Mendenhall Glacier Facts And other Local Glaciers
(updated 4/29/11)

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 680 meters, (2,230 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
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
1997-2010  800 meters, 1,889 feet
1760 maximum Little Ice Age extent to 2010 4.93 km, 3.06 miles
2010 distance from Visitors Center to terminus 2.1 km, 1.3 miles

Average Retreat Rates
2005-2009  52 meters/year, 173 feet/year
2000-2005  58 meters/year, 190 feet/year¹
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).\(^1\)
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.”

2009-2010  Depth -1.19 meters/year, volume -0.11 cubic km/year (-45,000 Olympic swimming pools/year).
2001-2007  Depth -1.44 meters/year, volume -0.13 cubic km/year (-52,000 Olympic swimming pools/year).\(^2\)
1995-2001  Depth -0.93 meters/year, volume -0.08 cubic km/year (-32,000 Olympic swimming pools/year).\(^2\)

**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
2003  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.\(^5\)
- 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 thinning⁷. Center terminus likely still thickening and advancing.
2001-2008 Average terminus advance 14 meters/year, 46 feet⁴
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 miles⁶

Mass Balance
2000-2007 Depth -1.24 meters/year, volume loss -0.02 cubic km/year (-8,000 Olympic swimming pools/year).²
1995-2000 Depth -0.85 meters/year, volume loss -0.01 cubic km/year (-4,000 Olympic swimming pools/year).²

Ptarmigan Glacier (west of and adjacent to Lemon Creek Glacier)

2001 Area 1.3 square km, 0.5 square miles⁶

Thomas Glacier (viewable up Lemon Creek valley from Egan Drive)

2001 Area 2.9 square km, 1.1 square miles⁶

Nugget Creek Glacier

2001 Area 1.9 square km, 0.7 square miles⁶
**Herbert Glacier**

2001  **Area**  56.5 square km, 21.8 square miles

1998-2009  **Average terminus retreat**  430 meters, 1,430 feet, (39 meters/year, 130 feet/year)

**Eagle Glacier**

2001  **Area**  40.2 square km, 15.5 square miles

The terminus has been retreating. The 2009 terminus was GPS’ed. Retreat data will be posted after subsequent GPS measurements.

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7. Based on 2009 photographs by Bruce Molnia, USGS.