

Snow Coverage Area for the Sierra Nevada –March 1, 2011

The following analysis of **Snow Covered Area (SCA)** is derived from MODIS (Moderate Resolution Imaging Spectroradiometer) aboard NASA's Terra and Aqua satellites. Data from MODIS are processed to provide a resolution of 500 meters and a fractional SCA product where each pixel can range in value between 0 and 1 (e.g. 0.50=50% of the 500 meter pixel is covered by snow) as opposed to the operational binary product that defines a pixel as either snow or snow free. The MODIS SCA product is available on a daily basis, but viewable areas are subject to cloud cover. In addition, tree canopies mask a portion of the SCA and should be viewed accordingly based on the vegetation characteristics of each hydrologic unit and watershed.

This analysis covers the Sierra Nevada and various river basins, with Figure 1 highlighting the SCA over the Sierra Nevada for February 28, 2011 and February 28, 2010, and Figure 2 showing the monthly change in SCA between February 1 and February 28, 2011. Figures 3 (a-e) focuses on the **Feather, American, Tuolumne, Merced, and Kaweah** River basins. The historical March 1 and April 1 SCA represent the average observable SCA across each 300 m (1000 foot) elevation band over the MODIS period 2001-2010. Additional basins will be added throughout the year and upon request.

This data and analysis are made available by the University of California, Merced, University of California, Santa Barbara, and NASA's Jet Propulsion Lab under *NASA Grant NNG04GC52 (REASoN CAN 'Multi-resolution snow products for the hydrologic sciences')* and *California Department of Water Resources Agreement 4600008548*.

For further information or comments/suggestions please contact Robert Rice (rrice@ucmerced.edu) or (209)228-4397.

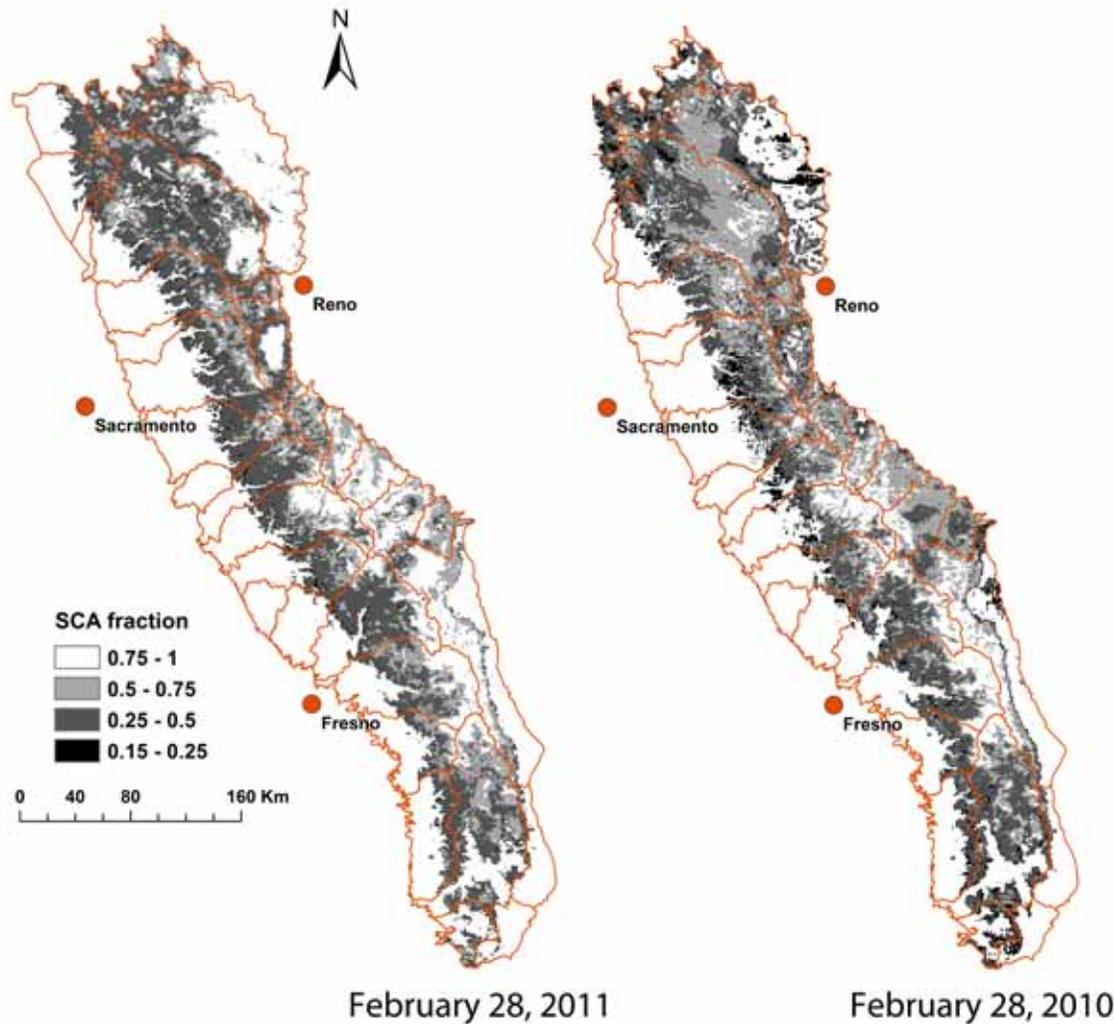


Figure 1. SCA over the **Sierra Nevada** on February, 28 2011 and 2010 outlined by the individual watersheds. Evident is the similar snow cover extent between February 28, 2011 and 2010, in which the statewide snow water equivalent (SWE) on March 1, 2011 was 125% of the historical March 1 average, while March 1, 2010 was 106% of the historical March 1 average. It should be noted that March 1, 2011 was 110% of the historical April 1 average, and March 1, 2010 was 93% of the historical April 1 average.

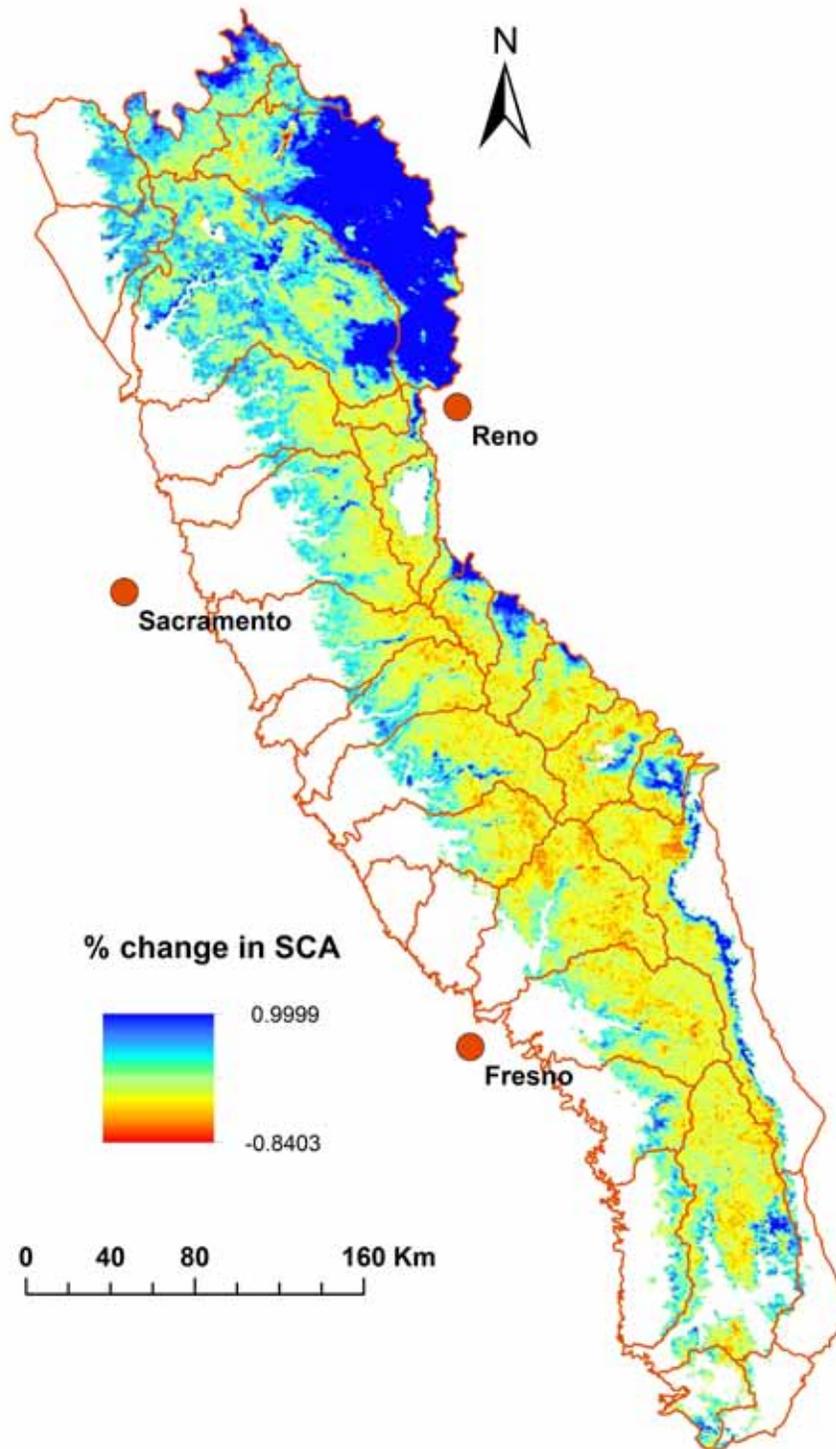
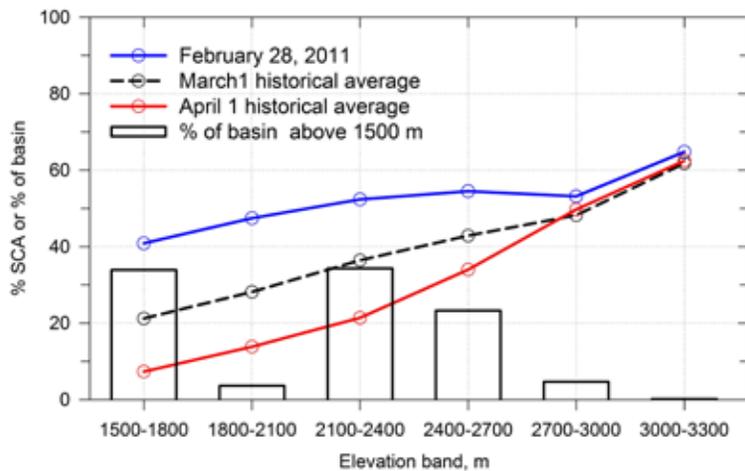
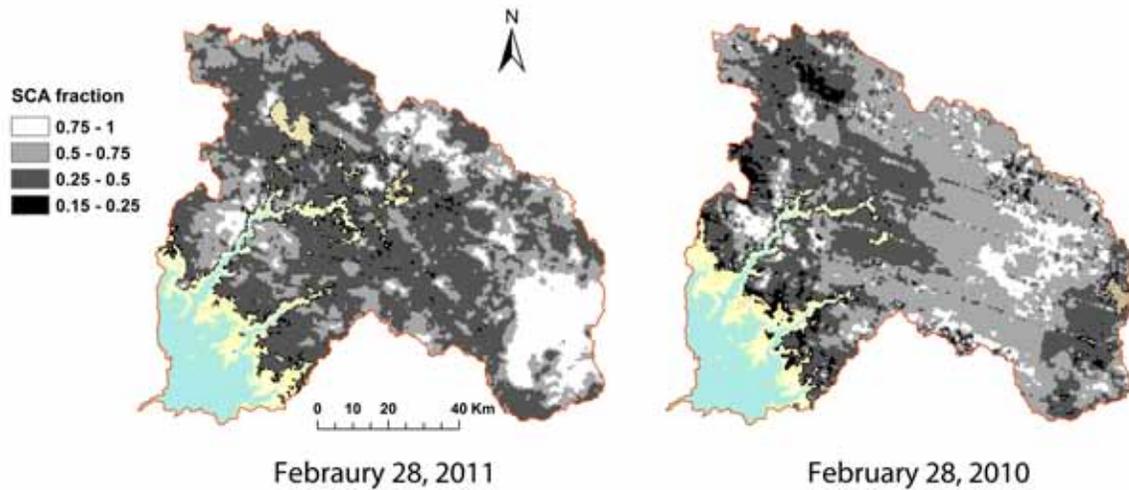
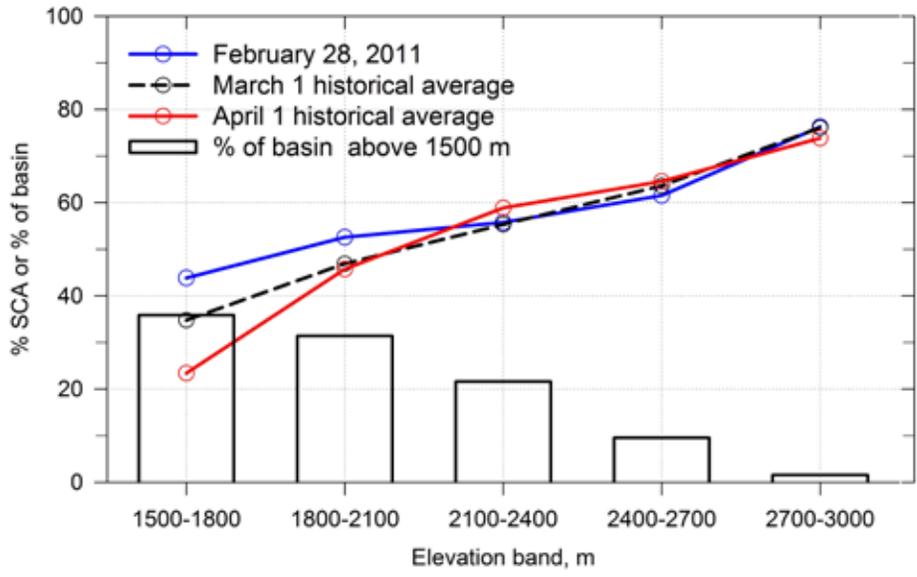
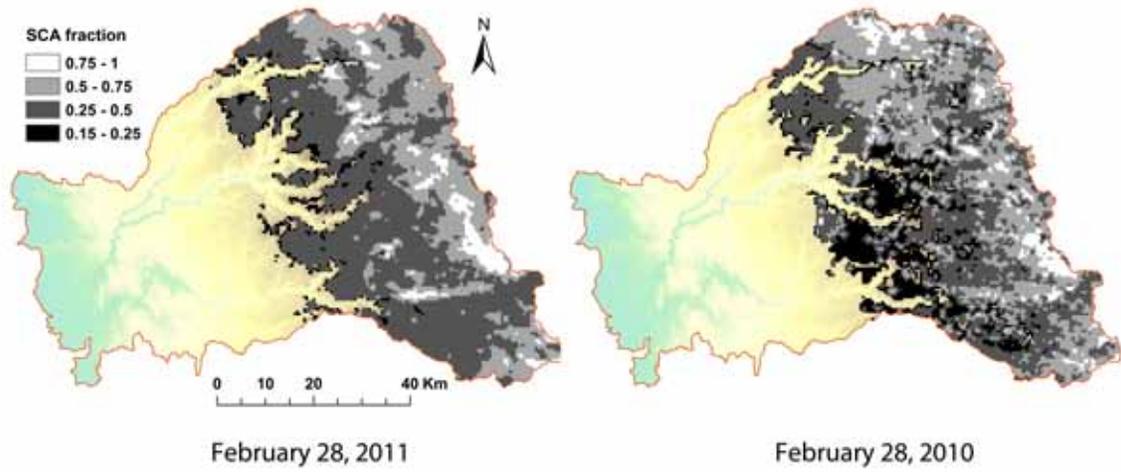


Figure 2. The graph shows the % change of SCA from February 1–February 28, 2011. Of interest is the increase of snow cover area at the lower elevations throughout the Sierra Nevada, as a wet conditions and cool temperatures contributed to the increase.



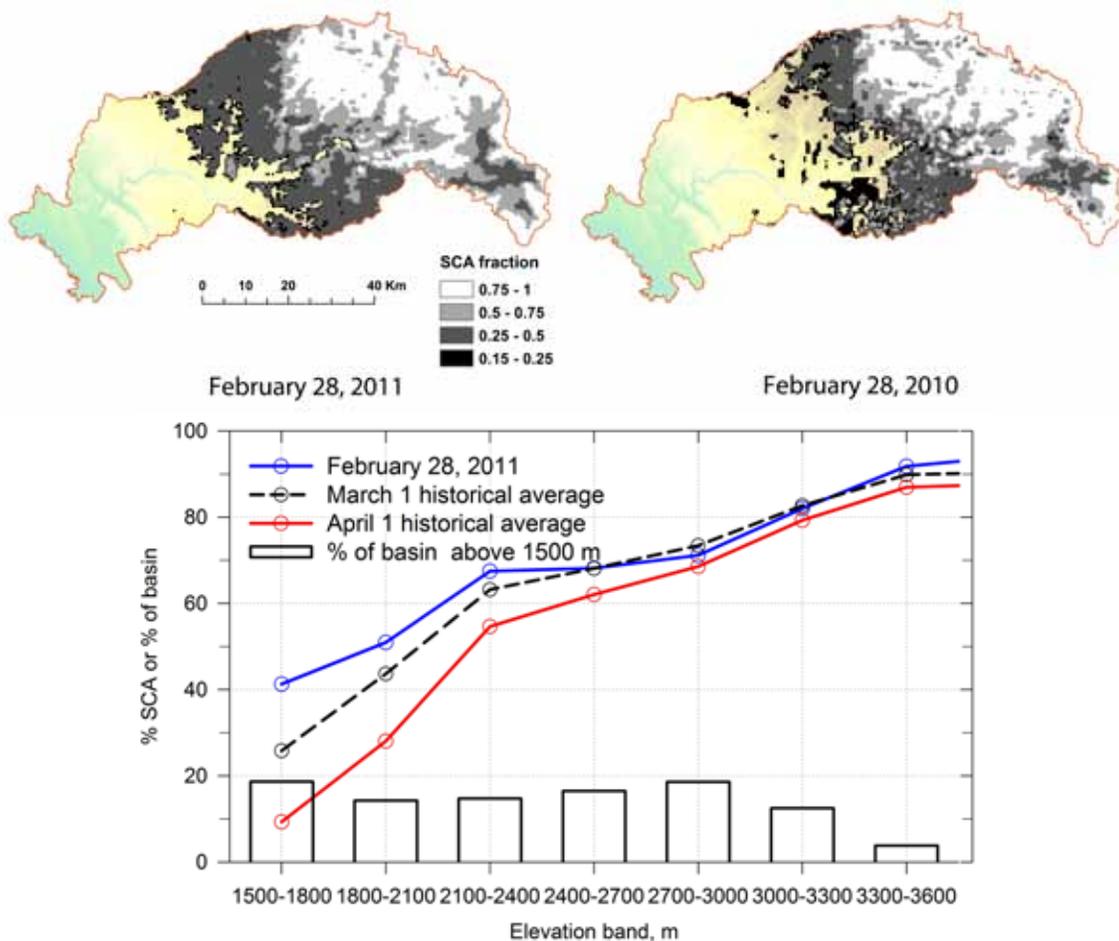
	February 28, 2011	March 1	April 1
1500-1800	41%	21%	7%
1800-2100	47%	28%	14%
2100-2400	52%	36%	21%
2400-2700	54%	43%	34%
2700-3000	53%	48%	50%
3000-3300	65%	62%	62%

Figure 3(a). SCA over the **Feather River** basin on February 28, 2011 and 2010. On March 1, 2011 basin-wide SWE was 114% of the March 1 historical average (based on basin-wide snow course data) and 100% of the April 1 historical average. March 1, 2010 was 109% of the March 1 historical average, and 96% of the April 1 historical average. Graphical and tabular data represent average % SCA by 300 m (1000 foot) elevation bands over the **Feather River** basin for February 28, 2011 and the March 1 and April 1 historical averages based over the MODIS period 2001-2010.



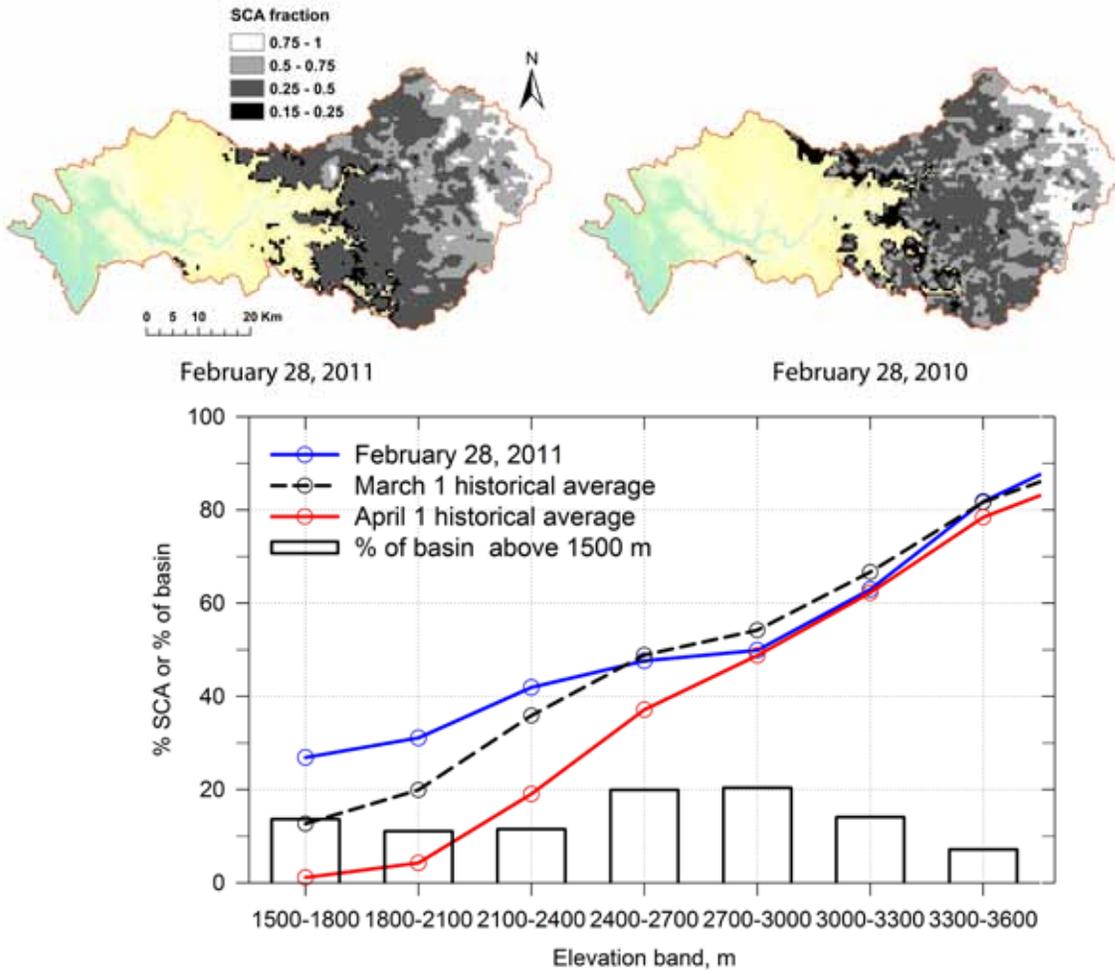
	February 28, 2011	March 1	April 1
1500-1800	44%	35%	23%
1800-2100	53%	47%	46%
2100-2400	56%	55%	59%
2400-2700	62%	64%	65%
2700-3000	76%	76%	74%

Figure 3(b). SCA over the **American River** basin on February 28, 2011 and 2010. On March 1, 2011 basin-wide SWE was 138% of the March 1 historical average (based on basin-wide snow course data) and 121% of the April 1 historical average. March 1, 2010 was 108% of the March 1 historical average, and 95% of the April 1 historical average. Graphical and tabular data represent average % SCA by 300 m (1000 foot) elevation bands over the **American River** basin for February 28, 2011 and the March 1 and April 1 historical averages based over the MODIS period 2001-2010.



	February 28, 2011	March 1	April 1
1500-1800	41%	26%	9%
1800-2100	51%	44%	28%
2100-2400	67%	63%	55%
2400-2700	68%	68%	62%
2700-3000	71%	73%	69%
3000-3300	82%	83%	79%
3300-3600	92%	90%	87%
3600-3900	94%	90%	88%

Figure 3(c). SCA over the **Tuolumne River** basin on February 28, 2011 and 2010. On March 1, 2011 basin-wide SWE was 134% of the March 1 historical average (based on basin-wide snow course data) and 117% of the April 1 historical average. March 1, 2010 was 111% of the March 1 historical average, and 96% of the April 1 historical average. Graphical and tabular data represent average % SCA by 300 m (1000 foot) elevation bands over the **Tuolumne River** basin for February 28, 2011 and the March 1 and April 1 historical averages based over the MODIS period 2001-2010.



	February 28, 2011	March 1,	April 1,
1500-1800	27%	13%	1%
1800-2100	31%	20%	4%
2100-2400	42%	36%	19%
2400-2700	48%	49%	37%
2700-3000	50%	54%	49%
3000-3300	63%	67%	62%
3300-3600	82%	82%	78%
3600-3900	93%	90%	88%

Figure 3(d). SCA over the **Merced River** basin on February 28, 2011 and 2010. On March 1, 2011 basin-wide SWE was 131% of the March 1 historical average (based on basin-wide snow course data) and 114% of the April 1 historical average. March 1, 2010 was 102% of the March 1 historical average, and 89% of the April 1 historical average. Graphical and tabular data represent average % SCA by 300 m (1000 foot) elevation bands over the **Merced River** basin for February 28, 2011 and the March 1 and April 1 historical averages based over the MODIS period 2001-2010.

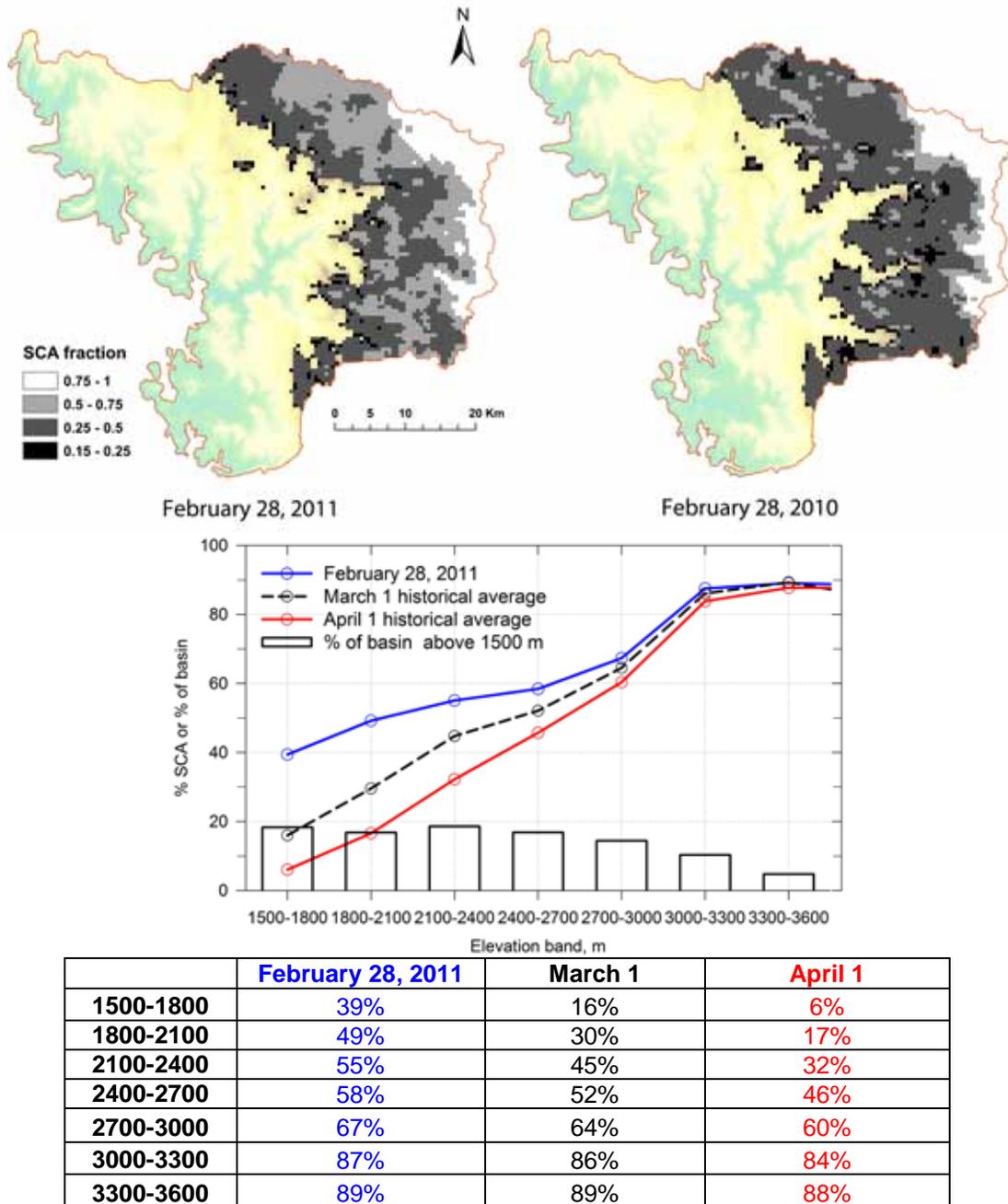


Figure 3(e). SCA over the **Kaweah River** basin on February 28, 2011 and 2010. On March 1, 2011 basin-wide SWE was 153% of the March 1 historical average (based on basin-wide snow course data) and 136% of the April 1 historical average. March 1, 2010 was 143% of the March 1 historical average, and 127% of the April 1 historical average. Graphical and tabular data represent average % SCA by 300 m (1000 foot) elevation bands over the **Kaweah River** basin for February 28, 2011 and the March 1 and April 1 historical averages based over the MODIS period 2001-2010.