Mendenhall Glacier Facts and other Local Glaciers
(updated 3/13/14)

This document can be found at http://www.uas.alaska.edu/envs/links.html. Click on Mendenhall Glacier Facts. On that same site is a Google Earth map of the “Mendenhall and other glaciers in Google Earth.”

Mendenhall Glacier Size
2009 Estimated area 95.27 square km (36.8 square miles) (not including the Mendenhall Towers glacier).
- Length 21.9 km, (13.6 miles).
- Widest cross section the upper South Branch 6.2 km (3.8 miles)
- Ice height at terminus 3-20 meters, (10-70 feet).
- Terminus width and narrowest part of the glacier 510 meters (0.4 miles) as the raven flies.
- Terminus exposed to lake, a non-linear 865 meters, (2,835 feet).

2000 Elevation at the divide separating the Mendenhall and Taku Glaciers 1,580 meters (5,182 feet).
- Highest contiguous glacier ice 1,893 meters (6,210 feet).
- Elevation of Mendenhall Lake 17 meters (56 feet).
- Lowest bed elevation on the glacier >100 meters (328 feet) below sea level near the North Star Trekking camp elevation 432 meters (1,420 feet).3
- Thickest ice 600 meters (1,968 feet) at the “Flux Gate,” mid-length on the glacier, below the confluence of the North and South Branches, elevation 680 meters, (2,230 feet).3

2008 Estimated depth of glacier below Mendenhall Lake level 65 meters (213 feet).

Glacier Health
Average Terminus Retreat Rates- Across the face of the glacier
2012-winter 2014 ~Unchanged on the lake, 78 meters on the rock outcrop at lake’s western edge
2011-2012 124 meters, 406 feet
2010-2011 133 meters, 437 feet
2009-2010 165 meters, 540 feet (255 meters or 836 feet in the center)
2008-2009 59 meters, 194 feet (most from the east side)
2007-2008 77 meters, 253 feet
2005-2007 126 meters, 413 feet
2004-2005 59 meters, 194 feet
2002-2004 169 meters, 554 feet
2000-2002 72 meters, 236 feet
1997-2012 1143 meters, 0.7 miles
1760 maximum Little Ice Age extent to 2011 5.12 km, 3.18 miles
Distance from Visitors Center to 2012 terminus 2.4 km, 1.5 miles
Average Retreat Rates
2005-2009 52 meters/year, 173 feet/year
2000-2005 58 meters/year, 190 feet/year
1997-2000 66 meters/year, 216 feet/year
1997-2009 48 meters/year, 158 feet/year

- Ice loss from calving 2.6-4% of total ablation (ice loss).
1997-2008 Ice loss area on lower glacier 0.91 square kilometers (0.35 square miles).

Mass Balance
A glacier’s mass balance is the net amount of water equivalent snow and ice that is gained or lost yearly and quantifies “glacier health.”

Surface Mass Balance (excludes calving)
2011 Depth -0.79 meters/year, volume -0.07 cubic km/year
2010 Depth -0.67 meters/year, volume -0.06 cubic km/year
2005 Depth -0.9
2004 Depth -1.2
2003 Depth -1.8
2000 Depth +1.4
1998 Depth -1.4

2001-2007 Depth -1.44 meters/year, volume -0.13 cubic km/year (-52,000 Olympic swimming pools/year).
1995-2001 Depth -0.93 meters/year, volume -0.08 cubic km/year (-32,000 Olympic swimming pools/year).

AAR & ELA
A “healthy” stable glacier that is neither advancing nor retreating has approximately >70% of its area at the end of the summer still covered by that prior winter’s snowfall. This is called the Accumulation Area Ratio (AAR). The snow line that separates the snow above from the firn (1 yr old snow) or bare glacier ice below is the equilibrium line altitude (ELA). The end-of-summer elevation of the ELA is the best visual indicator of yearly health. Lower ELA’s are better for the glacier.

2010 AAR 63% Average ELA 1036 m, 3,400 feet
2009 AAR 63%, ELA North Branch 915 meters, 3,000 feet; South Branch 1,160 meters 3,800 feet
2008 AAR 73%, ELA 915 meters, 3,000 feet
2007 AAR 45%, ELA 1,225 meters, 4,108 feet
2006 AAR 51%, ELA 1,170 meters, 3,838 feet
2005 AAR 47%, ELA 1,200 meters, 3,936 feet
2004 AAR 42%, ELA 1,250 meters 4,100 feet
2005 AAR 29%, ELA 1,370 meters 4,500 feet
2000  AAR 80%, ELA 820 meters 2,690 feet
1999  AAR 57%, ELA 1,100 meters 3,608 feet
1998  AAR 42%, ELA 1,250 meters 4,100 feet

Miscellaneous Characteristics

Surface Ice Speed
- **Maximum ice velocity** 160 meters/year, 525 feet/year at the “Flux Gate,” mid-length on the glacier, below the confluence of the North and South Branches, elevation 680 meters, 2,230 feet.³
- **Ice velocity** at the terminus 68-93 meters/year, 223-305 feet/year.³

Snow Accumulation
- **High elevation snowfall** >10 meters, 32.8 feet, water equivalent.³

Ice Thinning (Melt)
- **Summer terminus melt** – minimum 2 centimeters (.75 inches)/day, maximum 24 centimeters (9.5 inches), average 12 centimeters (5 inches)/day.¹
- **Average annual terminus melt** 13.3 meters (44 feet) of water at 100 meters (328 feet) elevation.¹

Taku Glacier
- **2001 Area** 775 square km, 300 square miles⁶
- **Length** ~60 km, 37.3 miles
- **1995 Thickest part of glacier** 1,477 meters, 4,845 feet⁵
- **1995 Lowest bed elevation** ~ 600 meters below sea level, 1,968 feet below sea level⁵
- **2009 Northeast and southwest portions of terminus show signs of thinning.** Center terminus likely still thickening and advancing.
- **2006-2010 Average terminus advance** 21 meters/year, 68 feet
- **2001-2008 Average terminus advance** 14 meters/year, 46 feet ⁴
- **1948** Stopped calving as a push moraine (above sea level sediment) rose in front of glacier thus reducing mass loss.
- **1890-2009 ~7.3 km terminus advance, 4.5 miles**
- **~1750** Advanced across Taku River and formed a glacier-dammed lake, dam bursts and retreat begins

Mass Balance
- **1993-2007 Depth** -0.21 meters/year, volume loss -0.16 cubic km/year (-64,000 Olympic swimming pools/year).²

Norris Glacier
- **2001 Area** 144 square km, 55.6 square miles⁶

Lemon Creek Glacier Vicinity
Lemon Creek Glacier
2001  Area 9.5 square km, 3.6 square miles

Mass Balance
2000-2007  Depth -1.24 meters/year, volume loss -0.02 cubic km/year (-8,000 Olympic swimming pools/year).
1995-2000  Depth -0.85 meters/year, volume loss -0.01 cubic km/year (-4,000 Olympic swimming pools/year).

Ptarmigan Glacier (west of and adjacent to Lemon Creek Glacier)
2001  Area 1.3 square km, 0.5 square miles

Thomas Glacier (viewable up Lemon Creek valley from Egan Drive)
2001  Area 2.9 square km, 1.1 square miles

Nugget Creek Glacier
2001  Area 1.9 square km, 0.7 square miles

Herbert Glacier
2001  Area 56.5 square km, 21.8 square miles
2009-2012  Terminus retreat 37 meters, 120 ft
1998-2009  Average terminus retreat 430 meters, 1,430 feet, (39 meters/year, 130 feet/year)
1766-1949  3.29 km, ~18 meters/year
1949-1969  0.55 km, ~27 meters/year
1766 Little Ice Age Maximum to 2012 4.33 km, 2.69 miles

Eagle Glacier
2001  Area 40.2 square km, 15.5 square miles
2009-2012  Average terminus retreat 160 meters, 530 feet.
1958-1967  700 meters ~37 meters/year
1785-1949  2 km,

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6 National Snow and Ice Data Center, Global Land Ice Measurements from Space. http://www.glims.org/

7 Based on 2009 photographs by Bruce Molnia, USGS.

