

Snow Coverage Area for the Sierra Nevada –February, 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 January 30, 2011 and January 30, 2010, and Figure 2 showing the monthly change in SCA between January 1 and January 30, 2011. Figures 3 (a-e) focuses on the **Feather, American, Tuolumne, Merced, and Kaweah** River basins. The historical February 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).

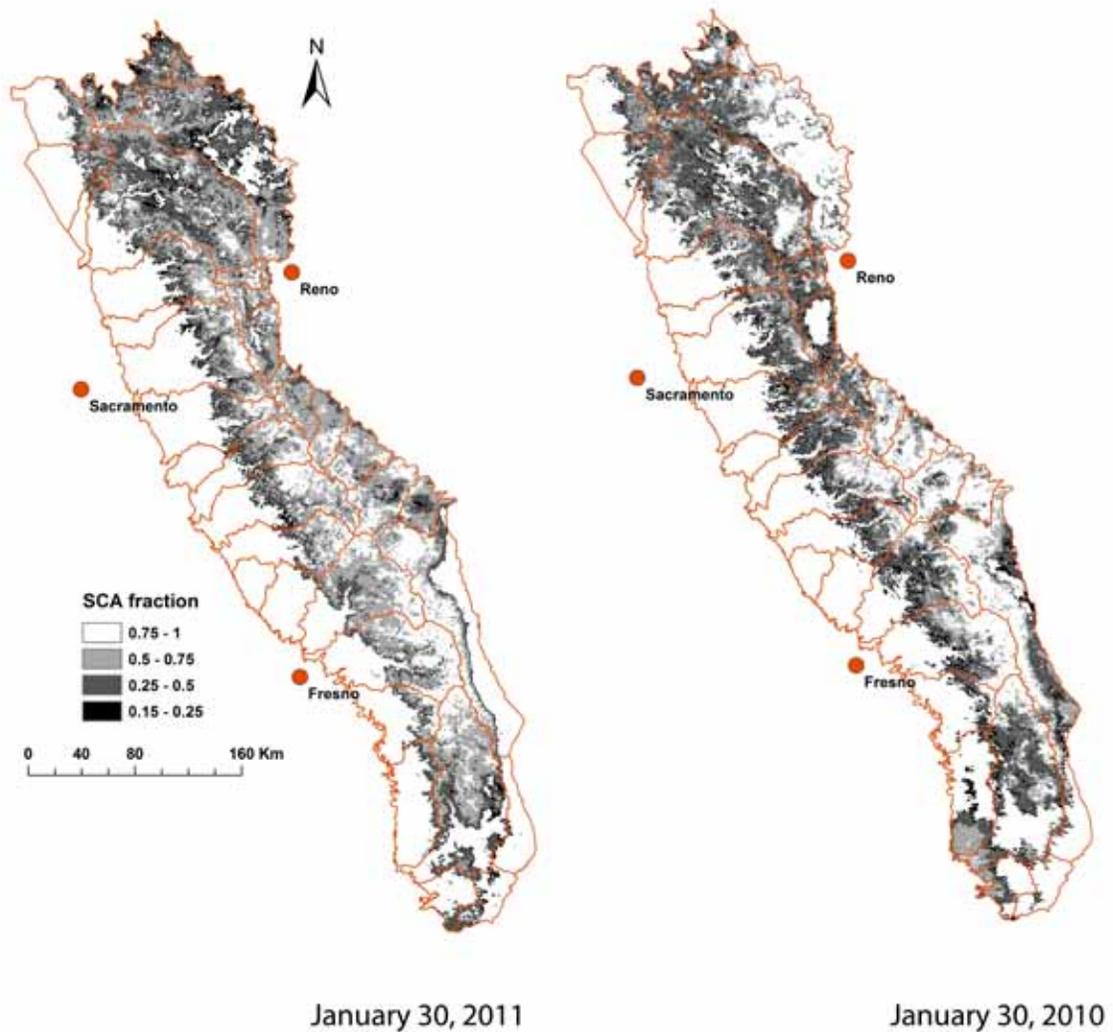


Figure 1. SCA over the **Sierra Nevada** on January, 30 2011 and 2010 outlined by the individual watersheds. Evident is the similar snow cover extent between January 30, 2011 and 2010, in which the statewide snow water equivalent (SWE) on February 1, 2011 was 134% of the historical February 1 average, while February 1, 2010 was 117% of the February 1 average. It should be noted that February 1, 2011 was 84% of the historical April 1 average, and February 1, 2010 was 74% of the historical April 1 average.

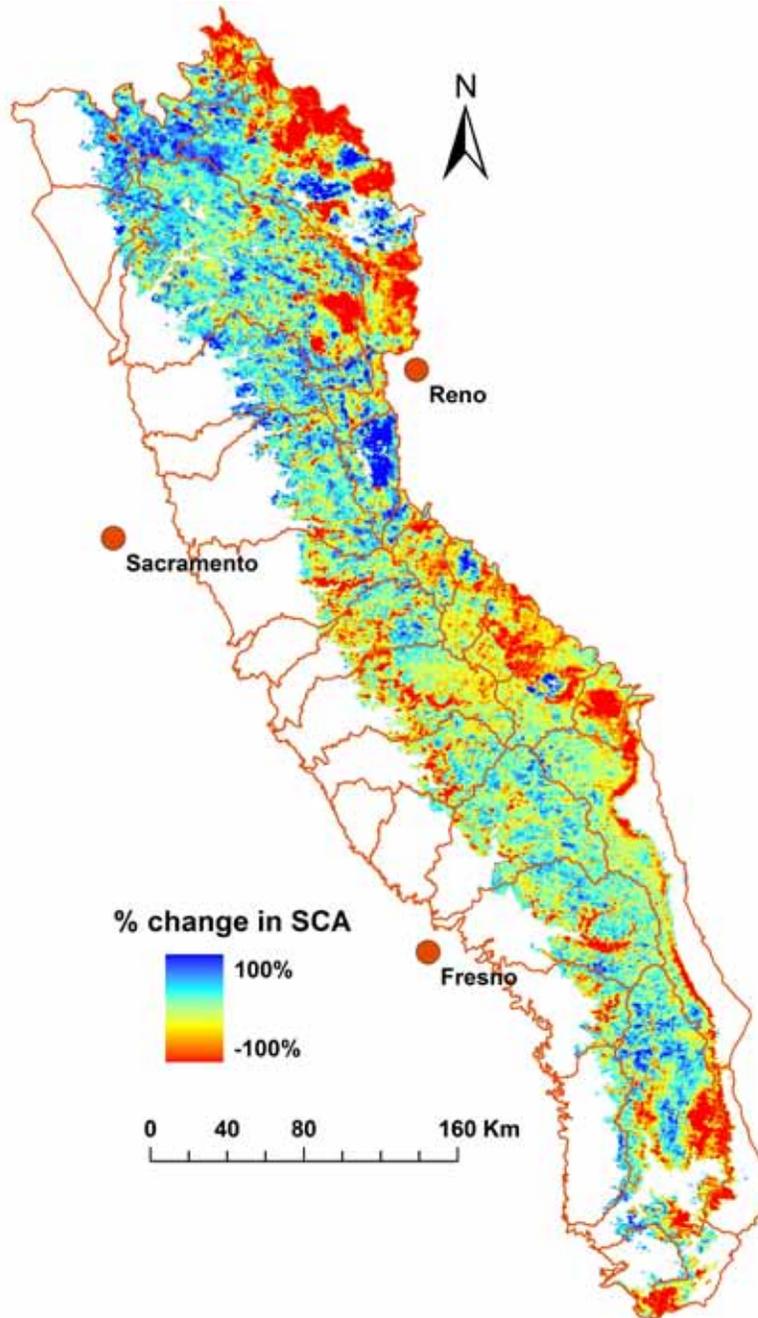
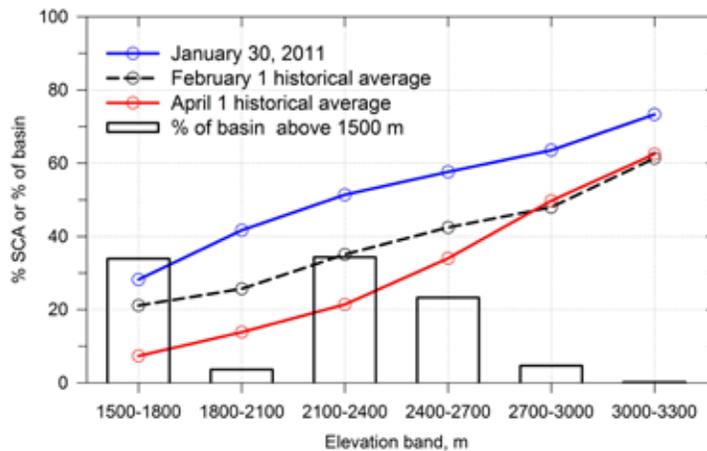
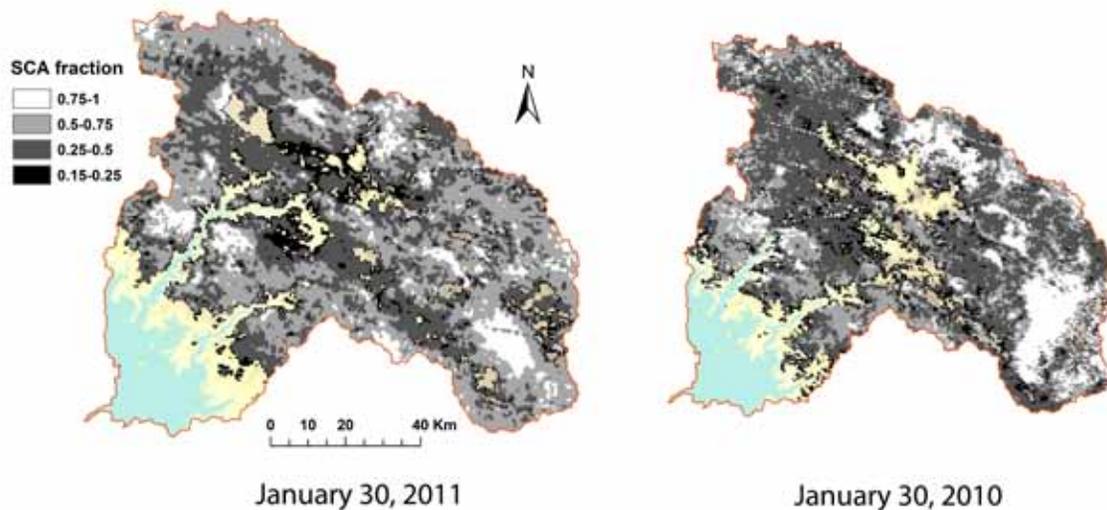
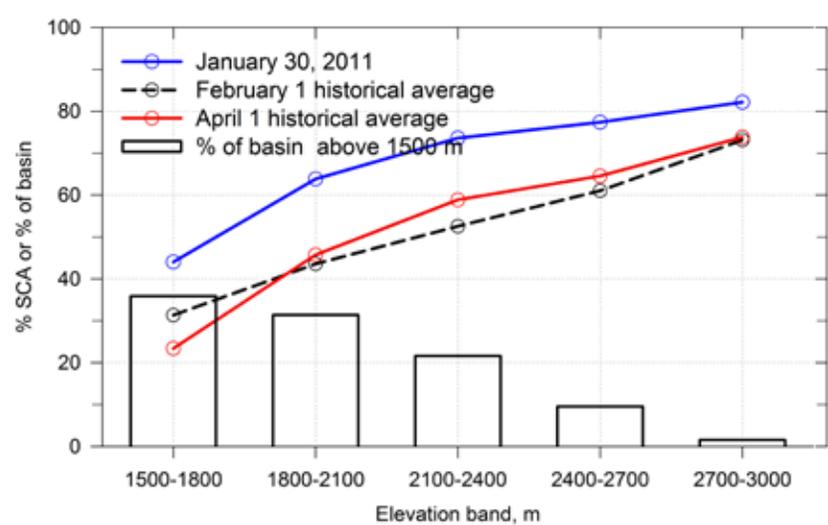
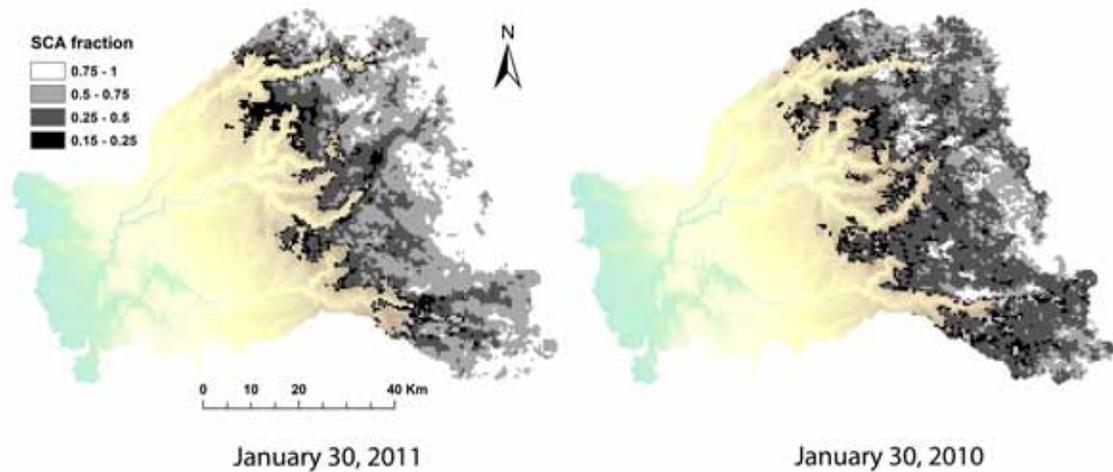


Figure 2. The graph shows the % change of SCA from January 1–January 30, 2011. Of interest is the decline of snow cover area at the lower elevations throughout the Sierra, as a drier atmosphere and warming temperatures contributed to the decline.



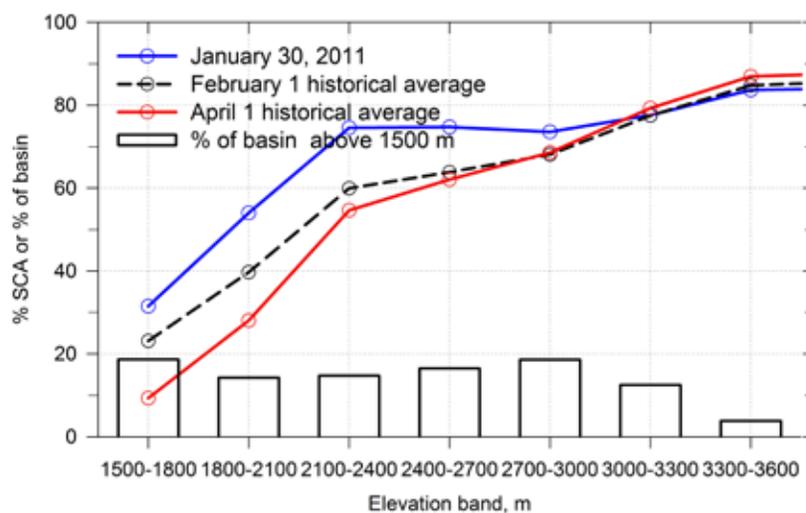
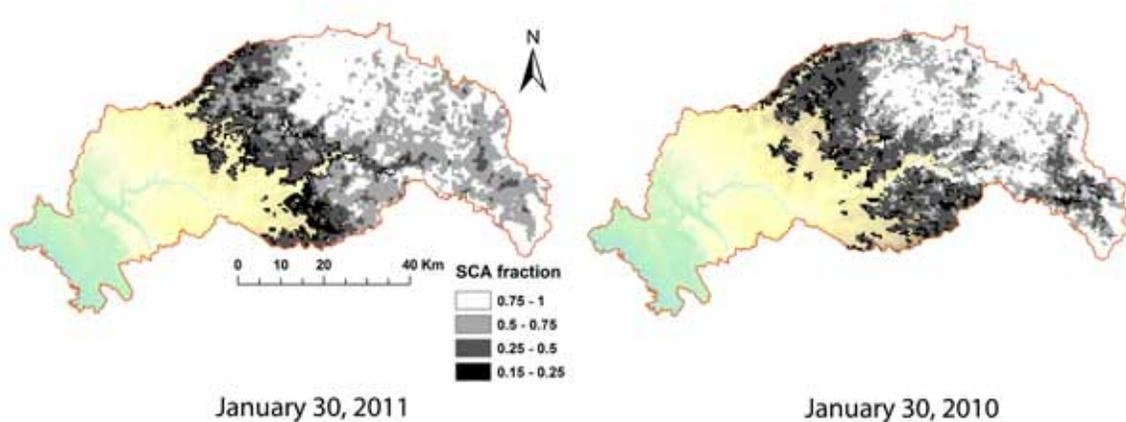
	January 30, 2011	February 1	April 1
1500-1800	28%	21%	7%
1800-2100	42%	26%	14%
2100-2400	51%	35%	21%
2400-2700	58%	42%	34%
2700-3000	64%	48%	50%
3000-3300	73%	61%	62%

Figure 3(a). SCA over the **Feather River** Basin on January 30, 2011 and 2010. On February 1, 2011 basin-wide SWE was 106% of the February 1 historical average (based on basin-wide snow course data) and 65% of the April 1 historical average. February 1, 2010 was 128% of the April 1 average, and 82% 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 January 30, 2011 and the February 1 and April 1, 2011 and 2010 historical averages based on MODIS.



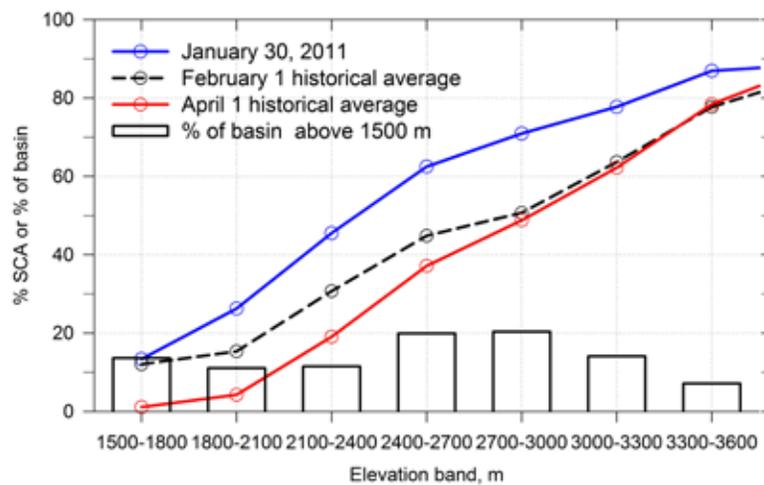
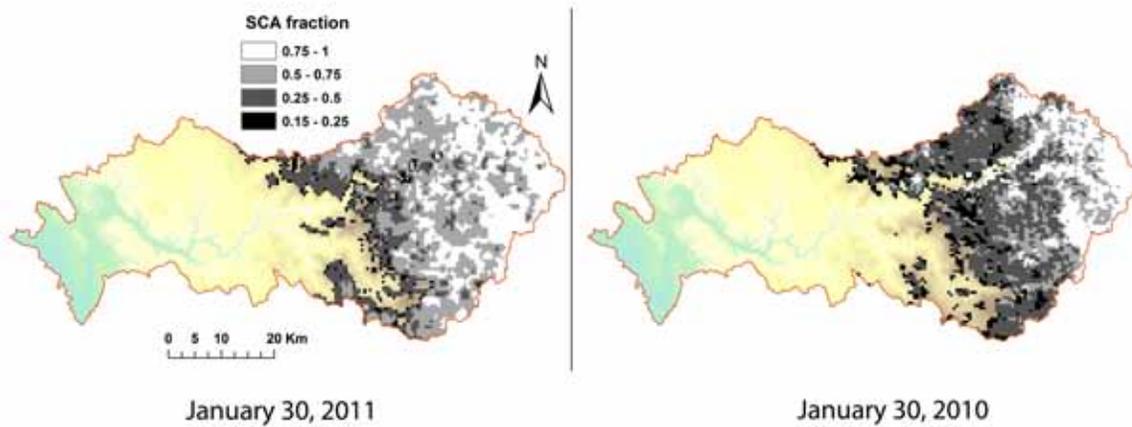
	February 1, 2011	February 1	April 1
1500-1800	44%	31%	23%
1800-2100	64%	44%	46%
2100-2400	74%	53%	59%
2400-2700	77%	61%	65%
2700-3000	82%	73%	74%

Figure 3(b). SCA over the **American River** Basin on January 30, 2011 and 2010. On February 1, 2011 basin-wide SWE was 133% of the February 1 historical average (based on basin-wide snow course data) and 85% of the April 1 historical average. February 1, 2010 was 123% of the April 1 average, and 73% 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 January 30, 2011 and the February 1 and April 1, 2011 and 2010 historical averages based on MODIS.



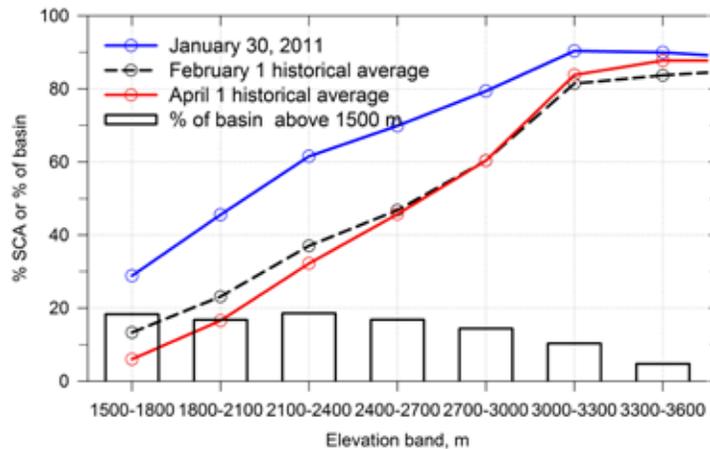
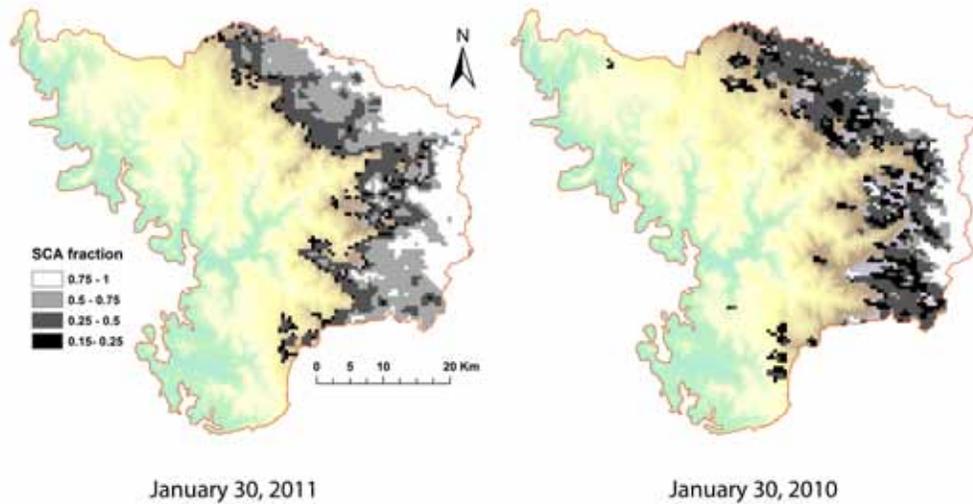
	January 30, 2011	February 1	April 1
1500-1800	31%	23%	9%
1800-2100	54%	40%	28%
2100-2400	75%	60%	55%
2400-2700	75%	64%	62%
2700-3000	74%	68%	69%
3000-3300	78%	75%	79%
3300-3600	83%	85%	87%
3600-3900	84%	86%	88%

Figure 3(c). SCA over the **Tuolumne River** Basin on January 30, 2011 and 2010. On February 1, 2011 basin-wide SWE was 149% of the February 1 historical average (based on basin-wide snow course data) and 94% of the April 1 historical average. February 1, 2010 was 117% of the April 1 average, and 74% 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 January 30, 2011 and the February 1 and April 1, 2011 and 2010 historical averages based on MODIS.



	January 30, 2011	February 1,	April 1,
1500-1800	13%	12%	1%
1800-2100	26%	15%	4%
2100-2400	46%	31%	19%
2400-2700	62%	45%	37%
2700-3000	71%	51%	49%
3000-3300	78%	64%	62%
3300-3600	87%	78%	78%
3600-3900	88%	85%	88%

Figure 3(d). SCA over the **Merced River** Basin on January 30, 2011 and 2010. On February 1, 2011 basin-wide SWE was 142% of the February 1 historical average (based on basin-wide snow course data) and 89% of the April 1 historical average. February 1, 2010 was 107% of the April 1 average, and 67% 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 January 30, 2011 and the February 1 and April 1, 2011 and 2010 historical averages based on MODIS.



	January 30, 2011	February 1	April 1
1500-1800	29%	13%	6%
1800-2100	46%	23%	17%
2100-2400	62%	37%	32%
2400-2700	70%	47%	46%
2700-3000	79%	60%	60%
3000-3300	90%	81%	84%
3300-3600	90%	84%	88%

Figure 3(e). SCA over the **Kaweah River Basin** on January 30, 2011 and 2010. On February 1, 2011 basin-wide SWE was 168% of the February 1 historical average (based on basin-wide snow course data) and 103% of the April 1 historical average. February 1, 2010 was 148% of the April 1 average, and 90% 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 January 30, 2011 and the February 1 and April 1, 2011 and 2010 historical averages based on MODIS.