



When Will the Taku Glacier Dam the Taku River Again?

Kathleen Iler-Galau 8th grade Science Teacher

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Introduction

The Taku glacier is a temperate maritime glacier originating from the Juneau Ice Field 32 km north of Juneau. It is the thickest (1500 m) and deepest temperate glacier (600m below sea level) yet measured (2). It continues to thicken at a glacier wide average of 0.7 m per year. The Taku glacier and its distributary Hole in The Wall Glacier are the only Juneau Ice field glaciers that are currently advancing. The advance rate determined by Motyka in 2002 was 30 cm per day (2).

Historically the Taku Glacier blocked the Taku river in the Taku inlet as recently as 1750 and was a tidewater glacier until 1900. The glacier has undergone five major cycles of advance and recession in the past 3000 years, and the cycles have not necessarily coincided with the behavior of other nearby glaciers (3). Taku Glacier shows evidence of both climate influence and the dynamic instability associated with tidewater glaciers (3). This project attempts to answer the question of when the Taku Glacier will dam the Taku river in the future given the current rate of advance calculated in 2002 by Motyka.

Fig. 1 & 2. Note the differences in the following pictures of the Taku Glacier, specifically the difference in thickness and the change in visible rock surrounding the glacier.



Fig. 1. 1939 photo of the Taku Glacier with the USS Hovey in foreground (photo courtesy of the Naval Historical Center).



Fig. 2. 2002 photo of Taku glacier.

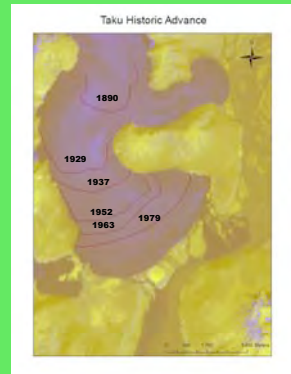
Materials and methods

In order to answer the question when will the Taku Glacier dam the Taku River again, I used the most current rate of glacial advance from 2002, 30 cm per day (2) and a current landsat map of the Taku area. I digitized the current terminus of the glacier and created multiple buffer rings around the digitized terminus. Then I digitized the multiple buffer layers in front of the terminus at four year intervals.

For comparison purposes I also created two rough estimate maps, one for the accumulation area of the Taku glacier from a map in *Taku Glacier on the Move Again* and the other for the advance of the Taku glacier since 1890 from Post and Motyka 1995. I had no geospatial data to work with for these maps so the authors will please forgive my poor map approximation skills.

Results

Below is the map with the approximate advance of the Taku Glacier from 1890 obtained from Motyka 1995. The map is an approximation since I had no georeferenced data.

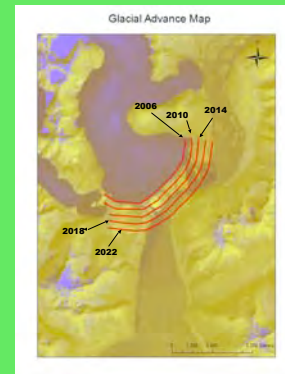


Results

This map is of the accumulation zone for the Taku Glacier. The entire zone is 1820 km². The glacier itself is 700 km²(3) The Taku has the largest accumulation zone in the Juneau ice field and the accumulation zone is at a higher elevation than most of the ice field ranging from 1550-2100 m (1).



Below is a map of the Taku Glacier 2006 with digitized lines for the potential advance at four year intervals.



Conclusions

At the current rate of advance the Taku Glacier will dam the Taku River in fourteen to sixteen years, around 2020-2022. Obviously, the glacier could slow or speed up and alter the time period. Thickening of the glacier and the presence of push moraines provide evidence that the glacier will continue to advance.

The damming of the Taku River will have adverse effects on fish and wildlife. It will prevent the spawning of salmon that reproduce in the Taku watershed and flood the Taku River valley. The local economy for Southeast Alaska and the Canadian portions of Taku will be negatively impacted. There is no controlling the natural cycles of glaciers, but preparation for the inevitable would be wise by local governments and leaders.

Literature cited

1. Post, A., and R. Motyka. 1995. Taku and Le Conte Glaciers, Alaska: Calving-Speed of Late-Holocene Asynchronous advances and Retreats. *Physical Geography*. 16:59-82.
2. Motyka, R. and K. Echelmeyer 2003. Taku Glacier on the Move Again: Active deformation of Proglacial Sediments *Journal of Glaciology*. 49:164-50-58.
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For further information

Please contact <http://www.uas.alaska.edu/spatialdata/> for more information on this and related projects.

