.05 in.</u>
	22.11 in.

CONCLUSION: A comparison of the Blue Canyon rainfall estimates from Route "A" and Route "B", shows a difference of **less than 1%**.

COMMENT: This supports our earlier conclusion that the precipitation, from the two nearly consecutive 10 day periods of January 1862, was widespread and proportional. It effectively counters the claim of some researchers that the data conflicts. **We say: Not so in this region!**

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