# 2020 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.

In advance of the 2020 fire season, a number of modifications were 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 zero, are located in Arizona, New Mexico, Nevada, Oregon and northern California. Unusually warm and dry weather the last two weeks of April produced rapid snowmelt in Oregon, Nevada and northern California. In these states the SSPI is much below the mean compared to Arizona and New Mexico. The highest SSPI values, 100 to 150 plus, extend from Montana and northern Idaho southward into Wyoming and northern Colorado, which is about normal for these states.

2020 Spring Snowpack Index
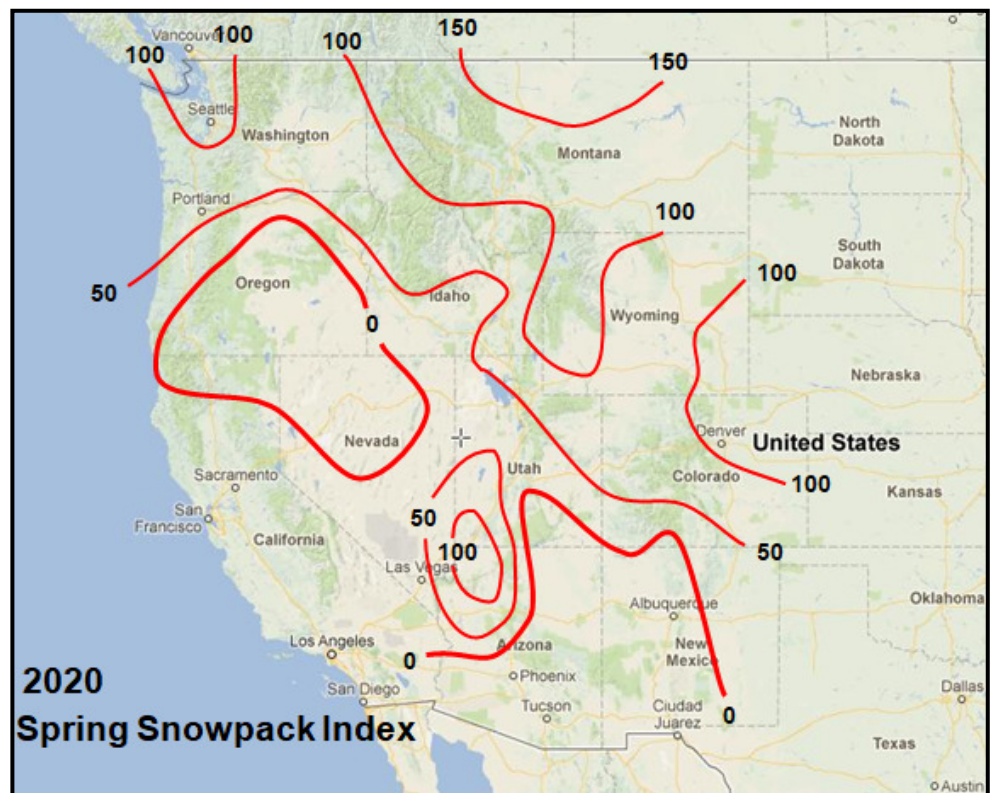
Using the new algorithms to predict acres burned for each of the western states, most states should experience a more active fire season this year compared to the mild 2019 season (see graphic below). An above average fire season is possible in Washington, Oregon, Idaho, Utah, Nevada and California. The remaining states of Montana, Wyoming, Colorado, New Mexico and Arizona will likely experience an average fire season. Based upon these algorithms, the Great Basin states could see a million and a half acres burned, Washington and Oregon a million acres, and California three-quarters to a million acres this fire season.
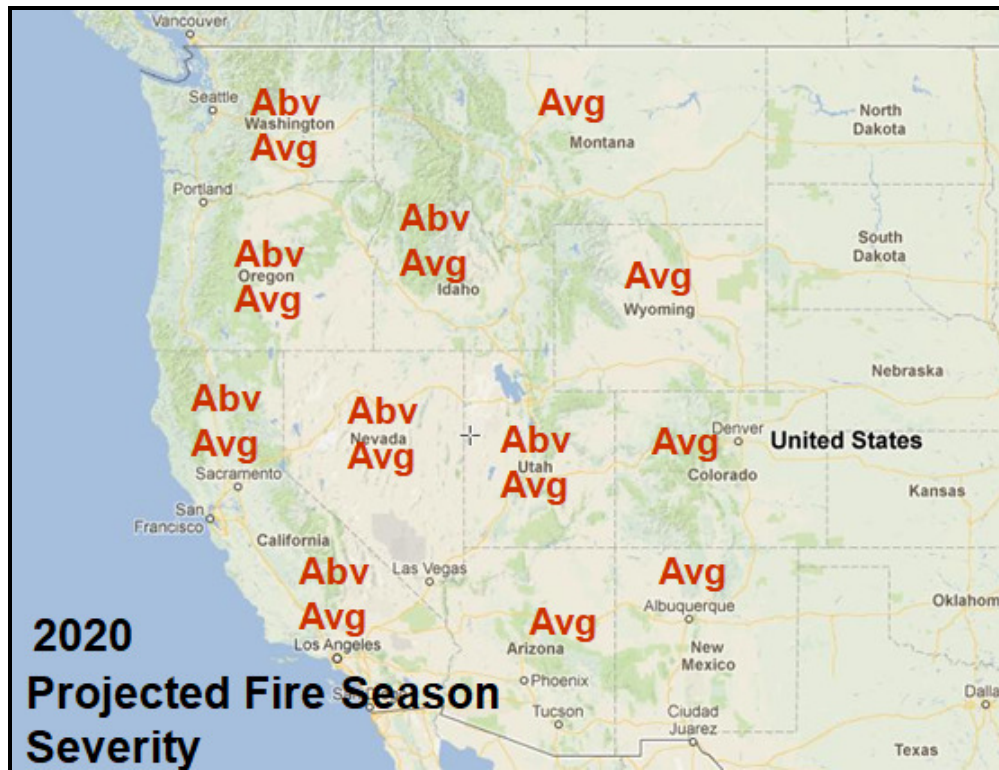

The table below lists the statewide SSPI averages for the past seven years. Figures in red indicate negative values with Arizona reporting the most. Nearly all states have significantly lower SSPI values this year compared to last year indicating lower winter snowpacks and above normal spring snowmelt rates. The only exceptions are Wyoming, Washington and Montana.

State	2020	2019	2018	2017	2016	2015	2014
MONTANA	101	109	154	151	67	56	166
WASHINGTON	86	73	140	146	48	24	125
WYOMING	91	83	116	155	125	49	145
IDAHO	61	112	78	200	55	9	113
CALIFORNIA	23	165	36	317	73	4	9
COLORADO	68	122	34	94	117	49	94
OREGON	7	87	34	200	8	4	62
NEVADA	-23	132	4	192	92	-9	57
UTAH	47	152	-6	115	89	1	53
ARIZONA	-14	49	-7	4	-6	0	-9
NEW MEXICO	-12	97	-13	40	48	15	15
AVG	40	106	52	147	65	18	75

Data developed by Weather Research and Consulting Services, LLC

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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 40 compared to 106 last year and 52 in 2018 (table previous page). The algorithm output is 7.7 million acres burned this year (graphic to the right), plus or minus 1.25

National Annual Acres Burned

Forecast
7.7 million acres

million acres. Thus, the number of national acres burned this year could vary between 6.5 million and nearly 9 million acres. This suggests an active fire season and is significantly higher than last year's 4.6 million acres burned nation-wide.

National Preparedness Level 4&5 Days

Forecast
34 days
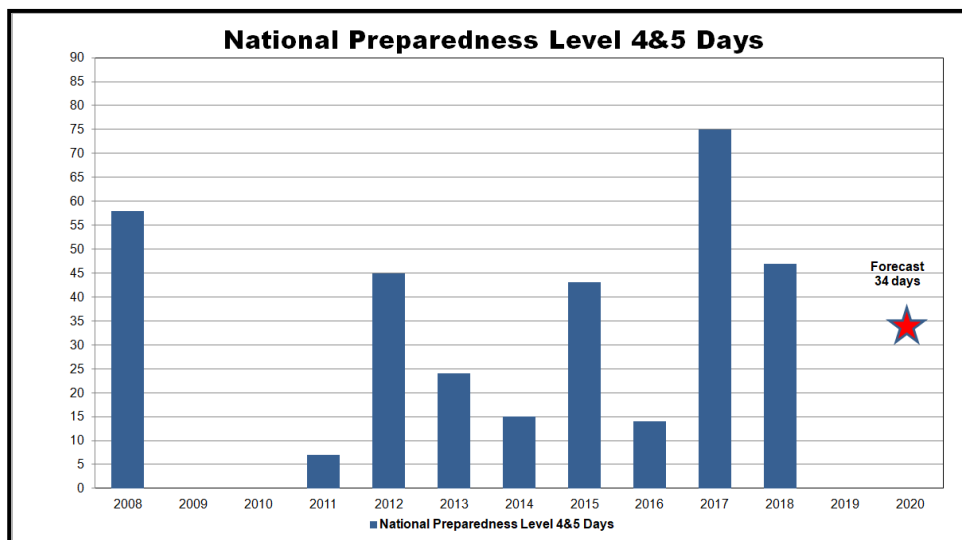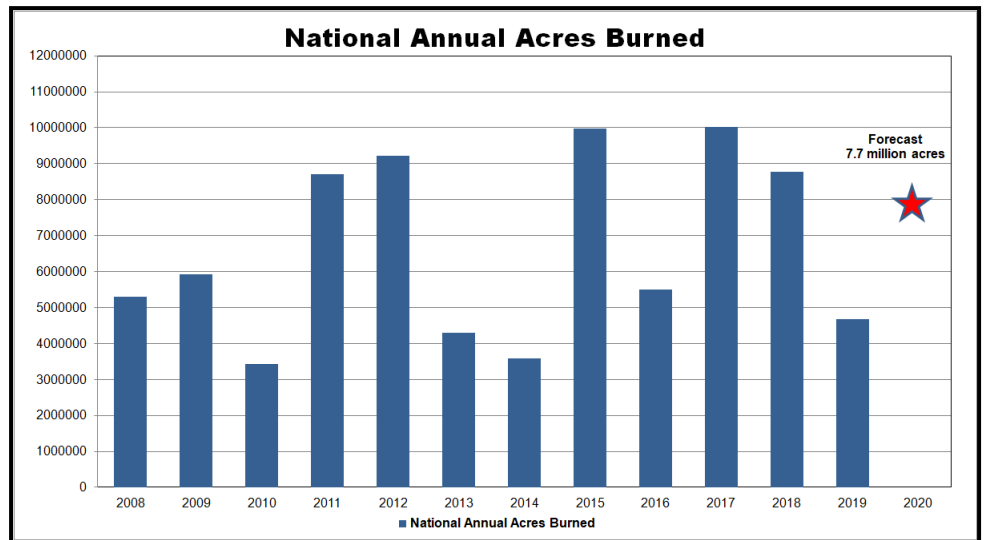
In addition to national acres burned, we also added an algorithm to predict the number of National Preparedness Level (NPL) 4&5 days during the fire season. This was done to provide insight into the severity of the fire season and also the level of fire management necessary to meet objectives. The forecast is for 34 NPL days this year compared to zero days in 2019. 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 very active 2020 fire season with 6.5 to 9 million acres burned nationally. A high demand for firefighting resources is likely in the Northwest and Great Basin Geographic Areas and the state of California.

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