REVISING JAN. 9-11, 1862 RAINFALL ESTIMATE FOR RED DOG

INTRODUCTION: In our Final Report of April 10, 2013, we made a pair of mistakes. The first mistake was made when I copied the wrong elevation of the cooperative weather observer's location at Iowa Hill for the month of February 1986. The second mistake was made when we didn't pay more attention to the method used to derive an estimated three-day rainfall total (January 9-11, 1862) for Red Dog. When our initial calculation of 14.65 inches came within .05 of an inch of matching a California Department of Water Resources estimate of 14.70 inches, made in an 1999 report, we decided that was close enough. However, this spring after our Iowa Hill elevation error surfaced we decided to review the whole process.

THE RESULTS OF THIS INVESTIGATION ARE OUTLINED BELOW

Available Precipitation (rainfall) Data for January 1862

Red Dog--- January 10, 1862: 5.82 inches (observation time 9AM)
January 11, 1862: 5.50 inches
Grass Valley--- Daily for January 1862 (observation time Noon)

Note: In order to estimate the total three day precipitation for January 9,10 and 11, 1862, we need to estimate how much rain fell at Red Dog on the 9th.

Procedure Followed to Obtain Original Estimate of 14.65 Inches

Step No. 1: Ratio and Proportion and a combination of Red Dog and Grass Valley data were used to estimate the rainfall at Red Dog for the 9th of January 1862.

2.77 in. (G.V. the 9th) : : 9.43 in.- total for 10th & 11th at G.V.
X 11.32 in.- total for 10th & 11th at R.D.

$$X = \frac{2.77 \text{ in.} \times 11.32 \text{ in.}}{9.43 \text{ in.}} = 3.33 \text{ in. (estimated rainfall R.D. on 9th)}$$

Step No. 2: Estimated three day total (Jan.9-11, 1862) for Red Dog:

3.33 in. + 5.82 in. + 5.50 in. = **14.65 inches**

Discussion: You will note that the observation times for Red Dog and Grass Valley differ by three hours. Even though the two stations are relatively

close (within ~ 8 air miles) a three hour difference in observation time has had some effect on the result. This argument has merit because you are comparing precipitation amounts from two different time frames. Another way to describe the difference: You are comparing apples and oranges instead of apples with apples.

Adjusting Grass Valley's Rainfall to Fit Red Dog's Time Frame

Station	**8th (Jan.) 9AM**	**9th (Jan.) 9AM**	**10th(Jan.) 9AM (11.32 in.)**	**11th (Jan.) 9AM**
Red Dog	0	5.82 in.		5.50 in.
	Noon	**Noon**	**Noon (9.43 in.)**	**Noon**
Grass Valley	.13 in.	2.77 in.	5.10 in.	4.33 in.

Step No. 1: Assuming the rainfall rate was fairly steady during the first 24 hours at Grass Valley, if we divide 2.77 inches by 8 we get a three hourly rate of .35 of an inch.

Note: Available evidence indicates that the storm was not only producing a steady rain when it entered the Grass Valley- Red Dog area---but it was at least of moderate intensity. On the 8th, the foothill region toward the north (Oroville) reported a hard rain all day with a similar report during the afternoon coming from the south—around Placerville. *Source: The floods of 1861-62 at and near Sacramento, compiled from daily papers by Sacramento City Engineers Given and Grunsky.* Sacramento's temperatures during the end of the storm, on the forenoon of the 11th, remained quite mild. *(See figure 3 in LAKE SACRAMENTO - Can It Happen Again? and Microfilm Roll "B" of Dr. Logan's observations.* This suggests that atmospheric conditions were stabilizing and the rainfall produced by the storm gradually faded away and did not end with a downpour. In Sacramento the rain had ended by 7AM the 11th.

Step No. 2: Without an accurate way of estimating the difference in rainfall between the two, we are going to assume that the same amount of rain (~ .35 of an inch) fell during each three-hour period. The one at the beginning of the storm and the three hours at the end of the storm. We are

also assuming that the .13 of an inch for Grass Valley listed under the 8th of January fell during the three hour period (9AM –Noon).

Step No. 3: With the new information developed above, we will use ratio and proportion to calculate a revised estimate of the amount of rain that fell at Red Dog on January 9, 1862 . This will also enable us to calculate a new three day estimate (January 9,10 and 11) for Red Dog.

$$\frac{2.77 \text{ in.} - .35 \text{ in.} + .13 \text{ in.}}{X} :: \frac{9.43 \text{ in.}}{11.32 \text{ in.}}$$

$$X = \frac{2.55 \text{ in.} \times 11.32 \text{ in.}}{9.43 \text{ in.}} = 3.06 \text{ in.}$$ (estimated rainfall for R.D. on the 9th)

Step No. 4: New estimated three day total for Red Dog:

3.06 in. + 5.82 + 5.50 = **14.38 inches**

Comment: This estimate may be a little high because the evidence presented above suggests (comparatively speaking) that less rain fell during the three hour period at the end of the storm than fell in the first three hours.

Discussion: The above mention of the California Department of Water Resources 14.70 inch three day Red Dog precipitation estimate for January 9-11, 1862 was in no way intended to be critical. For one thing they did not have access to Grass Valley information. During our early research we found the daily Grass Valley precipitation data. It was not available until our book LAKE SACRAMENTO was published in late 2005.

For the sake of clarity, I am going to add the following statement: In the early 1960s as an employee of Pacific Gas and Electric Company one of my assignments was doing historical storm research for the company's law department. In this capacity I made a concerted effort to locate the original precipitation records kept by the South Yuba Canal Company in Nevada City. The details of this search are described in Chapter II of our book LAKE SACRAMENTO. My search ended when I learned that the original records were destroyed by the big Nevada City fire of 1863. I doubt that a complete copy of the Nevada City precipitation record (for the 1861-62 season) exists. Otherwise I am certain retired State Climatologist Jim Goodridge would have placed it in the proper historical file.

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