CITY OF ASPEN
CANARY INITIATIVE

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# Aspen Climate Study Finds Serious Risk to the Future of Skiing

**ASPEN, CO** – If global warming continues unchecked, there could be no skiing in Aspen by the end of this century and possibly well before then, according to a new study undertaken by scientists for the City of Aspen. On the other hand, if global emissions of carbon dioxide and other greenhouse gases are reduced, skiing in Aspen could be preserved.

The study found that Aspen is already seeing the impacts of climate change, with local temperatures climbing faster than the global average. For the future, climate models indicate that if global greenhouse gas emissions are reduced, Aspen is projected to experience about 6ºF of additional warming by 2100, giving it a similar climate to that of Los Alamos, New Mexico. If global emissions continue their rapid rise under a high emissions scenario, Aspen is projected to warm 14ºF by the end of this century, giving it a similar climate to that of Amarillo, Texas.

Local impacts of projected warming include more precipitation falling as rain rather snow, more wildfires and insect outbreaks, and threats to local species including alpine wildflowers, pika, and aspen trees. Earlier peak stream flows will have negative impacts on rafting, fishing, and water supplies. Longer summers will provide new opportunities for warm season tourism.

The climate impact study was undertaken as part of the "Canary Initiative" – a local effort to understand and reduce Aspen's role in and vulnerability to global warming. The city has already completed an inventory of its greenhouse gas emissions and is continuing to pursue plans to reduce those emissions. The impact study received additional support from the EPA to examine impacts associated with altered streamflow.

"While climate change is a global problem, its causes and its impacts occur locally," says Dan Richardson, Global Warming Project Manager for the city. "Like other mountainous areas, Aspen is particularly vulnerable to global warming," adds report coordinator John Katzenberger of the Aspen Global Change Institute. "This is really a pioneering study, where a single community realized climate change could affect their quality of life and the local economy and then commissioned a report to get specific climate change information about the consequent impacts," notes Gerald Meehl, senior scientist at the National Center for Atmospheric Research and a member of the science advisory panel for the study.

"The longer we wait to address the challenge of global warming, the worse it gets. If left unchecked, climate change will devastate much of what we care about," says Randy Udall of the Community Office for Resource Efficiency. "Global warming presents serious threats to our town's future. We are committed to being among the leaders in the global effort to respond to this challenge," says Aspen Mayor Helen Klanderud. Senior Scientist Peter Frumhoff of the Union of Concerned Scientists notes, "As we found in California, well-designed regional-scale studies of climate impacts can be powerful tools for informing and motivating sound measures to reduce emissions and prepare for changes that cannot be avoided. I applaud the city of Aspen for its leadership on this issue."

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# KEY FINDINGS

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## *Climate Change*

1. **Aspen's climate has changed noticeably over the past 25 years.** Temperatures have increased about 3 degrees F, and the average number of frost free days per year has increased about 20 days.

2. **While highly variable, total precipitation has decreased 6 percent in the past 25 years and the amount falling as snow has decreased 16 percent.** Higher in the area mountains at 10,600 feet, total precipitation has decreased 17 percent.

3. **The more aggressively the world responds to the climate challenge, the better Aspen will fare in the future.** If global greenhouse gas emissions are reduced, Aspen is projected to experience about 6 degrees F of additional warming by 2100. If global emissions continue to rapidly increase, Aspen is projected to warm by 14 degrees – giving it a climate more like that of Amarillo, Texas. Mid-range projections show 9 degrees F of warming.

4. **In the future, more of Aspen's precipitation will fall as rain rather than as snow.** Snowpack will decline, and peak runoff will occur earlier in the spring. Summer and fall stream flows will be reduced, potentially declining below the minimum needed to protect aquatic species. The greater the temperature rise, the more extreme these effects will be.

## *Ecological Impacts*

5. **Strong local warming will force some plant and animal species to move up to higher elevations.** By mid-century, the vegetation in Aspen is likely to look more like what we now see near Basalt, Colorado, a town 1,400 feet lower in elevation, 20 miles down the Roaring Fork River. Rising temperatures and the associated reduction in snowpack will threaten many local species, notably those dependent on alpine habitat such as ptarmigan and pika. Some species are likely to become locally extinct.

6. **Hotter springs and summers are projected to lead to larger and more intense wildfires during the first half of the 21st century.** For the Aspen area, global warming means higher air temperatures, reduced snowpack, forest stress, and increases in the number of trees killed by insects. Together, these are projected to lead to longer, more destructive fire seasons.

7. **Rising temperatures will increase the likelihood of insect outbreaks.** Cold nights and winters usually keep insect populations in check. Warmer nights and winters, along with longer, warmer summers will increase the risk of pest population explosions. Spruce-fir forests are likely to become more vulnerable to spruce beetle infestations, and aspen groves may become more susceptible to gypsy moth invasions. Overwinter mortality of pine beetles, affecting lodgepole, ponderosa, and limber pines, is likely to decrease, contributing to the likelihood of pine beetle outbreaks.

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8. **Warming is likely to increase the spread of invasive plant species.** Increased concentration of atmospheric CO2 has been shown to be advantageous to some invasive plant species. The current spread of invasives such as Canada thistle, field bindweed, leafy spurge, and spotted knapweed will continue, and new, non-native species are likely to colonize the area.

## *Socioeconomic Impacts*

9. **Water Supplies**: Summer and fall streamflows will likely be diminished as a result of peak runoff occurring earlier in the spring. With the local population expected to increase 75% by 2030, and associated water demand continuing to grow, the potential for water shortages will increase.

10. **Agriculture:** With the projected increase in summer temperatures and little change in precipitation, soils and vegetation are likely to become drier. Thus, increased irrigation on fields may be required, which could lead to increased pressure on water resources.

11. **The Aspen economy is likely to prove more adaptable to climate change than plants and animals.** Wealthy human communities can innovate and diversify, and this could buffer our economy somewhat from climate change impacts. However, winter recreation, which has been the mainstay of the town's economy, is very likely to shrink in relative importance. The greater the warming, the more difficult and expensive adaptation to climate change will be.

12. **Skiing**: **Continued growth in global greenhouse gas emissions is projected to end skiing in Aspen by 2100 and possibly well before then**. **Reducing emissions could preserve skiing at middle and upper elevations.** In general, the ski season is likely to start later and end earlier. Snow depths will be reduced. Spring melt will begin earlier. Higher temperatures will reduce snowmaking opportunities and increase competition for the needed water supplies.

13. **Rafting**: **Reduced streamflows will negatively affect the rafting industry in the Roaring Fork valley.** Earlier peak runoff will result in a shorter rafting season, and one that starts earlier, at a time when there are few tourists in town.

14. **Fishing:** Earlier peak runoff resulting in lower and less turbid streamflows in June could benefit recreational fishing during that month in the short term. On the other hand, lower streamflows throughout the summer and fall and increased water temperatures (as a result of lower water volumes, loss of vegetation cover, and higher air temperatures) could have adverse effects on trout spawning, stream insect development, and trout survival.

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