

The American Ski Industry: A Story of Climate Pressures, Consolidation, And The Uncertain Future Of Mountain Resort Town Communities

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Abstract

The objective of this research paper is to analyze one of the main underlying causes of change within the American ski industry: climate change and conclude how the continued deterioration of the ski industry is one of many consequences stemming from the average warming of global temperatures. This study reviews data on both global climates and the local climates in California ski towns, and it consults economic information related to cost of entry into the ski industry as well as its sustainability with artificial snow making in order to synthesize the climactic and economic pressures on the quality of skiing on today's mountain slopes to forecast the future demographic of skiers, the trend in ski economics, and the rise in the cost of living for ski town communities, especially for indigenous inhabitants. This study found that the average warming of the global temperatures, as a result of climate change, has assisted in the overall reduction of viable natural precipitation levels at historical ski resorts and inspired a cascading effect of artificial snow making, rising costs for both ski resorts and their customers, a consolidation of the ski market under two major conglomerates, and a future outlook of an aging ski demographic made up of the economic elite; all this points to a potential downturn in new customer participation, in youth participation, and an uncertain future for the ski industry.

Keywords: Climate change and skiing, U.S. ski industry, Ski resort consolidation, Artificial snowmaking, Mountain resort communities, Ski tourism economics, Indigenous communities, Ski season decline

Introduction

A way of life and transportation stretching back at least 8,000 years in both Europe and Asia, skiing became a distinct recreational activity born of military exercises in Scandinavia, and it became a phenomenon in North America by the time of the U.S. National Ski Association's inauguration in 1905. As a competitive sport attracting star athletes, skiing became a core pillar of the Winter Olympics' first iteration in 1924. Since these milestones, skiing has transformed from a niche necessity in mountainous communities into a commercialized activity beloved especially by urban dwellers seeking nature and a sense of freedom and thrill out in the country among the United States' most daunting and daring slopes. This transformation and the creation of dedicated ski resorts has refigured the structure of mountain communities around the sport and its seasonality.

While initially a boost to local economies and local communities' public attention, the ski industry has suffered heavily and adapted due to climate change and the difficulties of running a resort in the modern world; such rapid change has also manifested indirect effects for mountain communities and their economic livelihoods. This paper intends to analyze the effects that climate change has had on ski resorts in terms of their viability, the demographics of skiers, environmental and economic impacts on indigenous communities which have maintained the land since before American colonization, and ultimately make an estimate regarding what these trends mean for the long-term future of the sport and whether the families enjoying it will have a distinctly different experience than that of their grandchildren.

Methods

Alongside the published literature surveyed below, this paper draws on two original interviews conducted by the author in August 2026 with working ski instructors employed at resorts in different states and snow climates. Malcolm Ridenour, an instructor at Northstar in Placer County, California, was interviewed on August 23, 2026; Alexander W., an instructor in Aspen, Colorado, who asked that his surname not be published, was interviewed on August 26, 2026. Participants were selected based on depth of professional experience and contrast between the snow climates in which they work. Malcolm Ridenour is entering his thirtieth season as a ski instructor and has taught at Northstar and Palisades Tahoe in California and at Falls Creek in Australia; Alexander W. Has instructed for twelve years at Aspen Snowmass in Colorado, and

has also worked at Aspen Highlands and Buttermilk. Both spend more than one hundred days on the snow per season, so each speaks from extensive experience. The author knows both instructors personally, and that prior relationship was the basis of access; it is disclosed here because it bears on how the responses should be read.

The interviews were structured; each instructor received an identical written questionnaire of twenty-eight questions by email, covering observed changes in season length and opening dates over the course of their careers, what role artificial snowmaking plays at their resort, and how those changes affected the work available to them and the behavior of their clients. Both returned their answers in writing. Those written replies constitute the primary record, and every statement attributed to either instructor is drawn directly from them rather than from notes, recollection, or paraphrase. Both participants consented to being named and reviewed the statements attributed to them in this paper.

Two interviews cannot be representative of an industry that employs tens of thousands of instructors, and the accounts that follow are offered as illustration rather than as a basis for generalization. Their value lies in a different direction: the quantitative literature on shortening ski seasons describes the problem at the scale of regions and decades, and these interviews show how that same contraction registers in the daily operation of a single resort and in the working life of the people it employs. Where the sections below draw on these conversations, the instructor is identified by name in the text, and no separate citation is given, as the interviews are primary data generated for this paper rather than material drawn from an outside source.

Climate Change

2024 was recently ranked as the hottest year on record (serious recordkeeping began in 1850), and temperatures have risen globally by ~2.63 degrees Fahrenheit (1.46 degrees Celsius) since the pre-industrial period average [1]. While the overarching concept of climate change is nuanced and has localized differences, this paper's intention is not to analyze the specific causes of or remedies for climate change, and will simplify the topic to an overview of general temperature average increases over the last several decades in order to consider the implications for weather, snowfall, and the duration and quality of the ski season each year.

Given that water maintains a boiling point of 100 degrees Celsius and a freezing point of 0 degrees Celsius, sustained global average temperature increases are associated with a smaller

likelihood of consistent snowfall, a smaller likelihood of snow that sticks (does not melt or ‘slush’ quickly), and a shorter ski season with worse-quality slopes from a skier’s perspective. While there exist anomalies within the broad trend of climate change that make skiing in some parts of the world better for a short period of time, those are minor reprieves in comparison to the consistent trend experienced globally. For instance, 2026 is theorized to experience a strengthened El Nino climate pattern, an intensification that some research associates with rising global temperatures, particularly in California and the western coast of the United States up until the Sierra Nevada mountain range. This climate pattern typically causes a greater degree of precipitation in the form of rain and snow, even if the winter season is generally warmer because of the El Nino climate pattern [2]. However, this same climate pattern, strengthened by global temperature changes, conversely deprives East Asia (particularly mountainous Japan) of snowfall for its ski season, so any benefit is globally uneven.

When it comes to precipitation levels, the volume and quality of snowfall determines the period during which ski resorts are able to open for business. Modeled ski seasons in the United States, accounting for snowmaking, ran between 5.5 and 7.1 days shorter across the 2000–2019 period than they did across a 1960–1979 baseline, and projections for the 2050s indicate a further contraction of 14 to 33 days under a low-emissions scenario and 27 to 62 days under a high-emissions scenario [3]. Given that the average ski season in the U.S. runs ~110 days between November and April, even the low-emissions projection amounts to a cut of roughly 13% to 30% in operating days, while the high-emissions range would remove as much as half the season; losses on this scale have the potential to threaten all levels of ski resorts, from tiny individual hill facilities to large corporate entities. Critically, strong snowfall and ‘powder’ snow cover before the Christmas and New Year’s period leads to the greatest business and popularity for ski resorts; forecasts of precipitation thresholds through 2050 estimated that only 23% of resorts may have a minimum baseline of snow cover by December 15th to prepare for the most lucrative portion of the season [4].

For this reason, many ski resorts have resorted to artificial snowmaking in order to create viable paths on their slopes. In an interview, Malcolm Ridenour, an instructor at the Northstar ski resort in Placer County, California near the tourist destination of Lake Tahoe, reported that the facility has been increasingly using artificial snowmaking to provide a viable early-season opening for pass holders at the resort, and to open up more runs for skiers; snowmaking has been a way for

resorts like Northstar to outdo competitors, since they're able to offer paths for skiers all over the mountain as opposed to the limited runs created by natural snowfall. A report from the University of Basel on the problems with and consequences of artificial snowmaking concluded that the snowmakers themselves significantly increased the water and energy consumption of the ski resorts studied, with increases up to a factor of five, and the snowmaking process would have issues regardless of the water and energy provided due to warm conditions making snow formation challenging naturally and artificially [5]. Aside from the financial and physical challenges of artificial snowmaking, the practice also exacerbates existing environmental issues. Normally, the water used to create artificial snow strains winter resources in the area surrounding the ski resort, which can deplete the local water table and threaten local vegetation (and then the fauna reliant on that vegetation). Ironically enough, the increasing sale of real estate in ski towns has also led to a noticeable increase in water consumption from visitors during the ski season, compounding the strain on water resources [6]. This issue presents itself most obviously in water-poor areas such as along the Colorado river, where the Colorado River Compact already divides the limited water capacity among several states and their counties.

Given the reduced outlook for precipitation in the future at ski resort sites, companies will have to weigh the costs and benefits of artificial snowmaking to extend the operating season as natural snowfall levels threaten to shorten operating days and profit. This also means that ski resorts have less total slope area to work with each season, as adequate snowfall will only exist for a minority of runs, and resorts will be limited in how many other paths they can artificially make available to skiers. The artificial snowmaking and the volume of temporary skier residents will continue to worsen the problem by depleting the limited local resources around each ski site, raising prices and the level of difficulty to maintain the natural beauty and skiing viability of the slopes for future seasons.

Industry Trends and Consolidation

Partly due to the economic impact of climate change on the sport and partly due to evolving business practices and tendencies across American institutions as the country has entered the modern era, skiing has more and more become a sport for older, richer, less diverse people as small business owners have made way for two conglomerates to essentially own the industry.

This section serves to outline the cause for these trends, and how they impact the sport's longevity.

The current duopoly controlling over 50% of the U.S. ski lift capacity is made up of Vail Resorts and Alterra Mountain Company. These entities also sell competing ski season passes (Vail sells the 'Epic Pass' and Alterra sells the 'Ikon Pass'). The large geographical control both corporations possess appears to have contributed to an inversion in seasonal pass prices as opposed to day passes given how many separate resorts each corporation can offer access to as a means of providing a unique offer to customers. While seasonal pass pricing has declined significantly to about half of what it was back in the mid 1990's, day pass pricing has risen 60% or greater at resorts [7].

Yet, seasonal pass prices still hover between \$900 and \$1,000, which remains a luxury purchase for many would-be-skiers, especially those who would be unable to commit themselves to returning to the resort multiple times over the course of the season to get the value out of their pass; this conversation has also failed to account for the cost of housing and other necessities such as food during a skier's stay at a resort or somewhere nearby. For the average skier, mountain resorts are typically located a significant distance from their home such that every trip to the resort would require at least one overnight paid stay. For example, a skier living in San Francisco who wants to visit the Lake Tahoe area to ski at resorts like Northstar would have to buy the Epic Pass for \$1,119 before driving around 195 miles (3.5-4 hours) to the resort, where they can expect to pay a few hundred dollars for one night's stay as well as \$40 for underground parking, not accounting for any other food and entertainment costs along the way. If the same skier wished to make the most of the expensive 'Epic Pass,' they would stay multiple nights for one extended trip or they would need to repeat the long journey and lodging process multiple times throughout the season. In a study completed in 2022, 45% of skiers in the U.S. maintained a household income greater than \$100,000 (the national average household income that year was \$74,580) and, later, during the 2023-2024, 88% of skiers were recorded as white [8]. Even at a reduced price, seasonal participation requires massive expenditure and resorts rely on the wealthiest demographic of the U.S. to support the industry.

The 60% increase in day pass pricing also creates another limitation in the ski industry: the barrier to entry rises significantly. Depending on the day they travel to the resort, the same hypothetical skier would have to pay between \$100 and \$300 for access to the ski runs for just

one day alone (this is why the seasonal pass makes more financial sense to committed skiers). If the hypothetical skier is brand new to the sport, however, and is only trying it out of interest or because an acquaintance does the sport, justifying the cost to try it out for a day becomes quite challenging and most newcomers would also find it hard to commit to a seasonal pass when they're not sure what their level of enjoyment will be. In addition to the earlier-discussed costs and travel barriers, a new skier would also have to obtain all the required ski equipment (up to \$100 if renting for the day, but thousands of dollars if purchasing outright) and sign up for lessons if no one offers to teach them (which can range from just under \$100 to over \$1,000 for a day). Resorts are struggling to convert first-time adult skiers into repeating customers more than 15-17% of the time while also combating a declining number of total visits per-resort and unique visitors per-resort [9]. Given the financial barriers to entry for newcomers, not to mention the difficulty of the sport, ski resorts are challenged to attract young customers who did not grow up in a family already accustomed to the finances and logistics of skiing. These barriers may explain why the average age at ski resorts continues to climb and why those resorts are increasingly looking to extract more value from an aging customer base.

The consolidation of resorts under a limited number of corporations appears to have reduced price competition in the industry and may have allowed companies to base their practice around the wealthier, older demographic which can support them perennially. Without an easy way to try out the sport, the younger generation and/or newcomers may be less likely to commit to skiing and become consistent visitors. Resorts are left with a shrinking and ageing pool of customers, which means that they have to offer more value and charge higher prices to in order to remain in business. Independent companies controlling less popular and lucrative ski sites struggle to compete, and often lose the little business they have. Taken together, these factors may reinforce one another in a cycle which gradually shrinks the number of Americans who will return to the resorts each year, though isolating the contribution of any single factor requires data this paper does not present.

Impact on Resort and Indigenous Communities

The volume of skiers visiting each season acts as the lifeblood of a ski town. A study conducted by the RRC Associates research group found that, just looking at resorts owned by Vail Resorts in Colorado, the ski industry generated \$4.8 billion annually and created over 46,000 full-time

jobs [10]. Given the challenges climate change presents, and the contraction in ruling companies within the industry, that economic activity may be more vulnerable than the figures suggest. Aside from businesses and the economic health of ski towns, the gentrification of ski towns by an increasingly rich and old demographic, the increased use of water, and the commercialization of the natural landscape raise questions about the heritage and livelihood of indigenous communities whose homelands include these areas. The discussion that follows examines one case in detail, the Washoe of the Lake Tahoe region, and its claims are limited to that community and that region; whether the same dynamics hold at Aspen, Jackson Hole, or Big Sky would require evidence this paper does not gather.

As the ski season shrinks and the number of independent resorts drops, the open jobs for ski instructors could be expected to decline, and a shrinking pool of opportunities may also push experienced educators and workers out of the industry. In an interview, Alexander W., a ski instructor in Aspen, Colorado, noted that climate change and the artificiality of snowmaking have reduced his available amount of work and the liveability of his job. Specifically, in some seasons he has lost 2 months of work compared to what was possible in prior years. Separately, with the decrease in real snowfall, he noted that some clients have refused lessons until days when a reliable snowpack is present to ski over. With less guaranteed work available within ski instruction, workers are forced to commit to multiple jobs at once or exit the industry in favor of a stable career; a reduction in experienced ski instructors may in turn reduce the quality which the controlling companies at resorts like those in Aspen can offer to customers, which could further reduce the desire to commit to learning skiing at the resorts. The same logic could be applied to lodges and ski-oriented businesses in the surrounding ski towns: where fewer skiers could lead to fewer purchases of those kinds of goods, which could lead to business closures, fewer offerings for skiers remaining in the town, and a further contraction of ski activity and economic activity in the town. This sequence is plausible rather than demonstrated; testing it would require town-level business data across several seasons.

In the Lake Tahoe region, the trend toward fewer, older, and richer skiers may widen the wealth gap between seasonal residents and the Washoe families who live there permanently. A 2006 study of modern representatives of the Washoe tribe around the Lake Tahoe region of California found that members of that cultural group mostly had an average household income between \$20,000 and \$35,000, well below the figures previously viewed regarding the average wealth of

skiers visiting resorts like Northstar [11]. That profile is now two decades old, and no more recent comparable survey was located for this paper, so it establishes a historical baseline rather than current conditions. As ski towns become more expensive, rising real estate prices and costs for basic goods and services may outprice Washoe individuals and make living in the area increasingly difficult. The sources consulted here establish income disparity but do not track displacement so this remains an inference rather than a documented outcome. For Washoe members living on reserved land, the water consumption from artificial snowmaking and from a large seasonal population may negatively impact the plants and wildlife the community has long relied on, though no study consulted here measures that effect directly in the Tahoe basin. Helen Fillmore, a councilwoman for the Washoe Tribal Council, articulated the potential problem in clear terms when she said that “if the land's not healthy, we're not healthy. We're not healthy, the land's not healthy.” [12] Where government assistance programs respond to these pressures, they address affordability at the margins rather than the wealth gap and inflation of prices driving it.

Conclusion

While climate change impacts many industries, it acutely influences season-based activities such as skiing and makes the sport more inaccessible and unprofitable by the year. In the long-term, without accounting for any change of course, the outlook for the ski industry in the U.S. is grim. The aging, shrinking population who can reliably access and participate in the sport at the reduced variety of resorts on offer appear to be supporting a continued contraction within the activity's demographics. Smaller companies face steep obstacles to competing with the big corporations in part because there isn't enough snowfall to make skiing attractive, and the cost of artificial snowmaking to extend the ski season and have more runs on offer is a big cost that not every company can afford to invest in. As climate change runs its course and global temperatures climb, the ski season will shrink in many popular locations and the sport may have to adapt to new forms that don't rely heavily on authentic snow and authentic slopes if the sport is to continue in the face of landscapes devoid of a safe snow pack. One can only hope that this trend can be reversed by a combination of changing ski resort policies and breakthroughs in environmental management so that skiers, townspeople, and indigenous inhabitants can continue to enjoy the mountain communities that have been a staple of American natural beauty.

References

1. Dahlman L, Lindsey R. Climate change: global temperature [Internet]. Silver Spring (MD): National Oceanic and Atmospheric Administration, Climate.gov; 2025 May 29 [cited 2026 Sep 18]. Available from: <https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature>
2. Wright S. El Niño forecast is 'off the charts.' What could this mean for ski season? [Internet]. San Francisco (CA): KQED; 2026 Sep 2 [cited 2026 Sep 18]. Available from: <https://www.kqed.org/news/12096560/el-nino-snow-weather-forecast-sierra-nevada-tahoe-california-ski-pass-winter-2026-2027>
3. Scott D, Steiger R. How climate change is damaging the US ski industry. Curr Issues Tour. 2024;27(22):3891-907. doi: 10.1080/13683500.2024.2314700
4. Wobus C, Small EE, Hosterman H, Mills D, Stein J, Rissing M, et al. Projected climate change impacts on skiing and snowmobiling: a case study of the United States. Glob Environ Change. 2017;45:1-14. doi: 10.1016/j.gloenvcha.2017.04.006
5. Jacobs A. Skiing over the Christmas holidays no longer guaranteed - even with snow guns [Internet]. Basel (Switzerland): University of Basel; 2022 Dec 28 [cited 2026 Sep 18]. Available from: <https://www.unibas.ch/en/News-Events/News/Uni-Research/Skiing-over-the-Christmas-holidays-no-longer-guaranteed---even-with-snow-guns.html>
6. Neustadter C. How Colorado water history shapes the science of snow [Internet]. Fort Collins (CO): Colorado State University; 2022 Mar 29 [cited 2026 Sep 18]. Available from: <https://source.colostate.edu/colorado-water-compacts-snow-ski-resorts/>
7. Swiger T, Looney A. Increasing concentration in the era of Epic and Ikon - are skiers and boarders better or worse off? [Internet]. Salt Lake City (UT): Marriner S. Eccles Institute for Economics and Quantitative Analysis; 2025 Feb 10 [cited 2026 Sep 18]. Available from: <https://marriner.eccles.utah.edu/increasing-concentration-in-the-era-of-epic-and-ikon-are-skiers-and-boarders-better-or-worse-off/>
8. Garcia JD. Skiing [Internet]. Ipswich (MA): EBSCO Information Services; 2022 [cited 2026 Sep 18]. Available from: <https://www.ebsco.com/research-starters/sports-and-leisure/skiing>
9. Hannah S. Increasing beginner conversion [Internet]. Woodbury (CT): Ski Area Management; 2018 Mar [cited 2026 Sep 18]. Available from: <https://www.saminfo.com/archives/2010-2017/2018/march-2018/increasing-beginner-conversion>

10. RRC Associates. Economic impact of skiing in Colorado: case studies [Internet]. Boulder (CO): RRC Associates; 2026 Jan 27 [cited 2026 Sep 18]. Available from: <https://www.rrcassociates.com/case-studies/economic-impact-of-skiing-in-colorado/>
11. Kalhammer M. Socio-economic profile of the Washoe people. Gardnerville (NV): Washoe Tribe of Nevada and California, Planning Department; 2006 Mar.
12. Romero ED. 'If the land's not healthy, we're not healthy': how the Washoe people view climate change [Internet]. Sacramento (CA): CapRadio; 2019 Aug 7 [cited 2026 Sep 18]. Available from: <https://www.capradio.org/news/tahoeland/2019/08/07/if-the-lands-not-healthy-were-not-healthy-how-the-washoe-people-view-climate-change/>