Snow Cover

This indicator measures the amount of land in North America that is covered by snow.

Background

The amount of land covered by snow at any given time is influenced by many climate factors, such as the amount of snowfall an area receives and the timing of that snowfall. Air temperature also plays a role because it determines whether precipitation falls as snow or rain, and it affects the rate at which snow on the ground will melt. As temperature and precipitation patterns change, so can the overall area covered by snow.

Snow cover is not just something that is affected by climate change; it also exerts an influence on climate. Because snow is white, it reflects much of the sunlight that hits it. In contrast, darker surfaces such as open water absorb more light and heat up more quickly. In this way, the overall amount of snow cover affects patterns of heating and cooling over the Earth's surface. More snow means more energy reflects back to space, while less snow cover means the Earth will absorb more heat and become warmer.

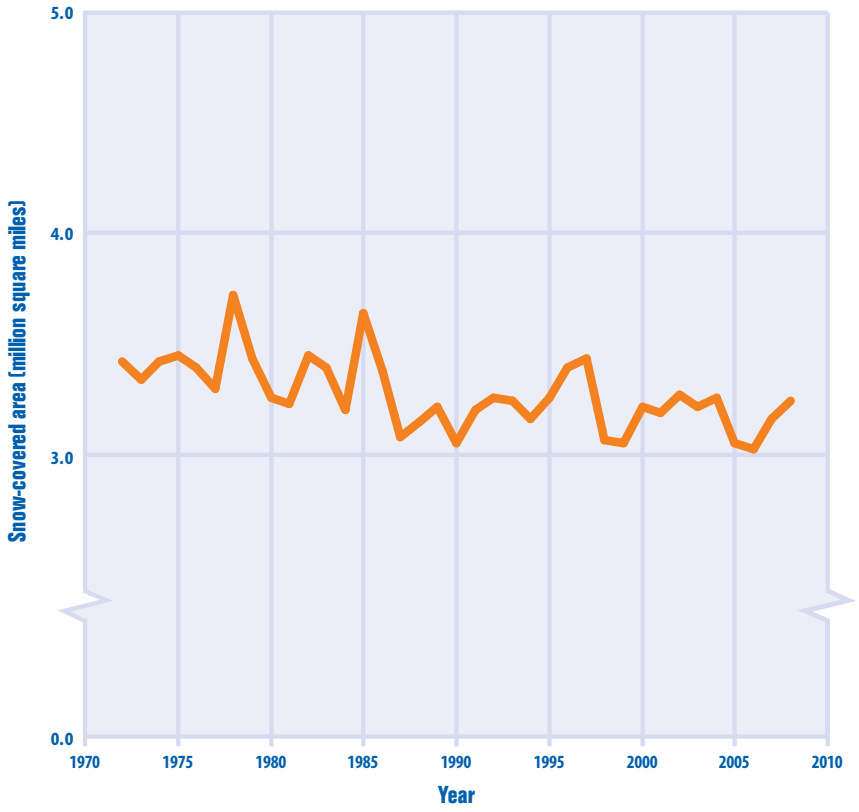
On a more local scale, snow cover is important for many plants and animals. For example, some plants rely on a protective blanket of snow to insulate them from sub-freezing winter temperatures. Humans and ecosystems also rely on snowmelt to replenish streams and ground water.

About the Indicator

This indicator tracks the total area covered by snow across all of North America since 1972. It is based on maps generated by analyzing satellite images collected by the National Oceanic and Atmospheric Administration. The indicator was created by analyzing each weekly map to determine the extent of snow cover, then averaging the weekly observations together to get a value for each year.

Figure 1. Snow-Covered Area in North America, 1972–2008

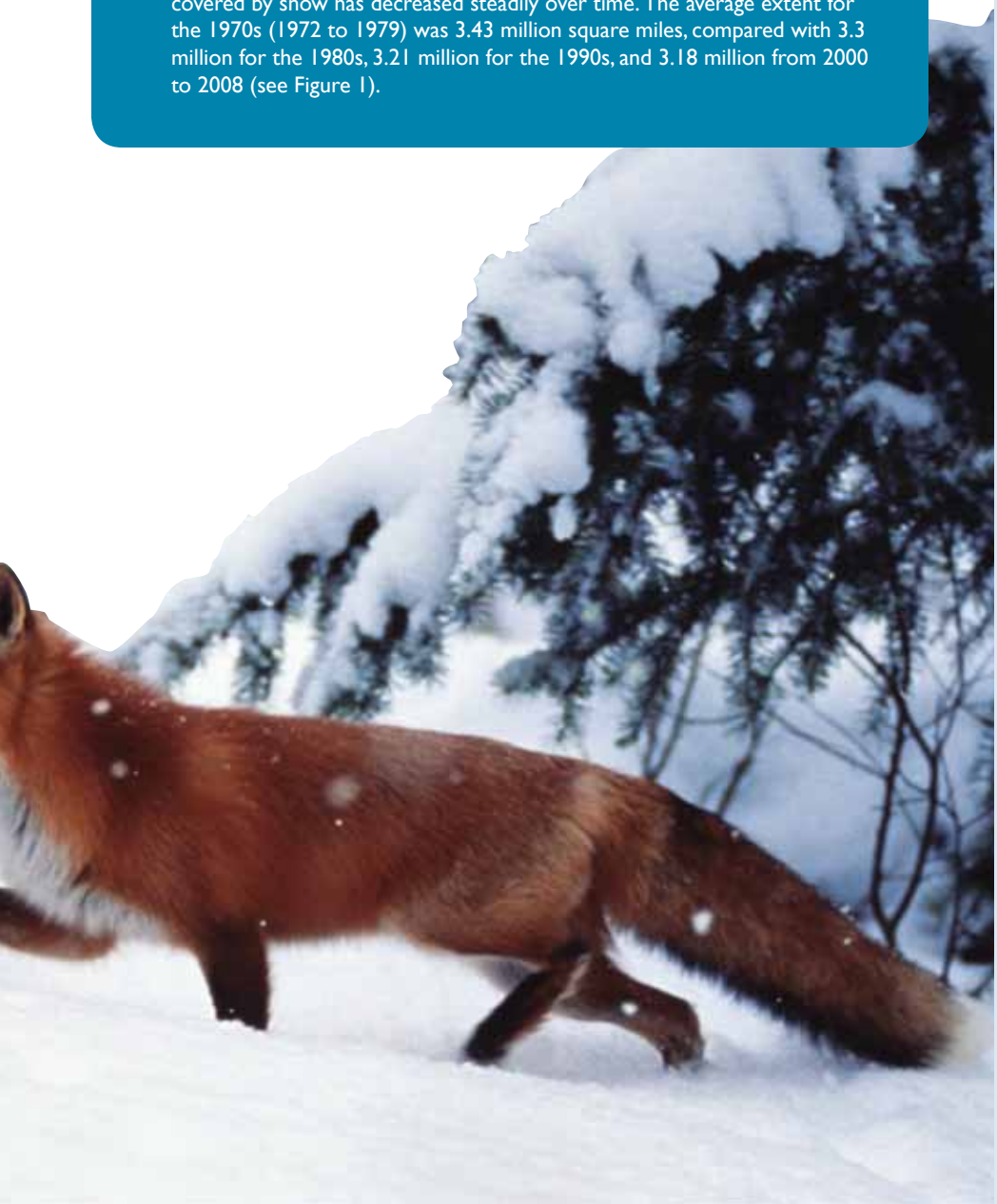
This graph shows the average area covered by snow in a given year, based on an analysis of weekly maps. The area is measured in square miles. These data cover all of North America.



Data source: Rutgers University Global Snow Lab, 2009[16]

Key Points

- Overall, during the period from 1972 to 2008, snow covered an average of 3.3 million square miles of North America (see Figure 1).
- The extent of snow cover has varied from year to year. The average area covered by snow has ranged from 3.0 million to 3.7 million square miles, with the minimum value occurring in 2006 and the maximum in 1978 (see Figure 1).
- Looking at averages by decade suggests that the extent of North America covered by snow has decreased steadily over time. The average extent for the 1970s (1972 to 1979) was 3.43 million square miles, compared with 3.3 million for the 1980s, 3.21 million for the 1990s, and 3.18 million from 2000 to 2008 (see Figure 1).



Indicator Limitations

Although satellite-based snow cover maps are available starting in the mid-1960s, some of the early years are missing data from several weeks during the summer, which would lead to an inaccurate annual average. Thus, the indicator is restricted to 1972 and later, with all years having a full set of data.

Because it examines only yearly averages, this indicator does not show whether trends in overall snow cover are being driven by decreases in winter extent, summer extent (at high elevations and latitudes), or both. An analysis of more detailed weekly and monthly data suggests that the largest decreases have come in spring and summer.[17]

Data Sources

The data for this indicator were provided by the Rutgers University Global Snow Lab, which posts data online at: http://climate.rutgers.edu/snowcover. It is based on measurements collected by the National Oceanic and Atmospheric Administration's National Environmental Satellite Data and Information Service at: www.nesdis.noaa.gov.