



IS SNOW IN YOUR FUTURE?

Weather Drives Participation, Participation Drives Sales

Weather plays a crucial role in predicting participation and sales in the snow sports industry. When the snow is good, more people flock to the slopes, and to their local specialty shop to purchase skis, snowboards and various other equipment, apparel and accessories they may need on the mountain. In fact, more than 3/4 of the variations in participation totals can be explained by snowfall¹. In other words, when the snow falls then more people ski. Additionally, in this model that compares weather, participation, and sales we confirmed mathematically a very significant correlation between participation and sales, when participation goes up, sales go up in tandem.

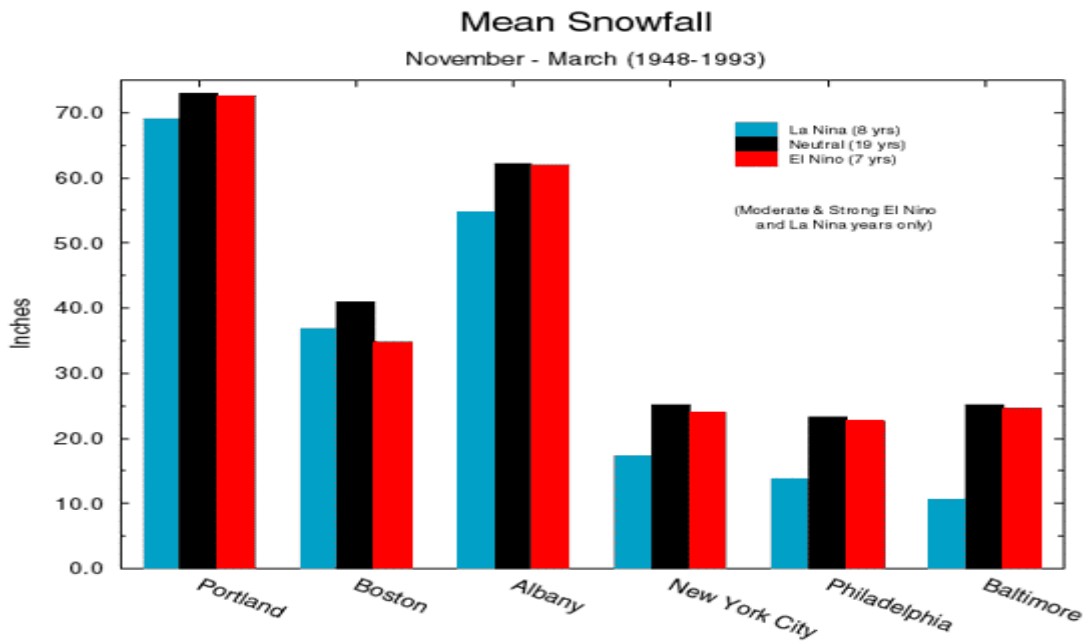
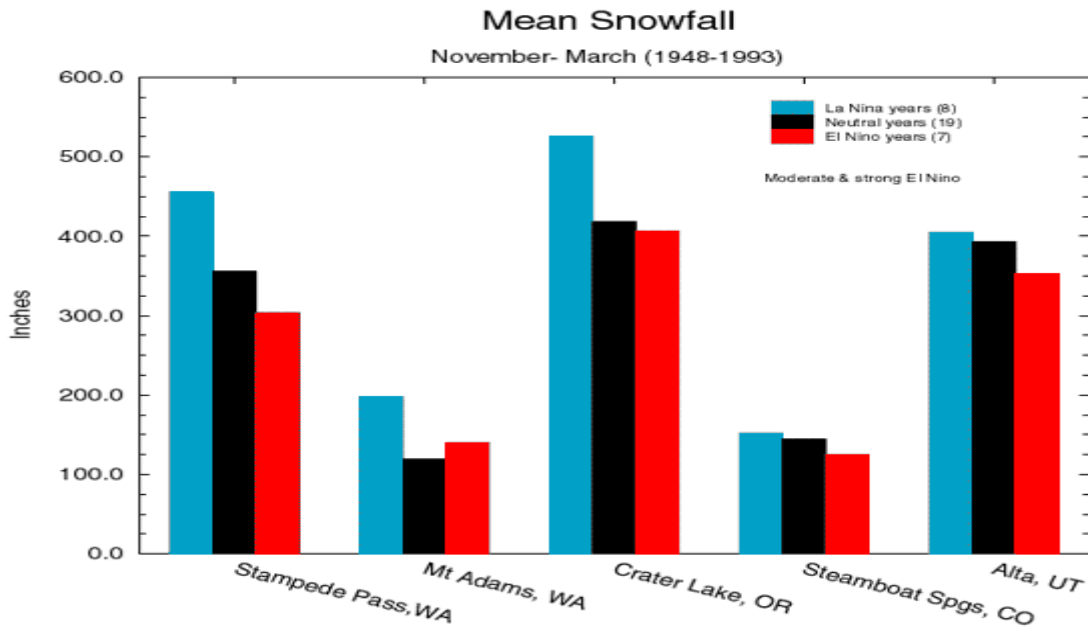
The model allowed us to examine quantified measurements of overall national snowfall patterns, temperature variations from averages over time, trends in arctic sea ice cover, and water temperature in the Pacific Ocean [El Niño, and La Niña effects] to discover the principal variables that may contribute to overall winter conditions in U.S. Ski areas. We discovered that sea ice had apparently little to do with snowfall; however the La Niña effect in the Pacific is significantly correlated with excellent snow conditions in alpine areas across the U.S. La Niña is characterized by unusually cold ocean temperatures in the Equatorial Pacific, compared to El Niño, which is characterized by unusually warm ocean temperatures in the Equatorial Pacific.

The common impacts of La Nina:

At higher latitudes, El Niño and La Niña are among a number of factors that influence climate. However, the impacts of El Niño and La Niña at these latitudes are most clearly seen in wintertime. In the continental US, during El Niño years, temperatures in the winter are warmer than normal in the North Central States, and cooler than normal in the Southeast and the Southwest. During a La Niña year, winter temperatures are warmer than normal in the Southeast and cooler than normal in the Northwest. Additionally, more precipitation tends to fall in the North and generally less in the Southwest and Southeastern Coastline.

In some regions such as the Northeast and mid-Atlantic regions, a neutral state between El Niño and La Niña brings the highest levels of snowfall over the course of winter. This may work to the industry's advantage when the "backyard effect" is considered.

¹ Based on SIA Retail Audit Totals 2002/03 to 2007/08 Specialty Sales, National Climate Data Center Data on variances in annual snowfall nationally, National Oceanographic and Atmospheric Administration, and National Ski Areas Association Rider/Skier Visit Data. Multivariate correlation calculations for Pearson's Product Moment conducted by SIA Research. R=.777 [participation = dependent variable]



Source: NOAA Climate prediction Center. Mean seasonal snowfall (November - March 1948 through 1993) in inches for selected East Coast cities. Blue bars are for moderate-strong La Niña years, black bars are for Neutral years, red bars are for moderate-strong El Niño years.

The “Backyard Effect”

It isn't always the snow that falls on the mountain that drives up participation totals; it's the snow that falls where skiers and riders live that drives them. The data indicate that if people are exposed to snow somehow (people in places that do not get snow like Houston and Orlando may be driven by other mechanisms such as seeing snow fall in New York or in Denver during a televised football game), then they are more likely to head for the slopes. If it snows in Boston, participation numbers go up all in Massachusetts, New Hampshire, Vermont, Maine, and New York. The same holds true for New York City, and all population centers².

University of New Hampshire researchers found that the New England ski industry is directly impacted by the “backyard effect,” which means that urban snow conditions significantly affect snow sports activity. Snow in urban backyards can be as important to winter sport businesses as snow in the mountains, according to the researchers.³

Notice that the increase in skier/rider visits in 1999-2001 match the La Nina effect indicated in the NOAA chart above. The same effect occurred in 2008 when La Nina returned to the Pacific. Note that neutral conditions following a La Nina or El Nino effects bring relative stability to skier/rider visits in 2002.03 to 2005.06. The most recent La Nina began in 2007 and you can clearly see the correlation as it brought record snow to most alpine areas of the U.S. in 2007.08.

Running 3-Month Mean ONI values

Historic Pacific El Niño (red) and La Niña (blue) episodes based on a threshold of +/- 0.5° for the Oceanic Niño Index (ONI) [3 month running mean of ERSST.V3 SST anomalies in the Niño 3.4 region (5N-5S, 120-170W)], calculated with respect to the 1971-2000 base period.

| Year | DJF | JFM | FMA | MAM | AMJ | MJJ | JJA | JAS | ASO | SON | OND | NDJ |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1980 | 0.5 | 0.4 | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 | 0 | -0.1 | 0 | 0 | 0 |
| 1981 | -0.2 | -0.4 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.3 | -0.2 | -0.1 | -0.1 | 0 |
| 1982 | 0 | 0.1 | 0.2 | 0.4 | 0.7 | 0.7 | 0.8 | 1 | 1.5 | 1.9 | 2.2 | 2.3 |
| 1983 | 2.3 | 2.1 | 1.6 | 1.3 | 1 | 0.7 | 0.3 | -0.1 | -0.5 | -0.7 | -0.9 | -0.7 |
| 1984 | -0.4 | -0.2 | -0.2 | -0.3 | -0.4 | -0.4 | -0.3 | -0.2 | -0.2 | -0.6 | -0.9 | -1.1 |
| 1985 | -1 | -0.9 | -0.8 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | -0.6 | -0.4 | -0.4 | -0.4 |
| 1986 | -0.5 | -0.5 | -0.3 | -0.2 | -0.1 | 0 | 0.2 | 0.4 | 0.6 | 0.9 | 1 | 1.2 |
| 1987 | 1.2 | 1.3 | 1.2 | 1.1 | 1 | 1.2 | 1.5 | 1.7 | 1.6 | 1.5 | 1.2 | 1.1 |
| 1988 | 0.7 | 0.5 | 0.1 | -0.3 | -0.9 | -1.3 | -1.4 | -1.2 | -1.3 | -1.6 | -2 | -2 |
| 1989 | -1.8 | -1.6 | -1.2 | -0.9 | -0.7 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.2 | -0.1 |
| 1990 | 0.1 | 0.1 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 |
| 1991 | 0.4 | 0.4 | 0.3 | 0.3 | 0.6 | 0.8 | 1 | 0.9 | 0.9 | 0.9 | 1.3 | 1.6 |
| 1992 | 1.8 | 1.7 | 1.5 | 1.4 | 1.2 | 0.9 | 0.5 | 0.2 | -0.1 | -0.1 | 0.1 | 0.3 |
| 1993 | 0.4 | 0.4 | 0.5 | 0.7 | 0.7 | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| 1994 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.9 | 1.3 | 1.3 |
| 1995 | 1.2 | 0.9 | 0.6 | 0.3 | 0.2 | 0.1 | -0.1 | -0.2 | -0.5 | -0.6 | -0.8 | -0.8 |
| 1996 | -0.8 | -0.7 | -0.5 | -0.3 | -0.2 | -0.2 | -0.1 | -0.2 | -0.1 | -0.2 | -0.3 | -0.4 |

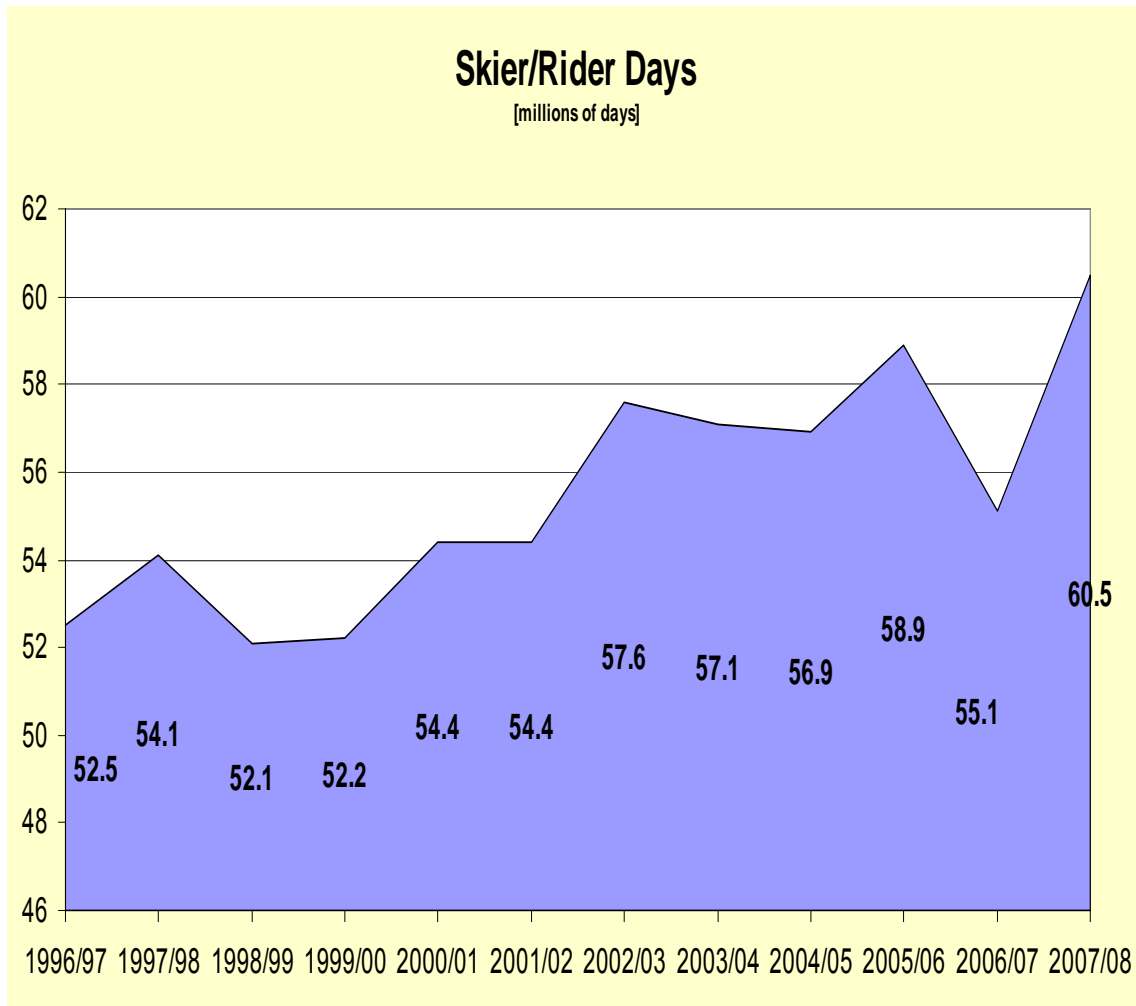
² December 2007 International Journal of Climatology (see footnote 3)

³ December 2007 issue of the International Journal of Climatology in the article, “Ski areas, weather and climate: time series models for New England case studies.” The researchers are Cliff Brown, professor of sociology at UNH; Lawrence Hamilton, professor of sociology at UNH; and Barry Keim, former professor of geography at UNH and New Hampshire State Climatologist who is now at Louisiana State University.

| | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1997 | -0.4 | -0.3 | -0.1 | 0.3 | 0.8 | 1.3 | 1.7 | 2 | 2.2 | 2.4 | 2.5 | 2.5 |
| 1998 | 2.3 | 2 | 1.4 | 1.1 | 0.4 | -0.1 | -0.7 | -1 | -1.1 | -1.2 | -1.4 | -1.5 |
| 1999 | -1.5 | -1.2 | -0.9 | -0.8 | -0.8 | -0.8 | -0.9 | -1 | -1 | -1.2 | -1.4 | -1.7 |
| 2000 | -1.7 | -1.4 | -1 | -0.8 | -0.6 | -0.6 | -0.4 | -0.4 | -0.4 | -0.5 | -0.7 | -0.7 |
| 2001 | -0.7 | -0.5 | -0.4 | -0.3 | -0.1 | 0.1 | 0.1 | 0 | 0 | -0.1 | -0.1 | -0.2 |
| 2002 | -0.1 | 0.1 | 0.2 | 0.4 | 0.6 | 0.8 | 0.9 | 0.9 | 1.1 | 1.3 | 1.5 | 1.4 |
| 2003 | 1.2 | 0.9 | 0.5 | 0.1 | -0.1 | 0 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.4 |
| 2004 | 0.4 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.7 | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 |
| 2005 | 0.6 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.2 | -0.1 | -0.4 | -0.8 |
| 2006 | -0.8 | -0.6 | -0.3 | -0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.7 | 0.9 | 1.2 | 1.1 |
| 2007 | 0.8 | 0.4 | 0.1 | -0.1 | 0 | -0.1 | -0.2 | -0.5 | -0.8 | -1.1 | -1.2 | -1.4 |
| 2008 | -1.5 | -1.4 | -1.1 | -0.7 | -0.5 | | | | | | | |

Source: NOAA, National Climate Data Center Oceanic Niño Index Data

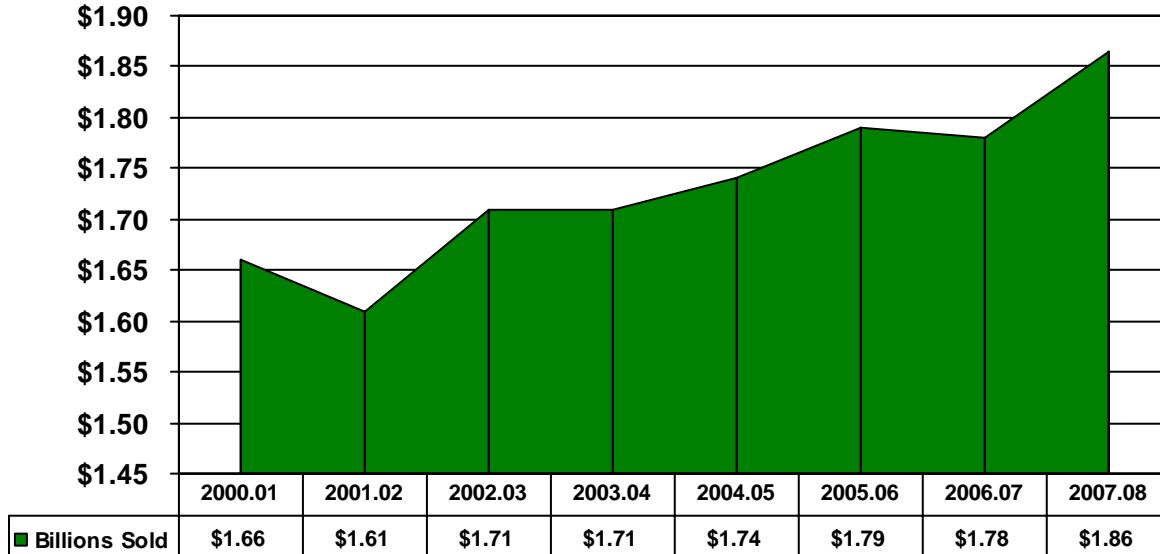
Interestingly, the correlation between La Niña conditions in the Pacific and high levels of participation in snow sports is strong [$R = .777$], and the correlation between participation and sales also was highly significant [$R = .594$] indicating a very strong relationship between participation and sales but not as strong as the relationship between La Niña conditions and skier/rider days. Note that increases in skier/rider visits in the 1999.00 to 2001.02 and in 2007.08 correspond with La Niña to neutral conditions while the decreases in 2002.03 too 2004.05 were consistent with El Niño to neutral conditions.



The relationship between participation and sales is significant and can be clearly seen by comparing the two visually. Close to 20% of snow sports sales occur in December corresponding with the holiday season so not all sales correspond directly with weather and the analysis of weather, influence of the holidays on sales, and participation supports the significant influence the December holidays have on sales.

All Snow Sports Products

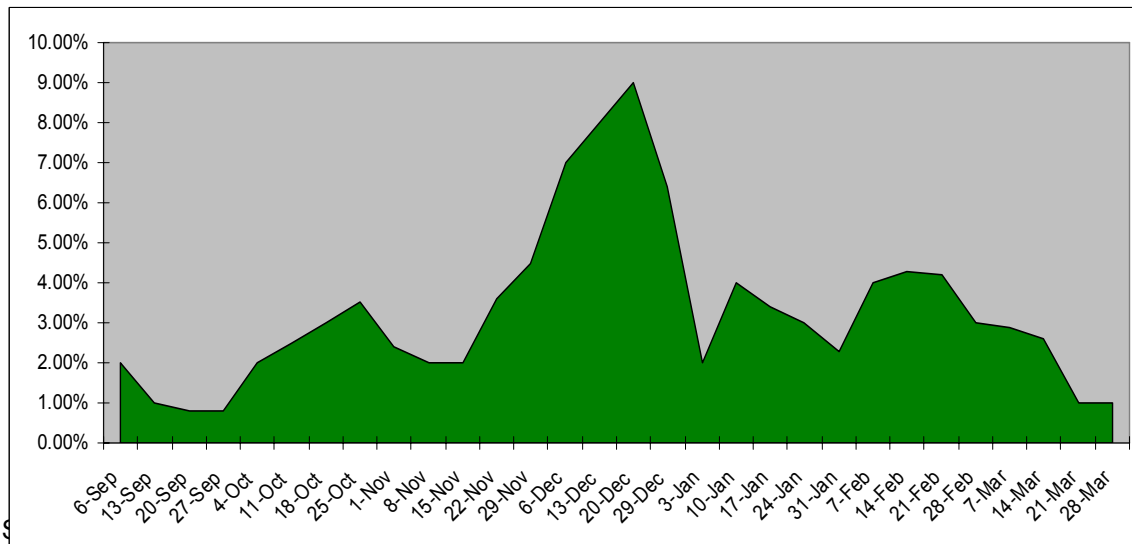
Dollar Sales in Specialty Shops
2000.01 – 2007.08



Source: SIA Retail Audit 2000 to 2008, specialty shops

All Snow Sports Products

Percent of Dollar Sales in Specialty Shops by Week
2007.08



Source: SIA Retail Audit

La Niña in 2008.09 Season

The National Oceanographic and Atmospheric Administration's (NOAA) Climate Prediction Center made the following forecast for La Niña in August 2008:

ENSO-neutral conditions continued during August 2008, as recent increases in sea surface temperatures (SSTs) abated across the equatorial Pacific Ocean. Above-average SSTs in the east-central and eastern Pacific diminished, while below-average SSTs in the central Pacific strengthened slightly (Fig. 1). From west to east, the latest weekly SST index values range from -0.4°C in the Niño-4 region to $+0.7^{\circ}\text{C}$ in the Niño 1+2 region (Fig. 2). The subsurface oceanic heat content (average temperatures in the upper 300m of the ocean, Fig. 3) also decreased in response to the emergence of negative temperature anomalies at thermocline depth in the east-central. Although ENSO-neutral conditions have been in place since June 2008, the atmospheric circulation over the western and central tropical Pacific continues to reflect lingering aspects of La Niña. Enhanced low-level easterly winds and upper-level westerly winds persist in this region, while convection remains generally suppressed over the central Pacific. Despite this lingering La Niña signal in the atmosphere, the overall atmospheric and oceanic system is consistent with ENSO-neutral conditions.

Predictions from the Model

The correlation between snowfall and participation suggests that [all other things being equal] if snowfall is average, then participation will be stable. There are approximately 15 million participants in the U.S. and another 9 million who identify themselves as skier or riders but did not participate more than once in 2007. Additionally, last year, resorts reported more than 60 million visits in one of the most prolific snow years ever recorded. The data in the model indicate that participation will remain at 15 million and skier visits will level off in the West where neutral conditions bring less snow than the 2007.08 season and more in the Eastern and Mid-Atlantic where neutral conditions bring more snowfall. Equipment sales will be flat overall but apparel sales will continue to increase as snow impacts major urban areas across the East Coast and Mid-western states.

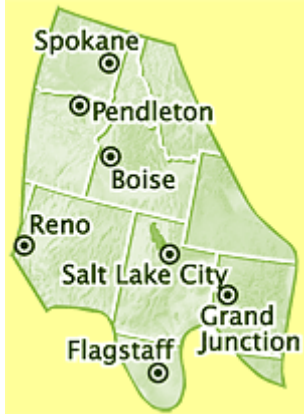
Weather Predictions from the Old Farmers Almanac

The Farmer's Almanac is a mainstay of long range weather prediction in the U.S. since 1792 during George Washington's first term as president. Their claim of 80% accuracy is fairly obviously inflated, but some still swear by it.

"Our weather forecasts are determined by the use of a secret formula (devised in 1792 by the founder of this Almanac, Robert B. Thomas), enhanced by the most modern scientific calculations based on solar activity, particularly sunspot cycles. We also analyze weather records for particular locales. We believe nothing in the universe occurs haphazardly; there is a cause-and-effect pattern to all phenomena, including weather. It follows, therefore, that we believe weather is predictable.

Modesty requires, however, that we add this caveat: It is obvious that neither we nor anyone else has as yet gained sufficient insight into the mysteries of the universe to predict weather long-range with anything resembling total accuracy."

Intermountain Region



Winter will be much colder and drier than normal, on average, with snowfall above normal in the north and below normal in the south. The coldest temperatures will occur in late December; early, mid-, and late January; and early February. The snowiest periods will be in mid-November, early and mid-December, mid- and late January, and late February.



Winter temperatures will be slightly above normal in the north but two degrees below normal in the south, on average. The coldest periods will be in the first half of December, early and late January, and early and mid-February. Precipitation will be near or slightly below normal, with below-normal snowfall. The snowiest periods will be in early December, mid-January, most of February, and early and mid-March.

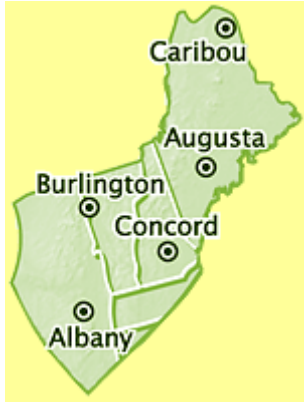


Winter temperatures will be about one-half degree above normal, on average, with above-normal rainfall in the north and below-normal rainfall in the south. The coldest periods will be in mid- and late November, early December, and mid-January. The snowiest periods will be in mid-November and mid-January.



Includes predictions for all or portions of California (Long Beach, Los Angeles, San Diego, San Francisco and San Jose).

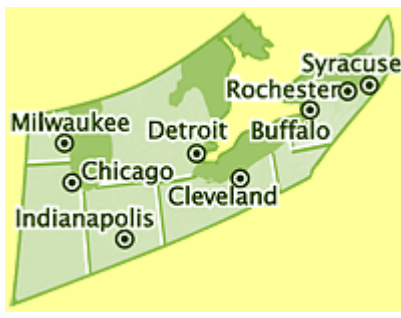
Winter temperatures will be about one degree below normal, on average, with the coldest periods in mid-December, early and mid-January, and early February. Rainfall and mountain snowfall will be below normal, with the stormiest periods in mid-November, mid-January, late February, and mid-March.



Winter will be colder than normal, on average, primarily due to persistent cold temperatures throughout December. Other cold periods will occur in early and mid- to late January, early and mid-February, and early March. Precipitation will be near or slightly above normal, with below-normal snowfall in the north and above-normal snowfall in the south. The biggest snowstorm will occur in early March, with other snowy periods in late November, mid- and late December, early and late January, and mid-February.



Despite a mild November, this winter will be colder and snowier than normal, with near or above-normal precipitation. The coldest temperatures will occur in mid-December, early January, and early February. The snowiest periods will be in early and mid-December, early January, early and late February, and early March.



After a mostly mild November, snow at Thanksgiving will signal the coming of a very cold period, especially in the west. Temperatures will seesaw from January through March. Precipitation will generally be below normal, with above-normal snowfall in the southwest and below-normal snowfall in most other parts of the region. The coldest periods will occur in December, early and mid-January, and in early and mid-February.

So how does your region stack up? Are you prepared for the season?