

# Real Time Snow Water Equivalent (SWE) Simulation April 5, 2012 Sierra Nevada Mountains, California

## Introduction

This report is a beta product and subject to revision. We have developed a real-time SWE estimation scheme based on historical SWE reconstructions between 2000-2009 and daily in situ SWE measurements for the Sierra Nevada in California. Real-time SWE will be released on a weekly basis during the maximum snow accumulation/ablation period.

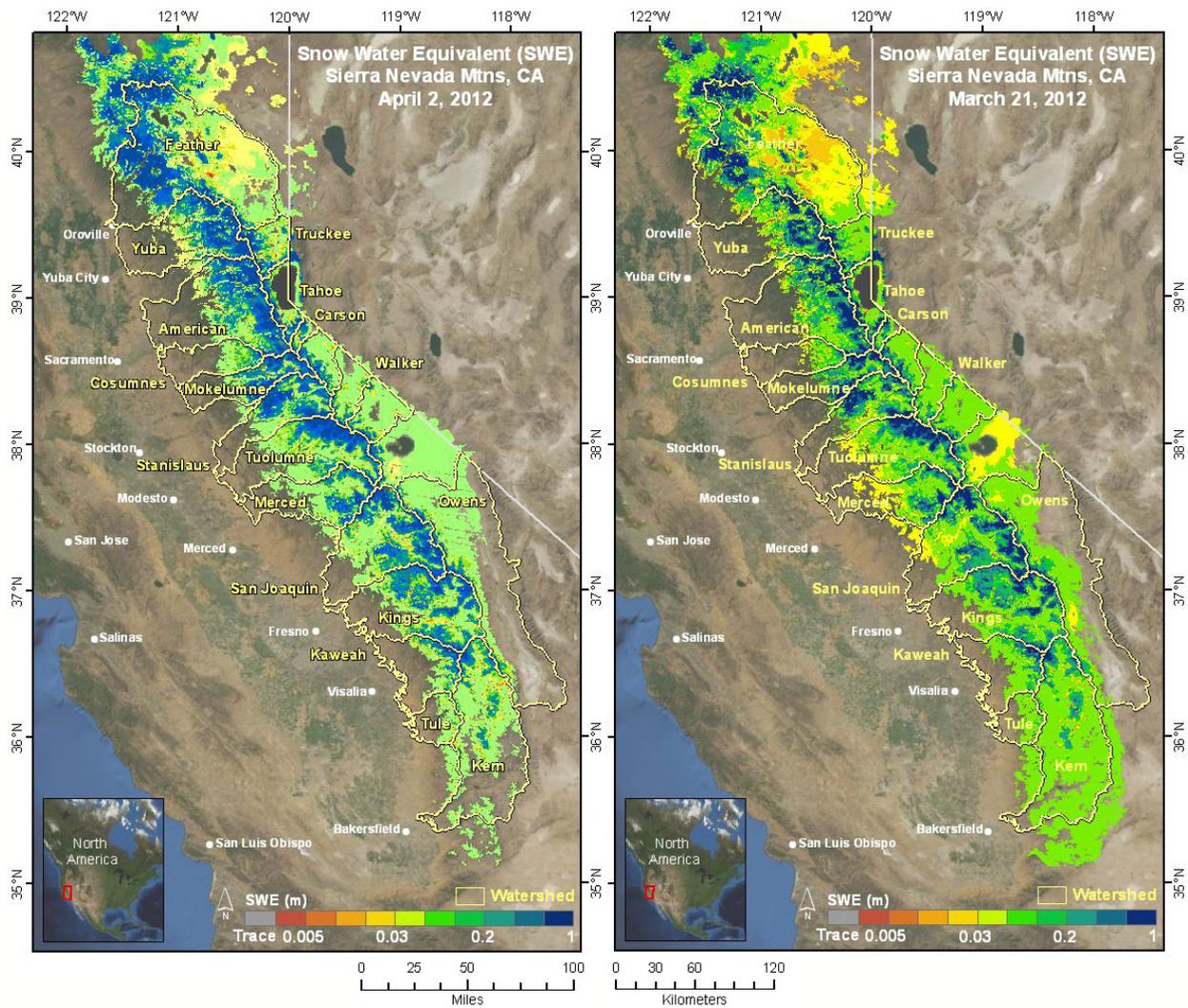


Figure 1. SWE amounts for April 2, 2012 are shown on the left and SWE amounts for March 21, 2012 are shown on the right.

## Discussion

Due to cloudy conditions the most recent cloud-free MODIS image available is for April 2, 2012. Figure 1 shows SWE amounts for April 2, 2012 on the left and SWE amounts for March 21, 2012 on the right. Note the marked increased depth of SWE between March 21, 2012 and April 2, 2012. Most watersheds are affected by the increased snowpack. Figure 2 shows the percent of average SWE for April 2, 2012 for the snow-covered area on the left. Note that most the northern areas are approaching higher % of averages from last week. On the right percent of average for April 2, 2012 is shown by watershed. Table 1 shows the average SWE by watershed for 4/2/2012, 3/21/2012, the percent of average for 4/2/2012 and the change between 3/21/2012 and 4/2/2012 for all areas above 3000 feet.

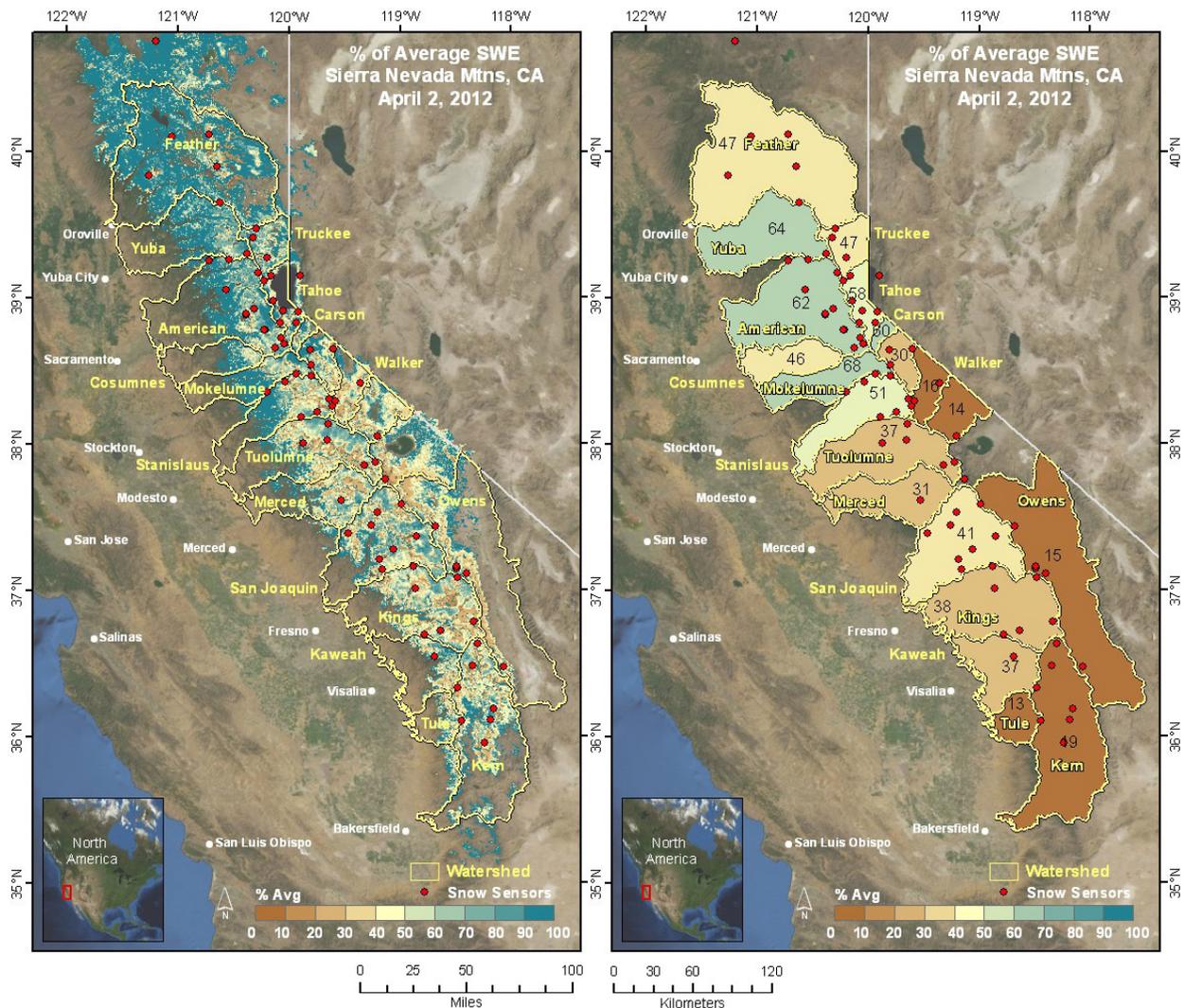


Figure 2. Percent of average SWE for April 2, 2012 for the entire Sierra (on left) and by watershed (on right).

## Methods

Results for the week of March 22–28, 2012 are based on March 21, 2012 real-time data from 80 in situ SWE measurements distributed across the Sierra Nevada, one Moderate Resolution Imaging Spectroradiometer (MODIS)/Terra Snow cover daily cloud-free image, a normalized reconstructed SWE image for March 1, 2006, and an anomaly map based on 10 years of modeled SWE (2000-2009). We are exploring other avenues to remedy the problem of when a cloud-free MODIS image is not available to produce a real-time SWE product. Relative to snow stations and the NWS SNODAS product, the reconstructed SWE product correlates strongly with full natural flow, especially late in the snowmelt season (Guan, et. al.).

Table 1. Mean SWE above 3000 feet for 4/2/2012, shown by watershed.

Watershed	4/2/12 SWE (in)	4/2/12 % Avg to Date	3/21/12 SWE (in)	3/21 thru 4/2 Change in SWE (in)
AMERICAN	15.56	62.48	13.92	1.64
FEATHER	11.17	46.79	8.00	3.17
KAWEAH	8.88	37.02	6.82	2.07
KERN	3.71	19.23	2.63	1.09
KINGS	10.02	38.31	9.99	0.03
TAHOE	17.61	57.91	17.73	-0.12
MERCED	8.19	30.76	7.48	0.71
OWENS	2.88	14.74	2.19	0.69
SAN JOAQUIN	11.74	40.98	12.09	-0.35
STANISLAUS	14.32	50.66	12.73	1.59
TRUCKEE	11.26	47.24	9.77	1.49
TUOLUMNE	10.80	37.24	9.98	0.82
YUBA	16.17	64.39	13.09	3.08
COSUMNES	5.33	46.12	3.22	2.12
MOKELUMNE	17.09	67.84	15.92	1.17
TULE	1.83	12.93	1.21	0.63
WEST WALKER RIVER	4.57	16.03	4.07	0.50
EAST WALKER RIVER	3.45	13.98	3.23	0.22
WEST FORK CARSON RIVER	13.11	60.13	11.56	1.55
EAST FORK CARSON RIVER	6.82	30.40	6.80	0.02

### ***Current Meteorology***

Between March 28 - April 2, 2012, 32 inches of snow fell in Alpine Meadows. 10 inches of snow fell in the Mammoth area. This weekend into Wednesday should see warmer temperatures and clearing skies.

## **References**

Guan, B., N. P. Molotch, D. E. Waliser, S. M. Jepsen, T. H. Painter, and J. Dozier: Snow water equivalent in the Sierra Nevada: Blending snow sensor observations with snowmelt model simulations. Submitted to *Water Resour. Res.*

Hall, Dorothy K., George A. Riggs, and Vincent V. Salomonson. 2006, updated daily. *MODIS/Terra Snow Cover Daily L3 Global 500m Grid V005*, March 4, 2012. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.