

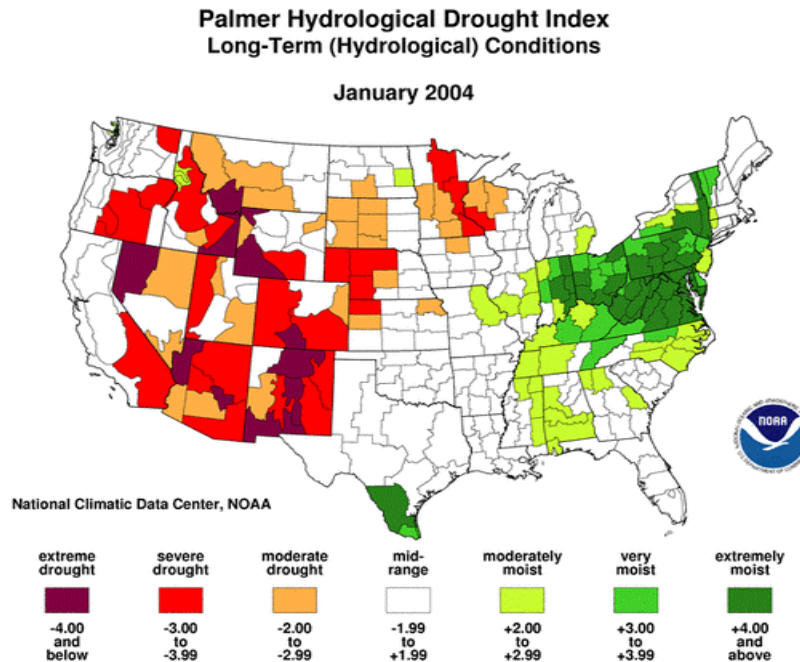
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## Global Warming Impacts in Ski & Snow Country

### Review of Climate Science in Mountain, Polar Environments

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**Snowfall this season has been average to above average in Colorado. However, most of the West, including Colorado, continues to experience severe to extreme drought.**



### Forecasts from the Rocky Mountain/Great Basin Regional Assessment by the federal government's U.S. Global Change Research Project

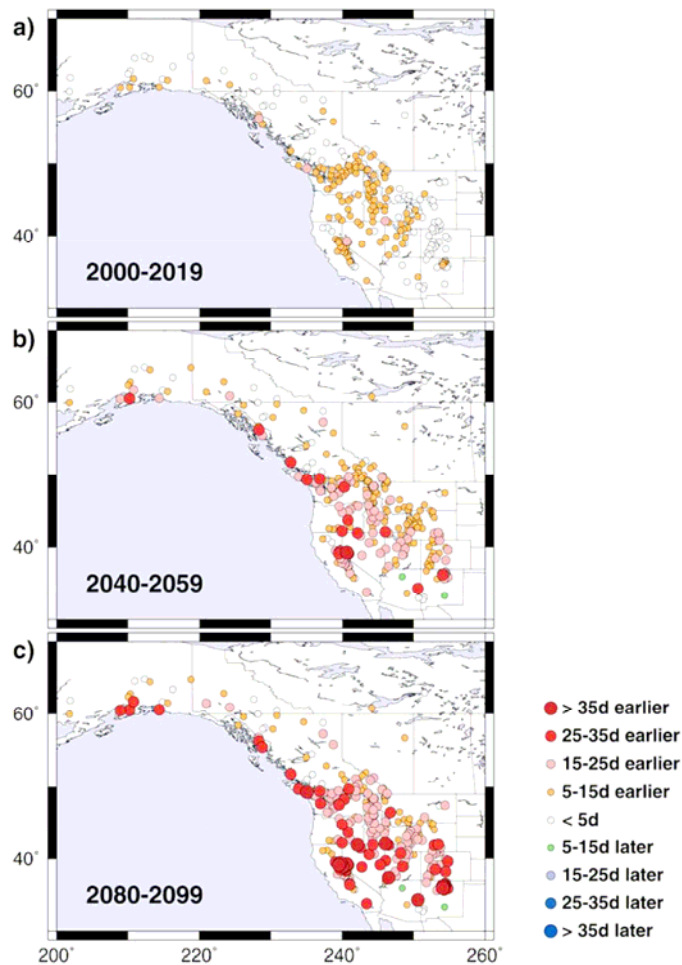
- The date of peak flow in three Rocky Mountain rivers (Boise, Humboldt, and Yellowstone) come 10-15 days earlier during the 20th Century.
- Predicts seasonal temperature increases of 4-14 degrees F over the 21st Century, with the largest increases in winter.
- 85 percent of the water used by people in the Rocky Mountain/Great Basin region is surface water, and 85 percent of this originates as run-off from mountain snowpack.
- Scientists predict increased *total* precipitation, but with a significant shift from snow to rain. This could have severe impact on skiing in future years, and create significant flood and water management challenges.
- One model even projects that skiing could be eliminated from the RMGB region by 2070.

**In February, University of Washington climate scientist Edward Miles previewed results of his study tracking global warming impacts on snowpack and spring runoff trends in the West:**

- Since 1950, climate change has been accompanied by an increase in precipitation, but more now comes as rain rather than snow, which means earlier spring runoff and longer summer droughts.
- Combining computer models with hundreds of measurements in the Cascades, Sierras and the Rockies, his research predicts the Western U.S. faces decades of chronic water shortages.
- For every 1.8-degree increase in average temperatures, the snow line rises about 500 feet higher. Assuming only modest temperature increases, the study anticipates a 59 percent drop in the water content of critical snowpack by 2050.
- Water storage systems in the Northwest and Northern California are not designed for such a regimen, which means it will be hard to meet the competing needs of fisheries, farmers and power generators.

**The January issue of the scientific journal *Climatic Change* published a number of new papers on global warming, precipitation and water in the West. Findings include:**

**Mountain Meltdown in Pacific Northwest  
Global Warming Means Earlier Peak Runoff**



SOURCE: *Changes in Snowmelt Runoff Timing in Western North America Under a 'Business as Usual' Climate Change Scenario*, by Iris T. Stewart; Daniel R. Cayan, and Michael D. Dettinger. *Climatic Change*, January 2004 pp. 217-232

- The date of peak spring runoff will continue to advance, coming more than a month earlier in many western rivers by the end of the 21<sup>st</sup> Century.
- Average snowpack in the Colorado River basin will decrease by 30 percent by mid-century. Total water demand for the Colorado River basin will exceed available supply.
- Decreases in relative humidity will increase the risk of severe wildfires.

The journal *Climatic Change* is available online at: [www.kluweronline.com/issn/0165-0009/current](http://www.kluweronline.com/issn/0165-0009/current)

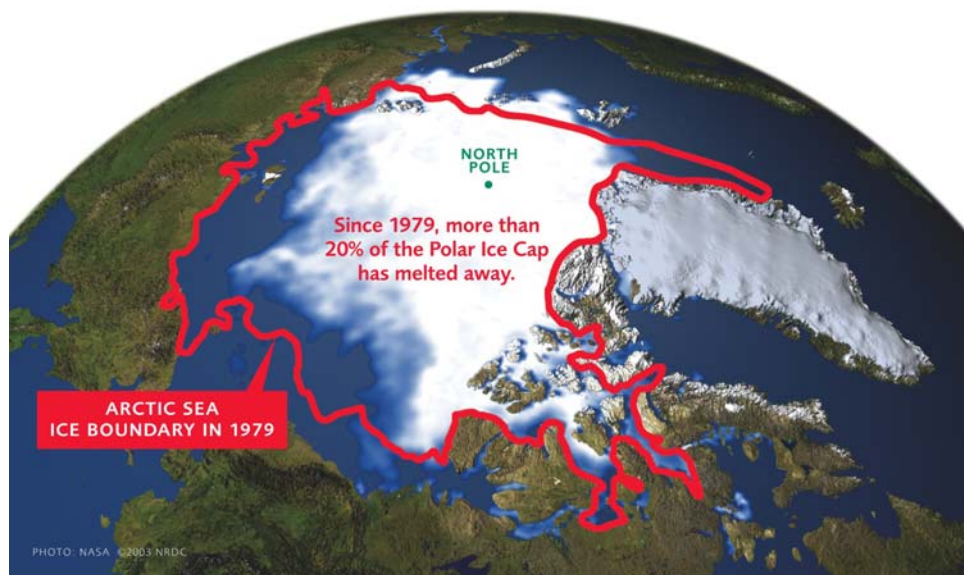
**A December 2003 report by the United Nations Environment Programme concludes that many low altitude ski resorts face serious economic challenges due to the effects of global warming.**

- The report concludes that ski seasons could shorten; that resorts would have to use up to 187 percent more snowmaking; and some may become completely economically unviable.
- The new UNEP report follows similar studies showing that resorts with a base below 5,000 feet may not receive adequate snow.
- This includes most U.S. ski resorts, including all ski resorts in the northeast. These low altitude ski resorts are also where many beginners learn to ski or snowboard.

The UNEP report can be found on their website at [www.unep.org](http://www.unep.org)

**The Biggest Effects of Global Warming Winter Climates:**

- The polar ice cap as a whole is shrinking. Images from NASA satellites show that the area of permanent ice cover is contracting at a rate of 9 percent each decade. If this trend continues, summers in the Arctic could become ice-free by the end of the century.



- Arctic ice is getting thinner, melting and rupturing. The Ward Hunt Ice Shelf, -- largest single block of ice in the Arctic -- had been around for 3,000 years when it started cracking in 2000. Within two years it had split completely, and is now breaking into pieces.
- Parts of Alaska have warmed as much as 7°F since the 1950s -- a huge change.
- 2002 was a terrible year for fires. Colorado, Arizona, and Oregon had their worst fire seasons ever. Across the Western U.S. more than 7 million acres burned.

**Temperatures fluctuate naturally from year to year, of course. But scientists say that overall, average temperatures have been warming at an unprecedented rate:**

- Nineteen of the 20 hottest years on record have been since 1980. 2003 tied for the second warmest year on record, right behind 1998.
- Average temperatures in the Arctic region are rising twice as fast as they are elsewhere in the world.