



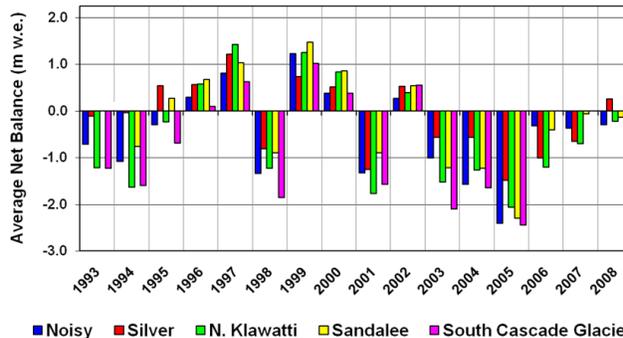
IMPORTANCE

Since the last ice-age, glaciers have continued to shape the dramatic scenery, topography, soils, lakes, streams, and landforms of the North Cascades. Covering a combined area of 235 km² in three large parks in the North Coast and Cascades Inventory and Monitoring Network, they are integral components of the region's hydrologic, ecologic, and geologic systems. Each summer glaciers provide billions of gallons of freshwater for drinking, irrigation, hydroelectricity, fishing, water-based recreation, and wildlife. Glacial melt water comes at a critical time of year when the weather is relatively hot and dry, buffering the region's lakes and streams. On the Skagit river alone glaciers provide 8-12% of total summer runoff, or about 120-180B gallons. The sensitive and dynamic response of glaciers to variations in both temperature and precipitation in all seasons makes them excellent indicators of regional and global climate change.

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Silver Glacier, North Cascades National Park in 1958 (Post) and 2006 (Scurlock). A map made in 1913 shows Silver Glacier completely covering Silver Lake.



Annual net mass balance of glaciers monitored at North Cascades National Park. Total net loss over this period for the four glaciers is 4.84 billion gallons.

Monitored at:

Mount Rainier National Park

North Cascades National Park Service Complex

STATUS and TRENDS

Small mountain glaciers are in rapid retreat throughout the world. At North Cascades, geologic mapping data and a 1998 inventory indicate that glacier area has declined approximately 50% in the last 100 years (Photo 1). Glacier mass balance measurements, since 1993 at North Cascades National Park Service Complex, and 2003 at Mount Rainier, provide a quantitative measure of the impact of climate change on glaciers (Chart 1). Between 1993 and 2008 all of the glaciers monitored at North Cascades National Park Service Complex have experienced significant reductions in volume, with a net loss of nearly 5 billion gallons of water. Since 2003 the much larger Nisqually and Emmons glaciers at Mount Rainier have experienced a net loss of 18 billion gallons of water (i.e. summer melting has outpaced winter accumulation).

DISCUSSION

Rapid loss of glaciers in this network is unambiguous evidence of global warming, and reflects a pattern observed in mountain ranges around the world. Loss of this resource and the buffering it provides to aquatic ecosystems will complicate efforts to protect threatened and endangered aquatic species such as Chinook salmon and bull trout. Research using glacier monitoring data indicates that the loss of glaciers during the last century in Thunder Creek watershed at NOCA has resulted in a 25% decline in summer stream flow. Complete loss of the glaciers in this basin would reduce summer stream flow an additional 20%.