



# The Snow Machines

Machine made snow has grown in Tahoe, but who does it help mo

two-part series, Moonshine looks at how snowmaking is inserting their hands in the weather machine. Here, we look at the practice of snowmaking at ski resorts, and next month, we look at how cloud seeding can increase precipitation.

**BY DAVE ZOOK**  
Moonshine Ink

man who knows exactly what he's doing and loves to do it. He goes on to compare snowmaking to a soda production plant, or a sprinkler system, although the latter means something has gone terribly wrong and the guns are spraying water.

Pick your analogy, but it's a combination of art, science, labor, and technology, all wrapped up in the goal of putting white stuff on the ground when Mother Nature doesn't. Going into the winter of 2015/16, snowmaking may be playing a more pivotal role than ever for the state's ski industry. After four years of suffering with below average snowfall, Lake Tahoe

exemplifies the full spectrum of snowmaking efforts, from million dollar operations to nothing at all.

## THE NEW POWDER STORM

I am told Northstar and Heavenly Mountain Resort, both owned by Vail Resorts, Inc., comprise the most sophisticated snowmaking operation in the Western U.S. At Northstar, up to 100 snow guns can run 24/7 when the weather is ripe, with the capacity to cover 75 percent of the mountain's trails with a calibrated mixture of air and water that join forces to make snow — all backed by a 12,000 horsepower energy system to get that air and water where it needs to be.

Automation is also the name of the modern snowmaking game. I watch "Hutch" work with four computer screens to monitor and fine tune compression levels, water temperatures, and much more. Larmore adds that he can do most of what Hutch does via smartphone when needed.

The day I visited, in early November, optimism was pulsing through the morning cold. The first storm of the winter came in as rain, which saturated the dirt before dropping temps froze it solid. Then 12 inches of natural snow fell over two days. To boot, cold air and low humidity — the recipe for high-output snowmaking — was forecast for the week.

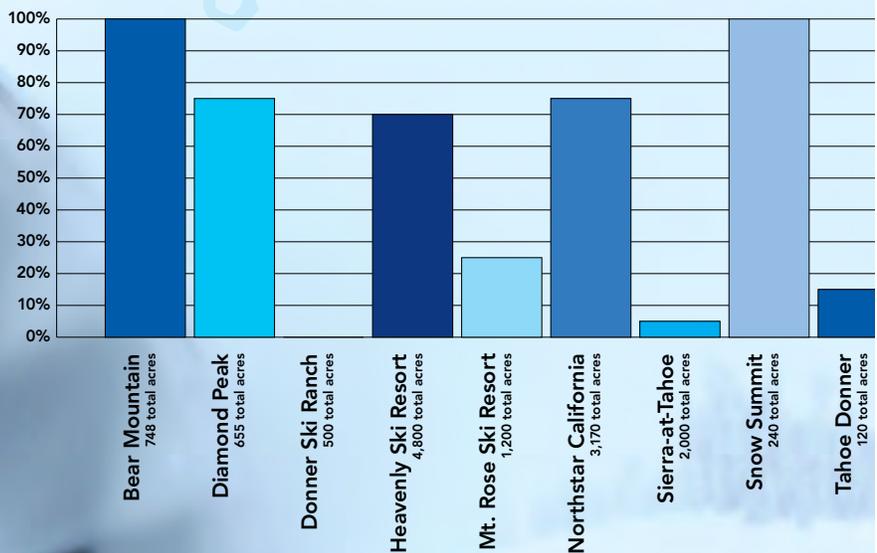
"This is looking like a very promising start," Larmore said.

Promising is a refreshing in the thirsty ski industry. In April, California Gov. Jerry Brown famously declared the Sierra snowpack to be 5 percent of the historical average, and the Central Sierra Snow Lab in Soda Springs recorded 130 inches of snow for the 2014/15 season, its all-time lowest recording since 1879, and many resorts in Tahoe received less than 200 inches.

Therefore, Northstar's investments make good business sense, and they mimic the trend around the country, where



A sampling of California ski areas and snowmaking capabilities, shown as the percentage of their groomed terrain they can cover with snowmaking



snowmaking is growing. A few resorts in California, such as Mountain and Snow Summit in Southern California, have almost fallen out of the equation, and made 100 percent snowmaking capabilities on their trails.

"In 2015, if you weren't making snow, you weren't a ski area," said Tim Porter, CEO of China Peak Mountain Resort in the central Sierra, and a former ski resort manager.

### INTENTIOUS COMMODITY

Snowmaking lets resorts open earlier in the season, and keeps them alive during extended dry spells. But it pulls on large amounts of power and water, and is very expensive, making some people cautious to tout snowmaking as a solution to low snow.

"Snowmaking is a way to mitigate climate change in the short term, but is certainly not a long-term solution. It only does it use valuable water resources that are likely to get more scarce over coming years, but it is the most energy-intensive operation on the mountain by far," said Porter Fox, author of *Deep: The Story of Skiing and the Future of Snow*. "Not only are we using a lot of water that other resorts and communities might need, we are actually enlarging your carbon footprint by making snow. It seems counterintuitive for a ski resort these days."

Creating an area that is 200-by-200 feet — about two thirds of a football field — with six inches of snow requires 10,000 cubic feet, or 74,600 gallons of water, according to Snow Machines Inc., (SMI), the largest snowmaking equipment manufacturer in the U.S.-based. Resorts source water in different ways; some pull from public utility districts, while others have on-site wells or reservoirs.

However, snowmaking is considered a consumptive water use, as the majority of water is returned to the source when the snow melts. Snowmaking generally returns between 85 to 90 percent of the water to the watershed. The balance is lost to sublimation, evaporation, said Jeff Ewald, the general manager of SMI. Documents from the Truckee River Operating Agreement listed similar numbers, and noted that snowmaking is 16 percent cumulative.

Water use is difficult to breakdown specifically for snowmaking, and resorts are not keen to advertise exactly how much is spent on power

for snowmaking, though Larmore did comment that "the power company loves me."

However, there is no rallying cry to stop snowmaking. The benefits, the most obvious being more skier days on the mountain and more open terrain, are simply beneficial for a depressed industry. According to the National Ski Area Association, last winter's California ski visits were 4.1 million. This was down 8.8 percent from 2013/14, a year that was still more than a million skier visits under the long-term average. It's no shock then that industry representatives are not advocating that resorts shut down the guns.

"Mother Nature is unpredictable, but she is our biggest partner. She can give and she can taketh away," said Michael Reitzell, president of the California Ski Industry Association. "Knowing this, resorts have to think strategically and have a plan when she isn't as generous. Snowmaking allows resorts to run a seasonal business, offer the best experience they can for their guests, and operate with better certainty."

### BIG GUNS GETTING BIGGER

In the 1930s, as the U.S ski industry was blooming, snowmaking meant transporting shaved ice, sometimes sourced from ice skating rinks, to the needed areas. Today, snowmaking happens through a calculated mix of air and water, and has grown tremendously. During the 2014 Winter Olympics in Sochi, for example, 400 snowmaking machines converted 230 million gallons of water to make enough snow to cover 500 football fields with two feet of snow.

There are several types of snow guns common to resorts, the most efficient being the fan gun, a cylindrical shaped apparatus. Fan guns release a combination of cooled water and pressurized air through nozzles on the inside of the cylinder that break up the water into tiny particles — this mixture acts as a seed for the water that is blasted from another set of nozzles on the perimeter of the fan. The result is still snow, just from a different mechanism and with a different crystal structure than the natural stuff.

The efficiency behind modern snowmaking has increased up to 40 percent over the last few decades, mainly due to the automation of modern systems, according to Nic

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an, the West Coast sales rep MI. Snowmaking capabilities also increased during warmer temperatures. This is bluntly relevant for Nevada resorts, where the average for 2014/15 was 32.1 inches, the first time in 120 years of record keeping that the temperature stayed above water's freezing point, according to California Climate Center.

### WHITE OR WRONG

Resorts have been pumping out machine-made snow for decades, with every Tahoe resort currently making snow, but the practice varies tremendously between resorts. The benefits hinge on the resort's clientele, location, type of mountain, and more.

There has been more interest overall, and recently, it's mostly from smaller resorts that are having a really hard time with the winters," Hancher said.

Case study for snowmaking's success at Heavenly Mountain Resort, the 10,000-acre resort perched on Donner Summit directly off Interstate 80. In 2007, the resort invested heavily in snowmaking, and that investment



**HIGH-TECH SNOW:** David "Hutch" Hutchison, who works in advanced snowmaking, and Jim Larmore, senior mountain operations director, monitor Northstar California Resort's snowmaking system through several software programs. Photo by Dave Zook/Moonshine Ink

is credited to being in the very slim category of California resorts that didn't hurt deeply for visitation in 2014/15. Boreal is a perfect fit for snowmaking as the majority of guests are terrain park riders or beginner skiers and snowboarders, a demographic that doesn't place importance on natural snow, according to Cohee. The mountain is also small, making top-to-bottom coverage less resource-intensive, and attractions like Woodward Tahoe are non-snow dependent. "The last four years they came closer to their visitor expectations than anyone in California," Cohee said.

Kirkwood, known for advanced off-piste skiing, and 40 minutes from the city of South Lake Tahoe, is on the other end of the spectrum. On a low snow year, South Lake skiers are very unlikely to travel the extra distance to Kirkwood when Heavenly is located central to South Lake with a behemoth snowmaking operation. "Certain resorts will never be successful on manmade snow," said Cohee, who was Kirkwood's CEO for 17 years.

Heavenly has a historic snowmaking story that has been featured in *The New York Times* and *Bloomberg Businessweek*. With 68 fully-automated fan guns, 90 air/water snow guns, 30,000 feet of pipes and hoses, and a staff of 39, their snowmaking can cover 70 percent of their 1,000 acres of trails. As a result, they haven't missed an opening day in over 10 years.

They also kick started the snowmaking movement in Tahoe in the late '70s, due to the vision of then-owner Bill

Killebrew. After some lousy winters that brought on debt, Killebrew pushed Heavenly back to profitability by the late '80s, due to their expanding snowmaking system. Many Tahoe resorts soon followed suit. Barrett Burghard, the senior manager for snow services at Heavenly, has seen the system grow over his 22 years at the resort, with a major jump in capital investments when Vail Resorts, Inc. purchased the mountain in 2002. "The automation and subsequent efficiency went way up. The system was pretty rudimentary before that," Burghard said.

Most of the larger resorts around Tahoe have high snowmaking capacity. Squaw Valley/Alpine Meadows has invested \$8 million in its snowmaking operations over the last five years and bought 15 new high-efficiency HKD SV10 snowmaking guns for 2015/16.

Other resorts are bulking up or initiating their snowmaking, looking to insure their winters. Mt. Rose Ski Tahoe upped its snowmaking for 2015/16 to cover about 25 percent of the mountain with around \$500,000 of their \$1.2 million investment going to snowmaking infrastructure, according to Mike Pierce, head of marketing. Tahoe Donner Cross Country and Downhill will make snow for its first time this winter. They purchased seven Silent Polecats — low energy, low noise snow guns, for which Tahoe Donner will be the first to use in North America — for a total investment of \$1.1 million. The cost includes the seven Polecats, a pump station building, 12 hydrants and electrical pedestals, and a cooling tower.

A few resorts don't make any snow such as Donner Ski Ranch, the 50-acre, family-owned ski area where an adult season pass goes for \$249. They had a small snowmaking operation prior to 2008, but after that year's water issues and equipment failure they ceased snowmaking operations.

### THE OUTLIER

Despite the trend of growth in snowmaking, not everyone is saving their money for more snow guns. Sierra-at-Tahoe, located 12 miles west of South Lake Tahoe, is a local example of alternative solutions to snowmaking, where president John Rice says he "repurposes every flat

Sierra-at-Tahoe suffered its shortest season ever in 2014/15, closing on March 16, but Rice remains optimistic; armed with a litany of tactics and techniques to squeeze the most out of what nature provides at a lower cost than snowmaking.

"We are now in the snow farming business," Rice said, not sarcastic. When the parking lot accumulates enough snow, his team will "corn" the snow into long lines using snow moving equipment. He then uses snow blowers to spray the snow into the beds of rented dump trucks that unload the piles around the mountain to then be pushed and smoothed by groomers on the driest areas.

The mountain also keeps its snow trails as free of debris like rocks and trees as possible, so it can open on very little. "The old owners used to say we could open on frost," Rice said. Summer crews will take months to the trails remove rocks and trim small trees. Employees even instituted a "bucket brigade," where they dig up snow from the shady north-facing aspects and haul them to the trails using five gallon buckets.

But no matter how far resorts can go with finding creative solutions or stay open through multi-million-dollar snowmaking investments, there is simply no replacement for the bountiful natural snow storms, still what every resort and skier hopes

"Every resort is looking at Dec. 2 the day they need to be open. There is so much emphasis on the holiday," Cohee said. "If it snows a lot in the early season, California will save hundreds of millions of dollars on snowmaking, plus a lot of skiers will be happy." (P)

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