

Mount Baker – studying the active volcano in our backyard

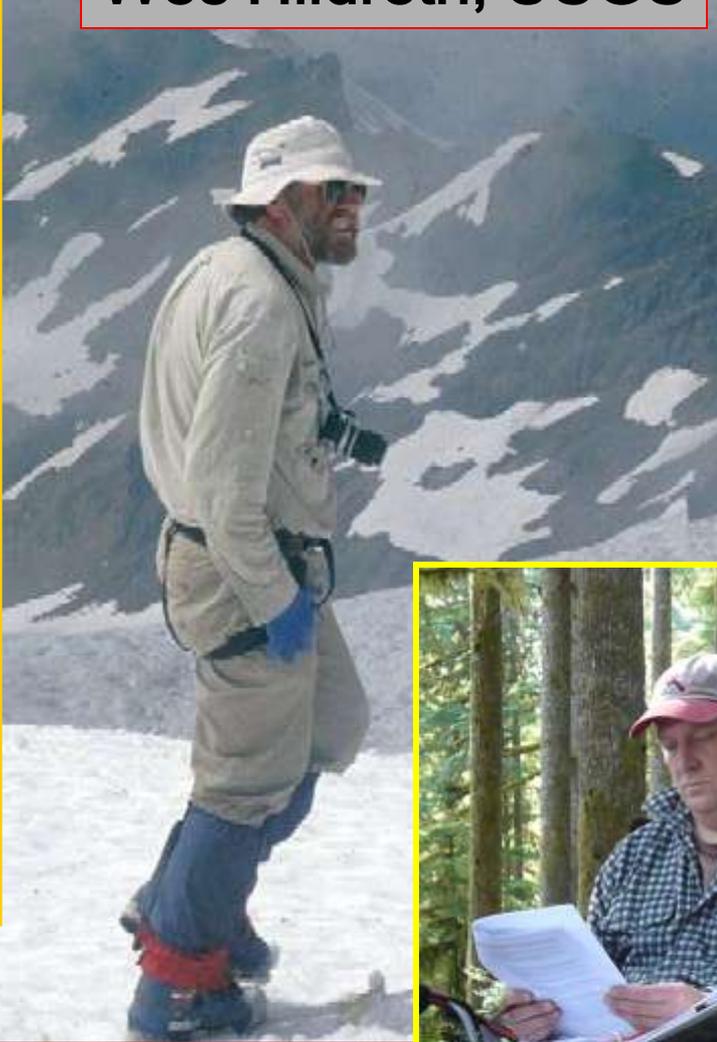
Dave Tucker
Mount Baker Volcano Research Center
Geology Department
Western Washington University

Acknowledgements: my colleagues in the field

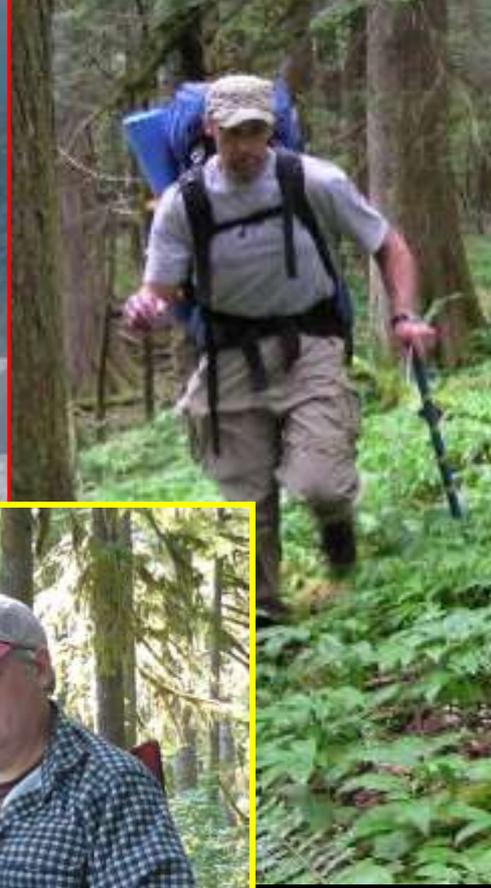
Kevin Scott, USGS



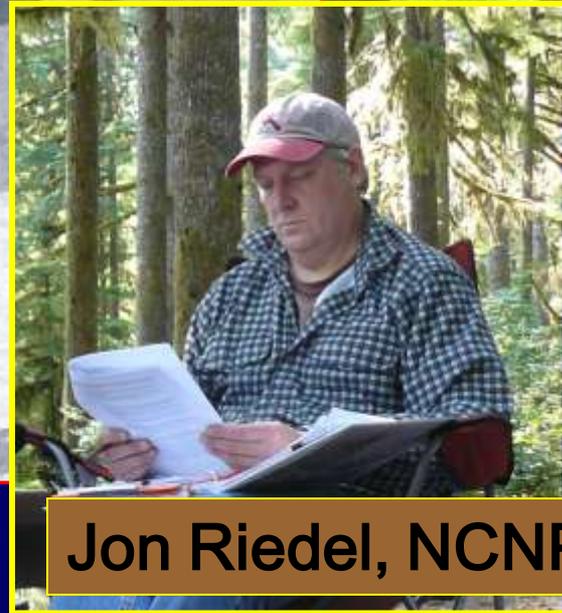
Wes Hildreth, USGS



Dave Lewis, MBHS



Melissa Park, WWU

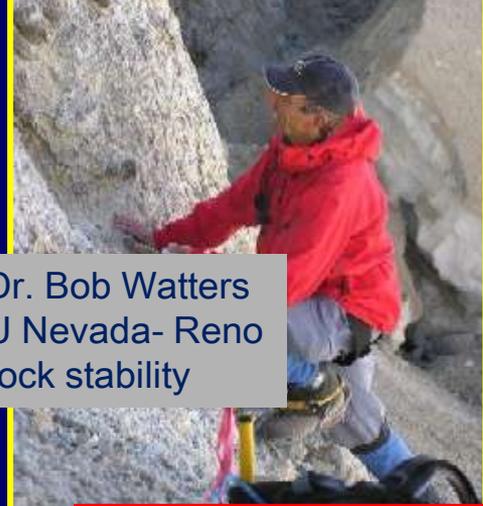


Jon Riedel, NCNP

Recent research



Brendan Hodge, WWU
volcano deformation

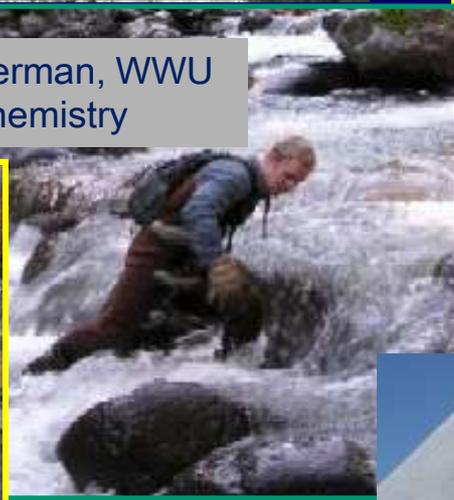


Dr. Bob Watters
U Nevada- Reno
rock stability

Kristin Hill, WWU
gravity studies



Troy Baggerman, WWU
andesite chemistry



Nikki Moore, WWU
basalt chemistry



Dr. J. Caplan-Auerbach,
WWU, seismology



Melissa Park, WWU
Sherman Crater
morphology



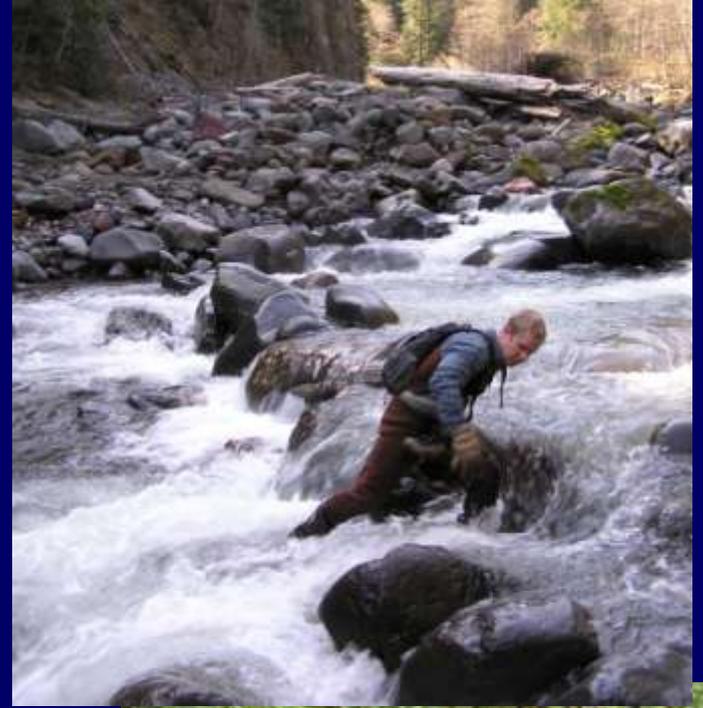
Sarah Polster, USGS
Sherman Crater magnetic
survey



Field work at Baker

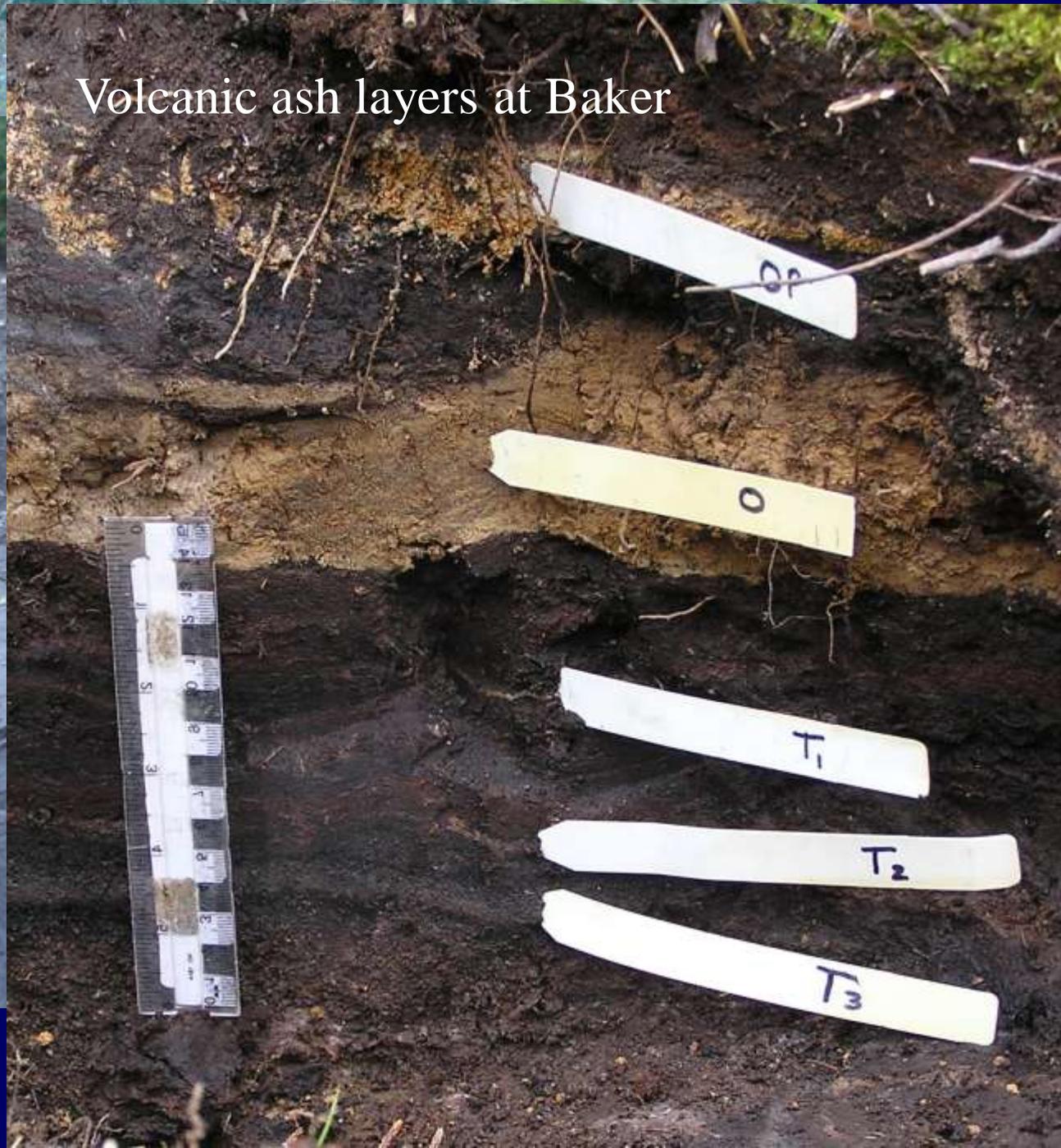


Getting there





Volcanic ash layers at Baker



Gravimetry



Geodesy- GPS



dendrochronology



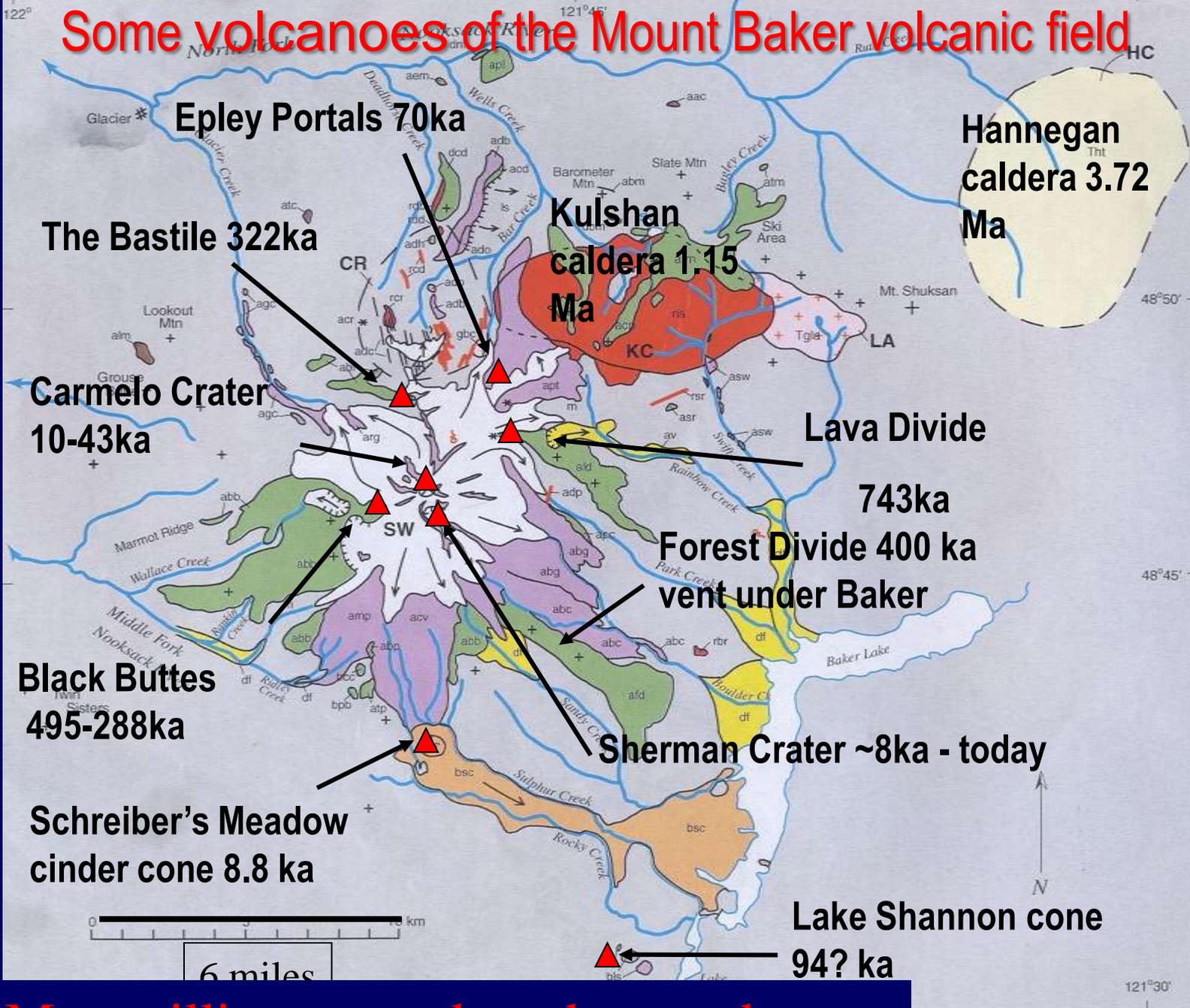
Stream gaging



seismometry

What do we learn from all this?

Some volcanoes of the Mount Baker volcanic field



Ma= million years; ka= thousand years

The Mount Baker volcano: 40,000 years ago to present

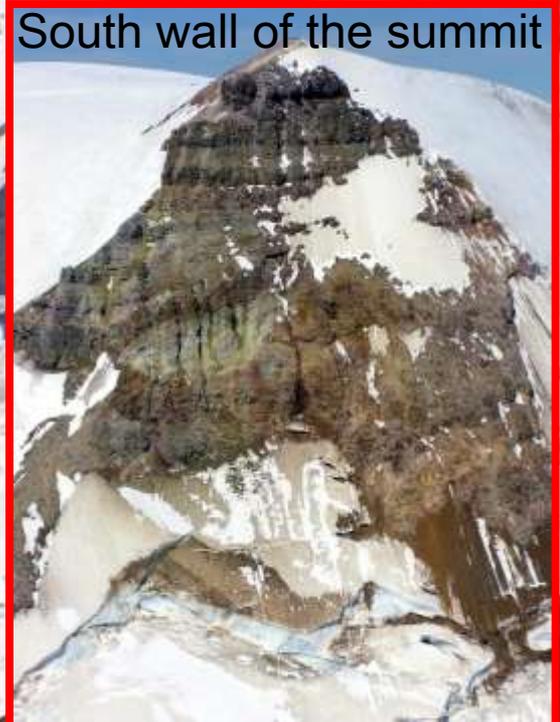


Carmelo Crater
now filled with
84 m of ice



- Oldest Baker lavas are ~40,000 years
- Pleistocene vent was Carmelo Crater. Active until ca. 10,000 years ago
- lava flows

South wall of the summit

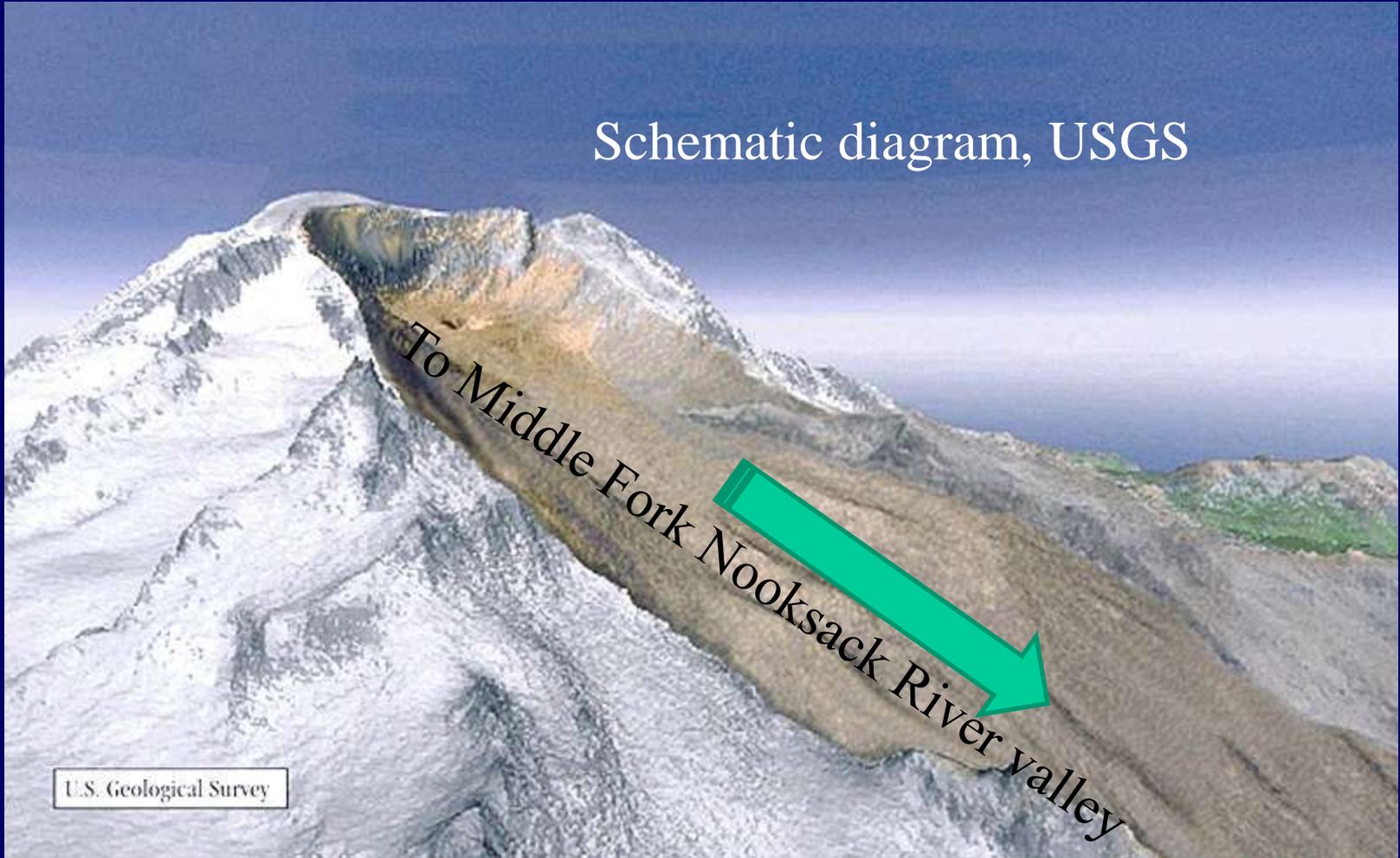


Coleman Headwall- Baker's 'North Face'
about 20 stacked lava flows

Post glacial volcanic history at Mount Baker

6600 years ago: Mazama Park eruptive period begins with high elevation flank collapse at Roman Wall

Schematic diagram, USGS



U.S. Geological Survey

Aerial view looking north

Grant Peak

Two landslides into MF
Nooksack ~ 6600 years ago

Roman Wall

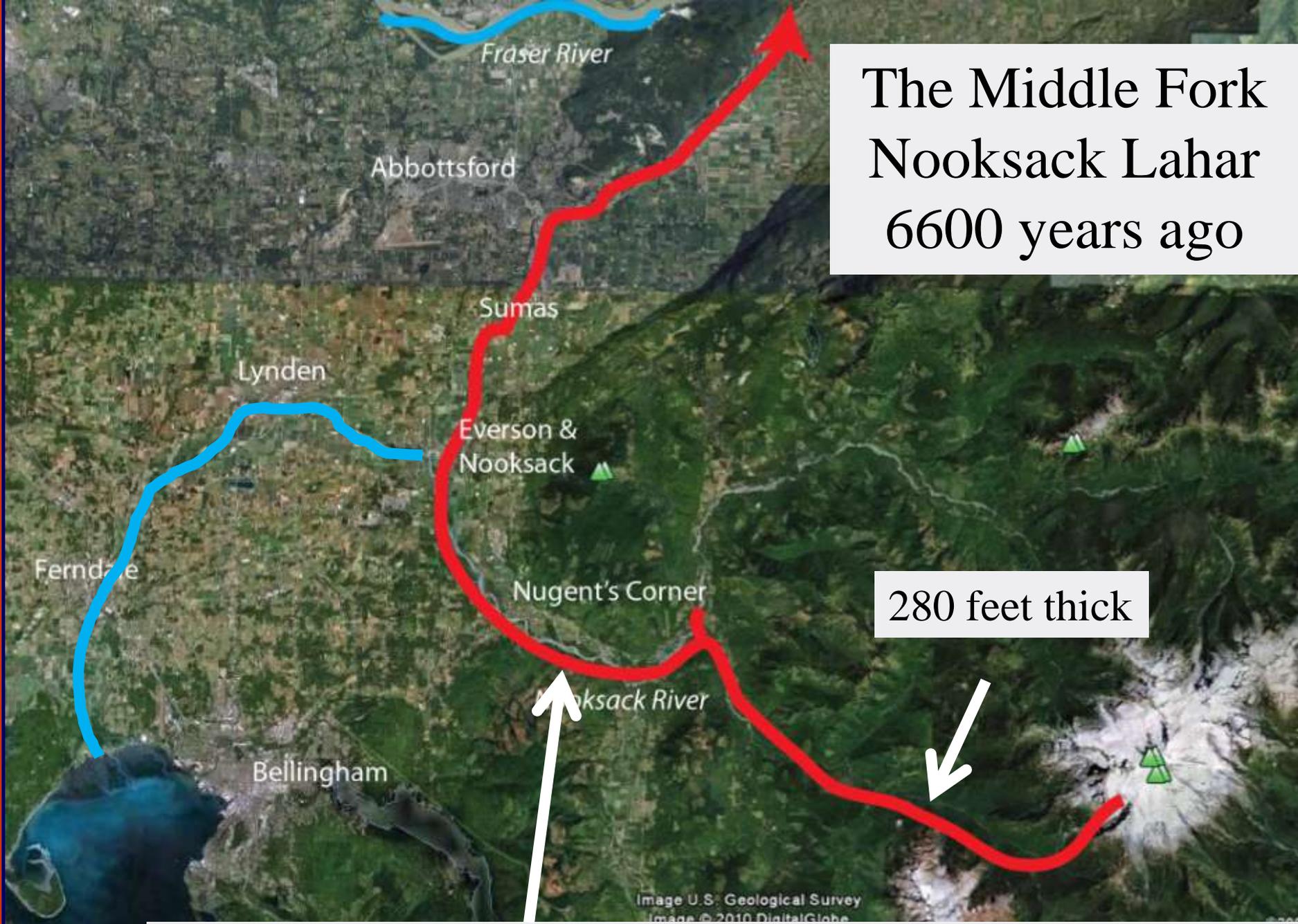
Sherman Crater
West rim



The Middle Fork Nooksack Lahar

- Largest known mudflow from Mount Baker, 6600 years ago.
- Traveled at least 36 miles down valley





The Middle Fork Nooksack Lahar 6600 years ago

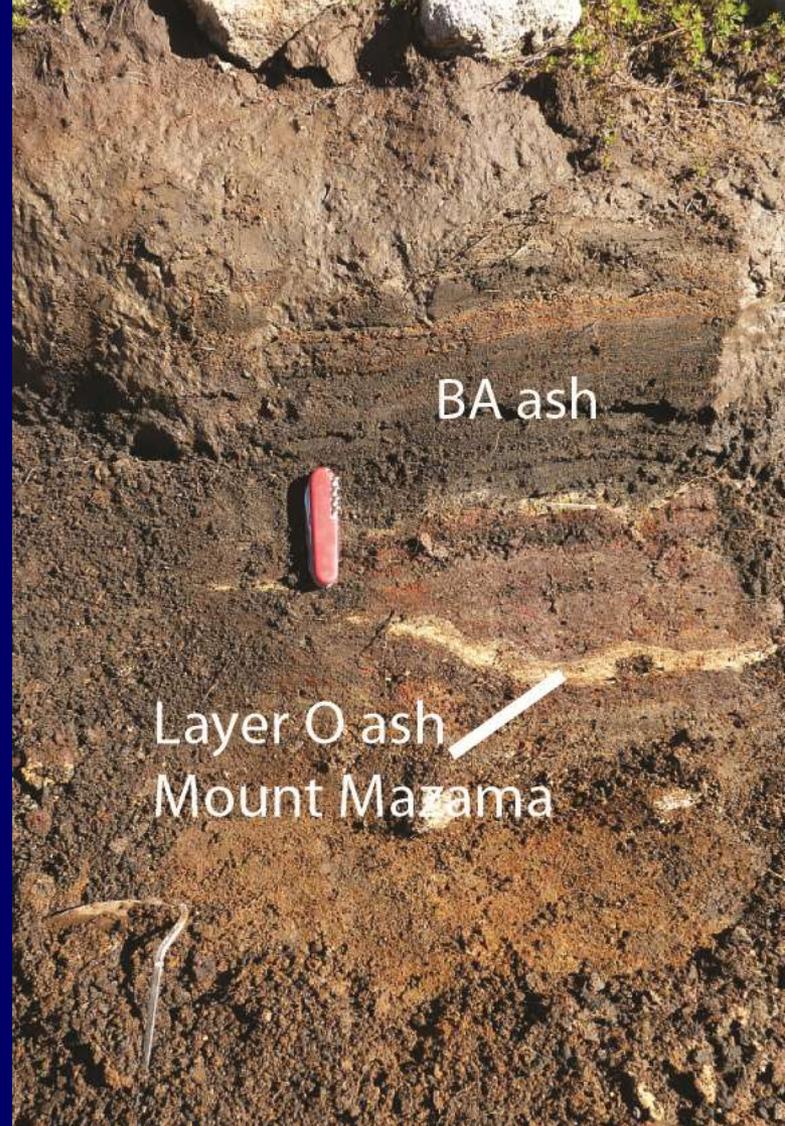
280 feet thick

Mud and boulder deposit 30 ft thick at Nugent's Corner

Mazama Park eruptive period

Culminates in an ash eruption
ca.6500 years ago.

May have been something like this:
Mount Redoubt, AK. 1990



Ash layers at Table
Mountain

Volcano Monitoring at Mount Baker

1. Two seismometers are maintained by **Pacific Northwest Seismic Network (UW-USGS)**. The USGS recommends five.



2. Periodic fumarole gas sampling in Sherman crater to monitor changes in magma chemistry and temperature.

Sherman Crater and its fumaroles

Ice-filled Carmelo Crater

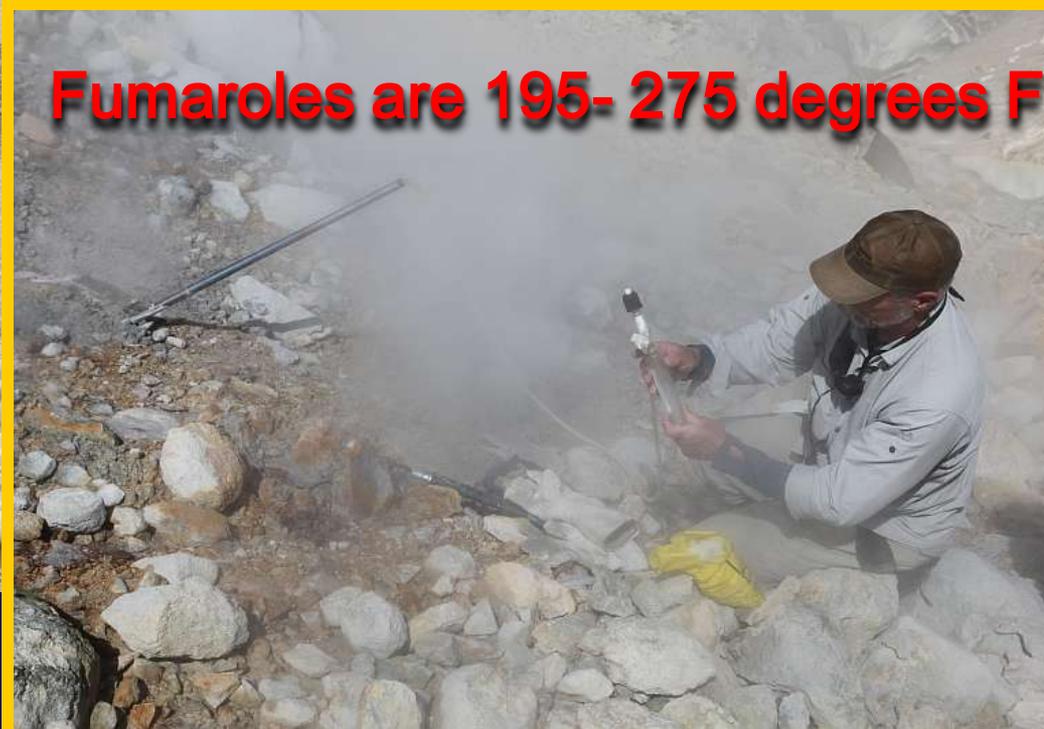


Sherman Crater



Aerial photos by John Scurlock

Sherman Crater fumarole gas sampling



Fumaroles are 195- 275 degrees F

John Scurlock photos

Gas, mostly water vapor, is collected in vacuum flasks

Sherman crater fumaroles emit

- 5 tons H_2S / day
- Up to 180 tons CO_2 / day

Russ Burmester photo, 2008

- # Volcanic Hazards from Mount Baker
- Ash eruptions- usually restricted effect
 - Lava flows- very restricted effect
 - Pyroclastic flows (hot ash) - uncommon at Baker
 - **Debris avalanches** (volcano collapse)- have occurred, and can give rise to lahars
 - **Lahars** (volcanic mud flows)

Lahars (volcanic mudflows) are the greatest threat

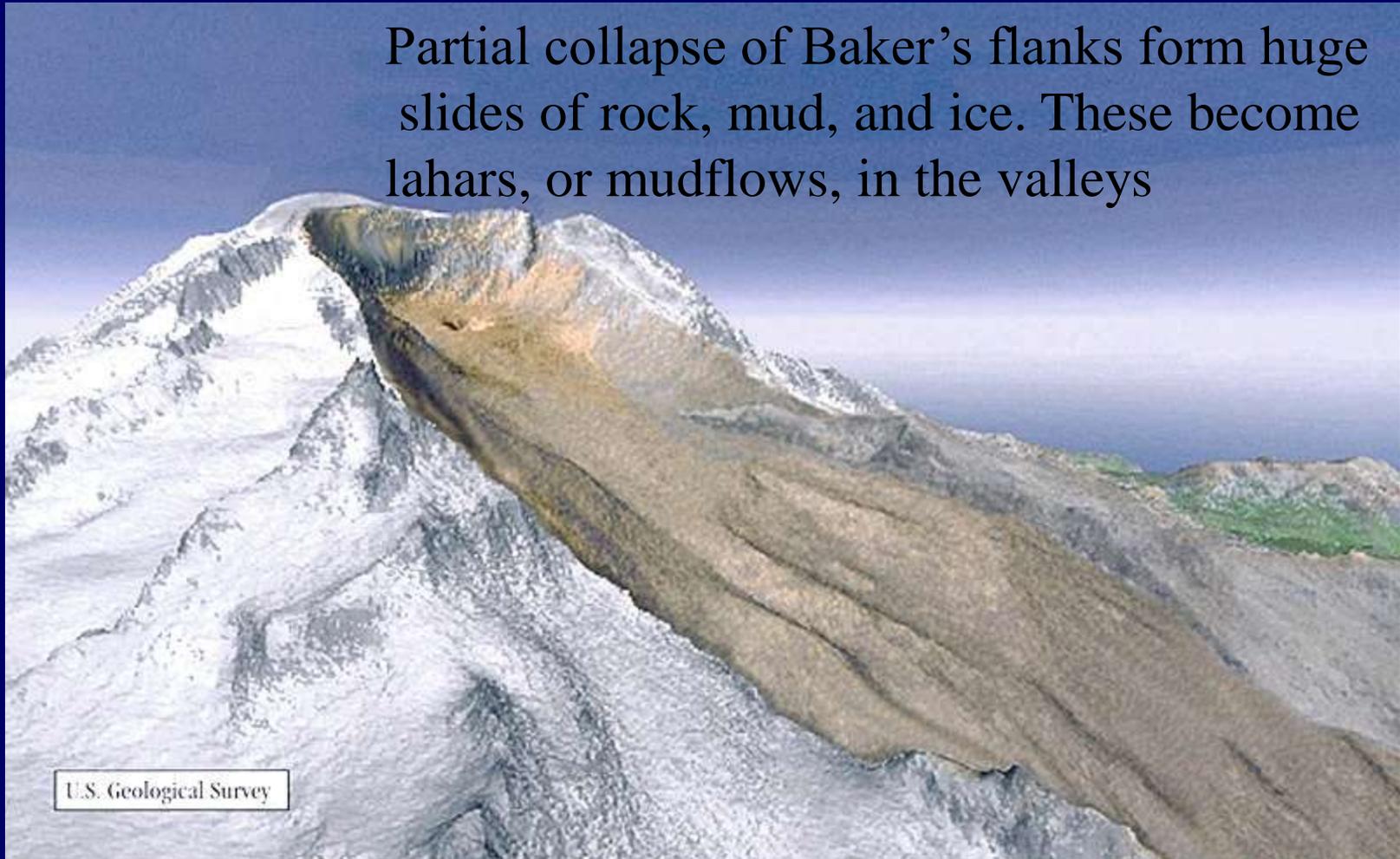
Mount Redoubt, AK, 1990: small lahars descend Drift River valley 35 km- a good model for Baker activity, past and future

LOW probability, HIGH consequence events.

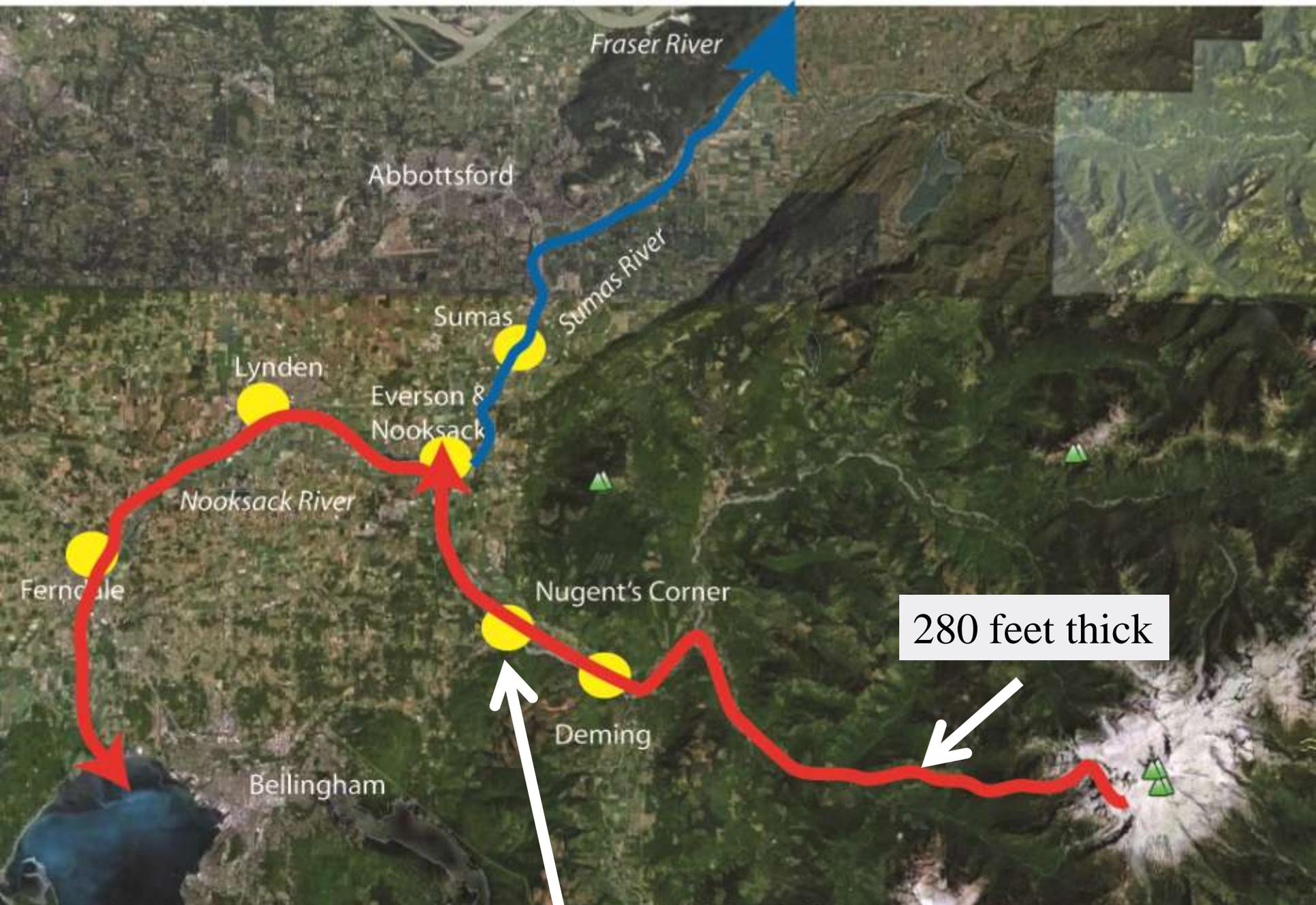
Photograph by S.R. Brantley on April 23, 1990

GRAVITY COLLAPSE- not predictable

Partial collapse of Baker's flanks form huge slides of rock, mud, and ice. These become lahars, or mudflows, in the valleys



U.S. Geological Survey



Fraser River

Abbotsford

Sumas River

Sumas

Lynden

Everson & Nooksack

Nooksack River

Fernvale

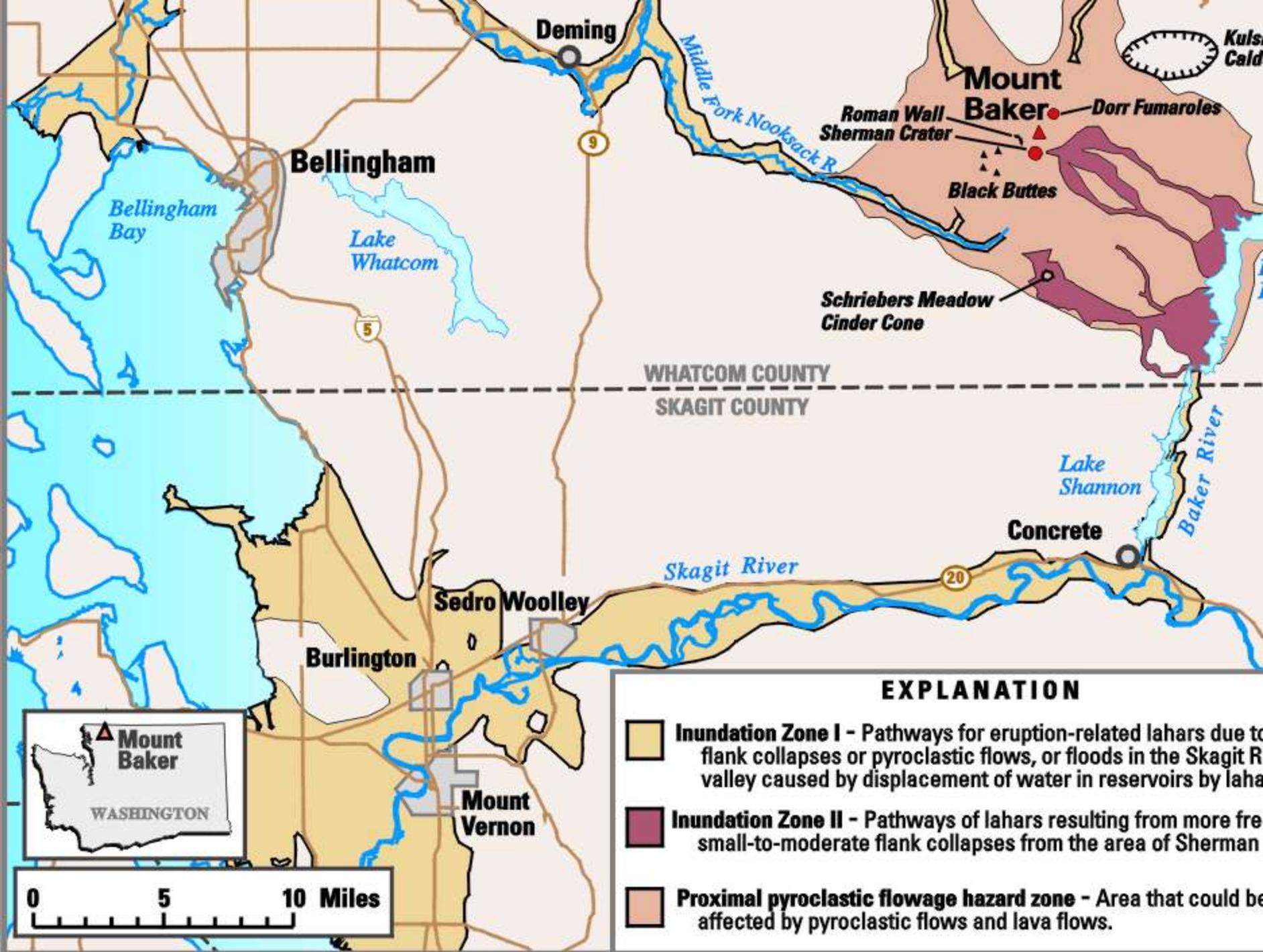
Nugent's Corner

280 feet thick

Deming

Bellingham

Mud and boulder deposit 30 ft thick at Nugent's bridge



Mount Baker's volcanic future

- Recent research has made Baker's history among the best known in the Cascades.
- Subduction will continue for the next few million years, so will volcanism.
- Fumarolic activity and sulphur gas emissions, indicate that magma is present beneath the volcano.

SO:

- Future eruptions are likely. Lahars are the greatest hazard based on the volcano's past behavior.

Mount Baker Volcano Research Center

*A clearinghouse for ongoing volcanic research at
Mount Baker in the North Cascades*



Main website:

www.mbvrc.wvu.edu

Free email subscription blog

www.mbvrc.wordpress.com

Up-to-date research and references; photos; links.
Please support us with your donation, or buy a t-shirt!

More information:

- Cascade Volcano Observatory-
www.vulcan.wr.usgs.gov
- Photography: John Scurlock-
www.pbase.com/nolock/mtbaker
- Soon to be published, detailed USGS report on Mount Baker history and hazards.
- Eruptive history and geochronology of the Mount Baker volcanic field, by W. Hildreth, 2003, GSA Bull. v 115

**Thanks for
coming today.**