

2023 Fire Season Outlook Using the Spring Snowpack Index

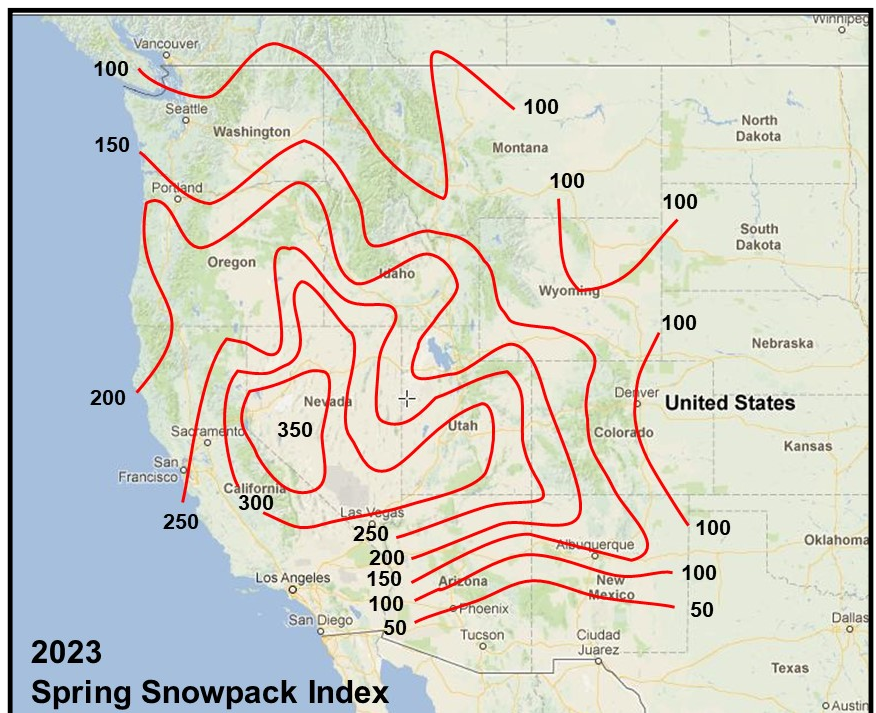
Paul Werth
Fire Weather Meteorologist
Weather Research and Consulting Services, LLC

The Spring Snowpack Index (SSPI) is a unique product developed by Weather Research and Consulting Services, LLC that has proven to be an effective predictor of wildland fire season severity. The SSPI combines Snow Water Equivalent (SWE) values and snowmelt rates from National Resources Conservation Service (NRCS) SNOTEL data resulting in a number that integrates both winter and spring weather (i.e. temperature, precipitation, and evaporation). Our research indicates that it is a much better predictor of fire season severity than SWE alone because it is a measure of snowmelt date, fire season length, soil moisture and both live fuel and large dead fuel moisture. SSPI values have a wide range extending from -100 to 300 or higher. In general, the lower the SSPI value, the higher the probability of an active fire season.

Several refinements were recently made to improve the predictive capabilities of the SSPI.

- 1) additional years of NRCS snowpack and fire data were added to the database
- 2) new algorithms were developed that predict national acres burned and the number of National Preparedness Level 4 and 5 days
- 3) algorithms were developed to predict acres burned for each of the eleven western states and Alaska, and
- 4) an SSPI climatology was implemented to determine the mean and median values for each of the eleven western states and Alaska.

The graphic to the right displays this year's SSPI calculated for river basins in the Western United States using NRCS SNOTEL data. The lowest SSPI values, less than 50, are in southern Arizona and southern New Mexico. Values around 100 extend from northern Washington to Montana and down the eastern slopes of the Rockies in Wyoming and Colorado. Elsewhere across the West, SSPI values exceed 200. An area of 300 or greater is located in the central and southern Sierra Mountains of California and much of Nevada. These high SSPI values are the result of record-breaking winter snow in the Sierra Mountains and a cool, wet spring that delayed snowmelt.





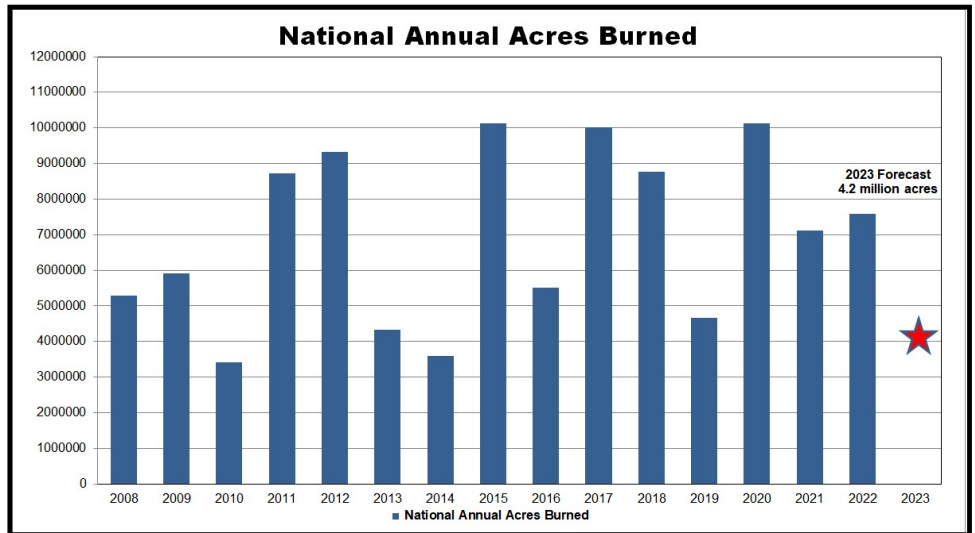
Using updated algorithms that predict acres burned for each of the western states, a below average fire season is probable for Oregon, California, the Great Basin states of Idaho Nevada and Utah and the Southwestern states of Arizona and New Mexico. An average fire season can be expected in Washington, northern Idaho, Montana, Wyoming, and Colorado. Our algorithms do not indicate any states with the potential above average fire season.

The table below lists the statewide SSPI averages for the past ten years. Figures in red indicate negative values with Arizona and New Mexico reporting the most. Nearly every state is reporting higher SSPI values in 2023 compared to last year. In fact, most states reported the highest values this year compared to previous years. The only exceptions are Washington and Montana which have slightly lower SSPI values this year.

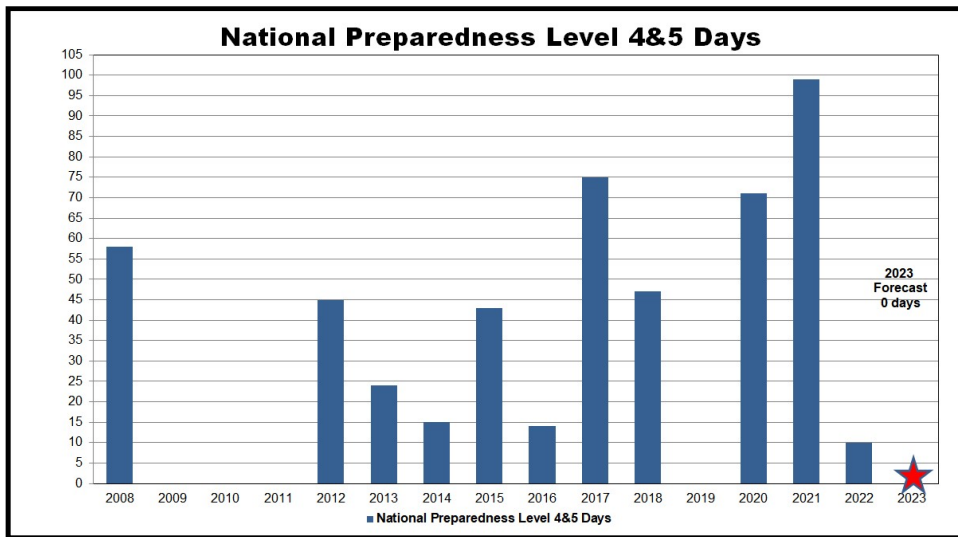
<u>State</u>	<u>2023</u>	<u>2022</u>	<u>2021</u>	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>
MONTANA	105	125	91	101	109	154	151	67	56	166
WASHINGTON	127	149	104	86	73	140	146	48	24	125
WYOMING	130	103	92	91	83	116	155	125	49	145
IDAHO	217	123	28	61	112	78	200	55	9	113
CALIFORNIA	321	73	-6	23	165	36	317	73	4	9
COLORADO	135	53	43	68	122	34	94	117	49	94
OREGON	318	144	4	7	87	34	200	8	4	62
NEVADA	258	63	8	-23	132	4	192	92	-9	57
UTAH	314	20	12	47	152	-6	115	89	1	53
ARIZONA	370	-27	-77	-14	49	-7	4	-6	0	-9
NEW MEXICO	127	-18	-28	-12	97	-13	40	48	15	15
AVG	220	73	25	40	106	52	147	65	18	75

Data developed by Weather Research and Consulting Services, LLC

The SSPI is also a good predictor of annual acres burned throughout the United States. The algorithm was developed by correlating the average SSPI value for the eleven western states with national annual acres burned as reported by the National Interagency Fire Center in Boise, Idaho. The average SSPI this year is 220 compared to 73 last year and 25 in 2021 (table previous page). The algorithm output is 4.2 million acres burned this year (graphic to the right), plus or minus a million acres.



Thus, the number of national acres burned this year could vary between 3.2 million and 5.2 million acres. This suggests a below average fire season due primarily to the record-breaking winter snow and cool spring that delayed snowmelt across much of the Western States. Most of the acreage burned will likely occur across the northern tier of states from Washington, northern Idaho, and Montana.



In addition to national acres burned, an algorithm was added to predict the number of National Preparedness Level (NPL) 4 and 5 days during the fire season. This was done to provide insight into the severity of the fire season and the level of fire management necessary to meet objectives. The forecast is for zero NPL days this year reflecting the projected below average fire season. This compares to 10 NPL days in 2022. The graphic to the left illustrates how this forecast compares to previous years.

In summary, an analysis of this year’s Spring Snowpack Index indicates a below normal 2023 fire season with 3.2 to 5.2 million acres burned nationally. A high demand for firefighting resources is unlikely this year.

Paul Werth
 Fire Weather Meteorologist
 Weather Research and Consulting Services, LLC
www.fireweather.com or www.firewx.com