Big Slow Movers: A Look at Weathered-Rock Slides in Western North Carolina

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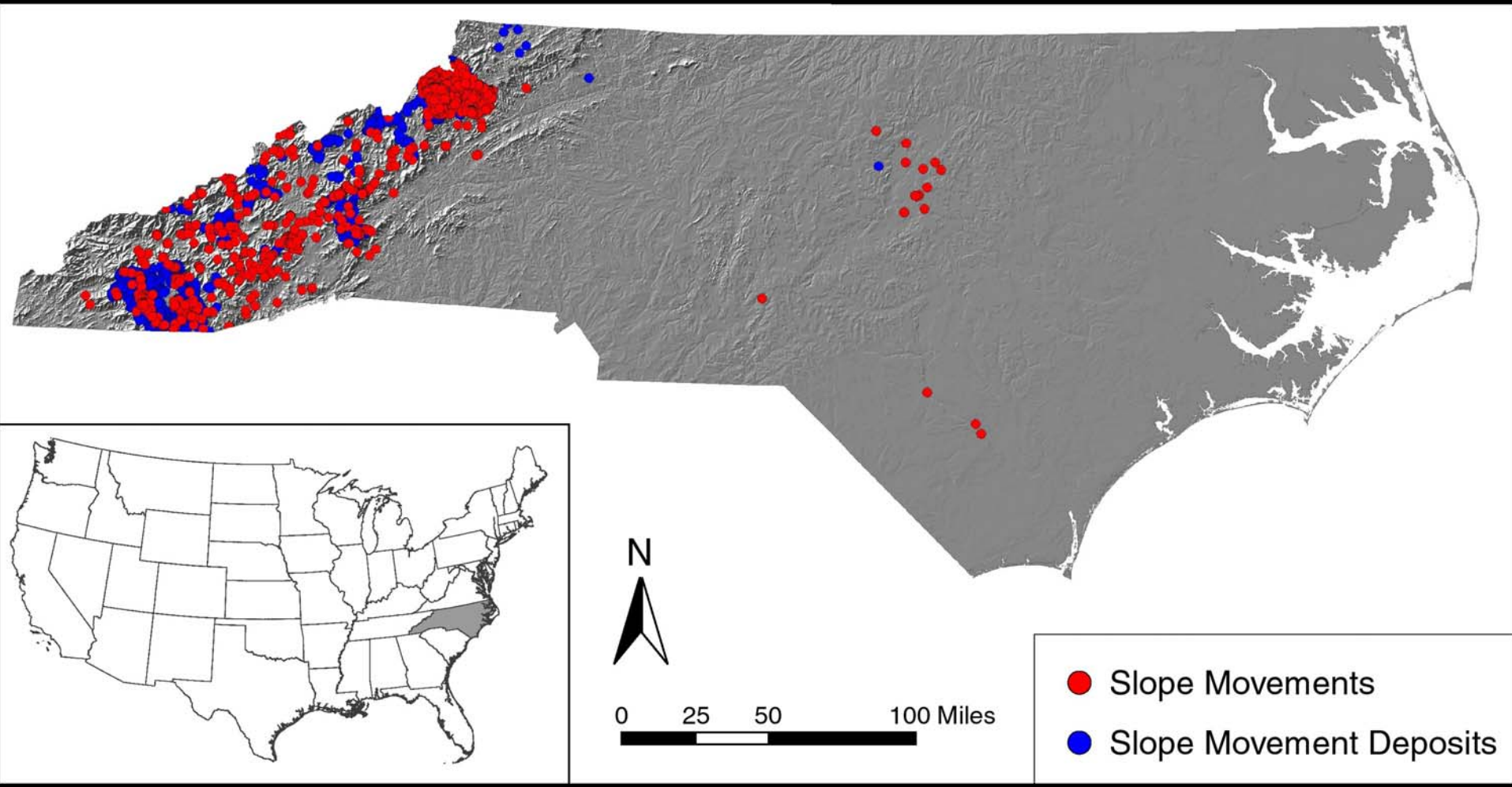
North Carolina SM-SMD Database

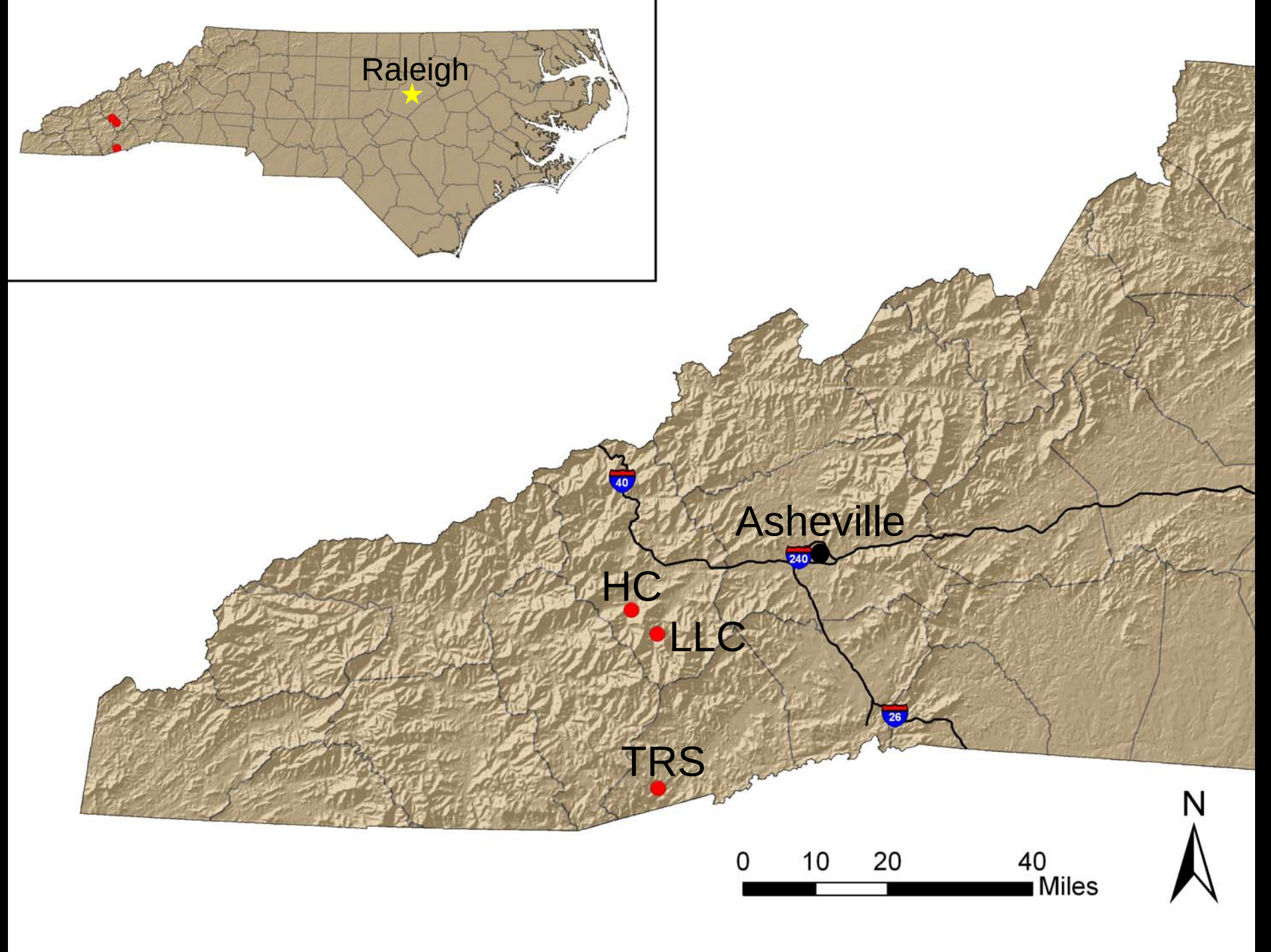
Over 4500 entries



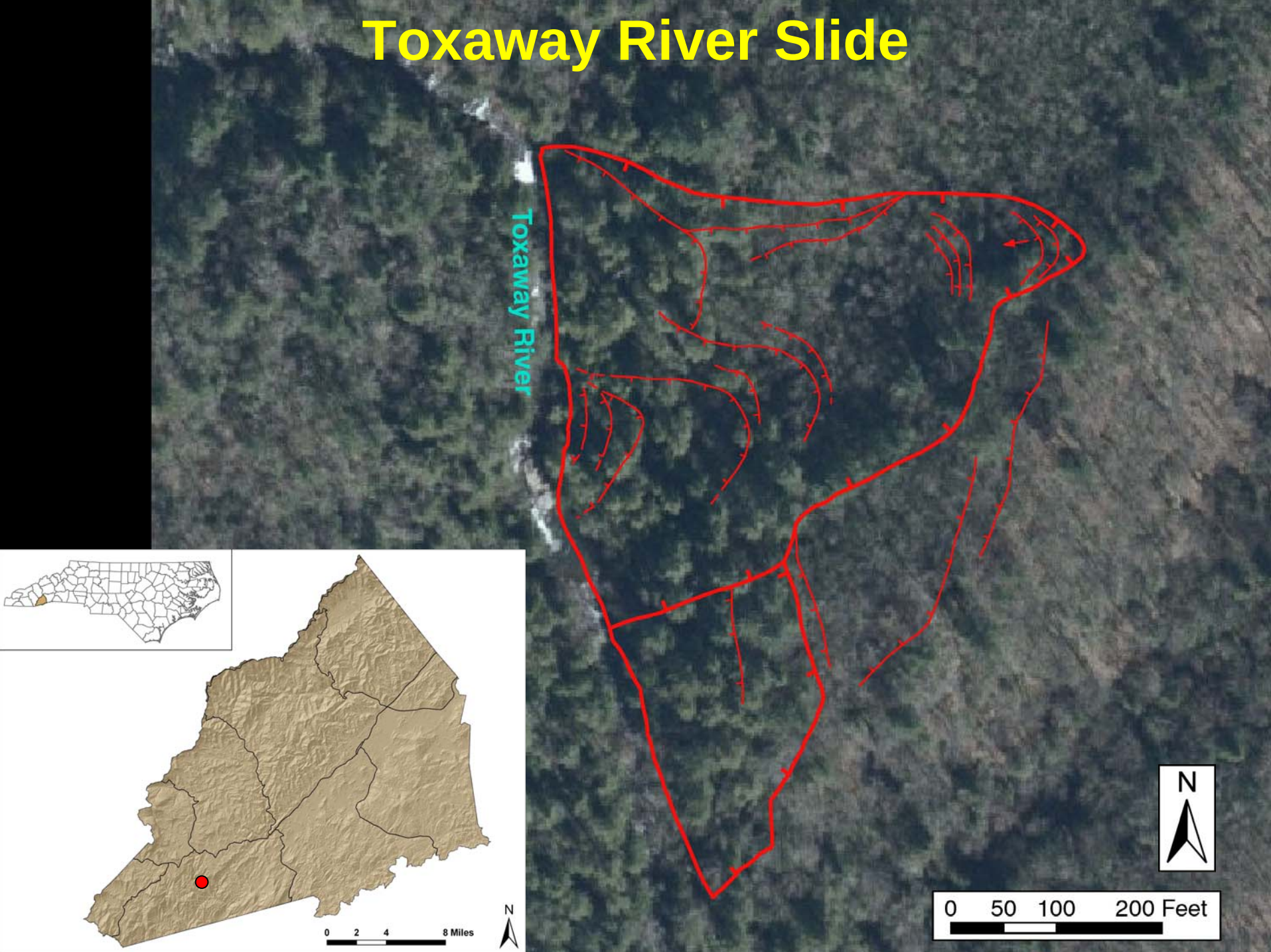
So what is a "Big Slow Mover"???

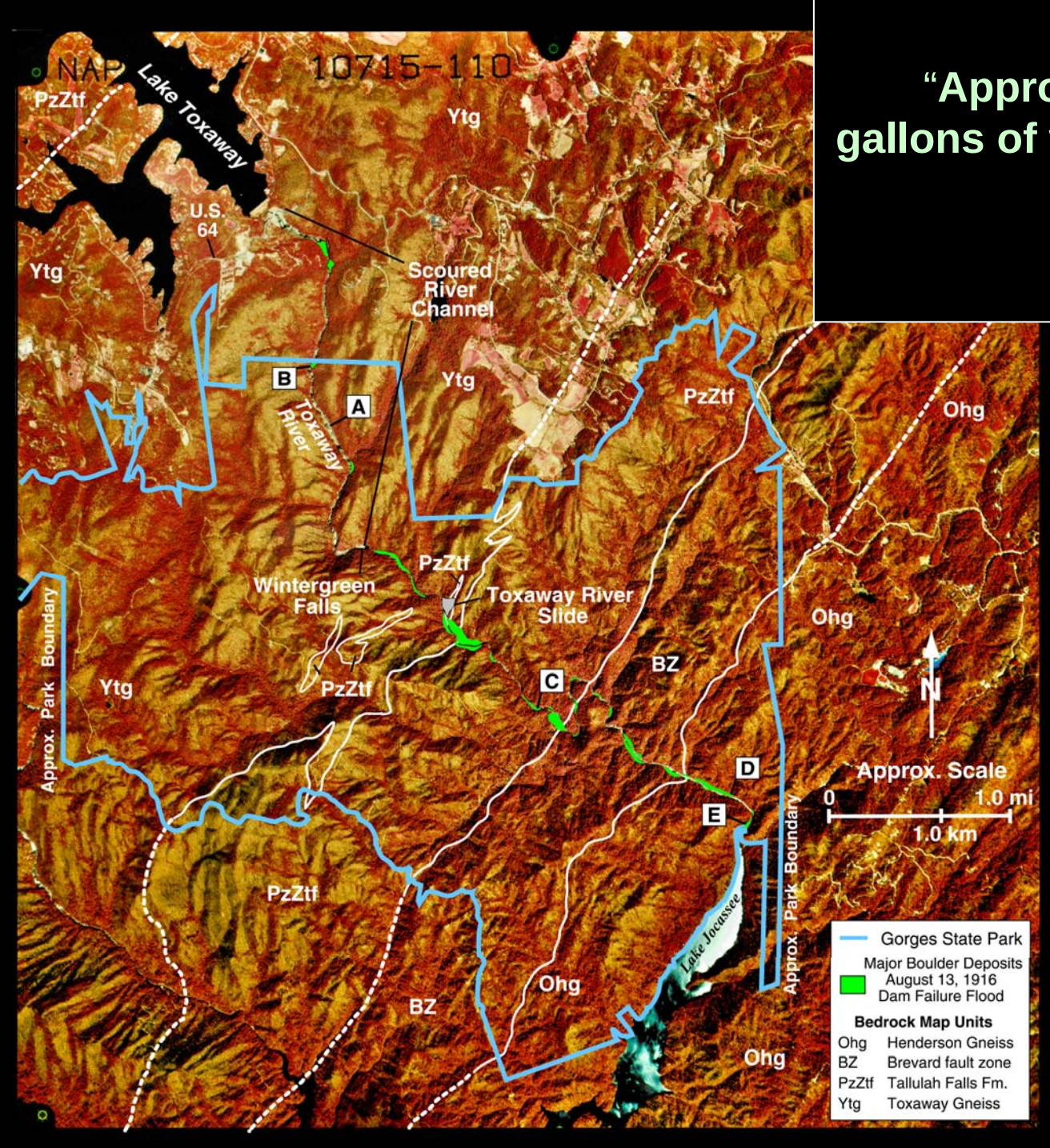
Big, slow to very slow moving, weathered-rock slide

- **BIG:** Relative description of size; refers to slides at least **0.5 acre** in size.
- **SLOW MOVER:** Velocity Class 2-3 (Cruden and Varnes, 1996) or **0.5-36 ft/yr**.
- **WEATHERED ROCK: Partially to completely decomposed** according to URCS (Williamson, 1984)


Raleigh
Asheville
HC
LLC
TRS
40
240
26
0
10
20
40
Miles
N

Toxaway River Slide





"Approximately 5,376,548,571 gallons of water changed hands."
S.W. McCallie

August 1916

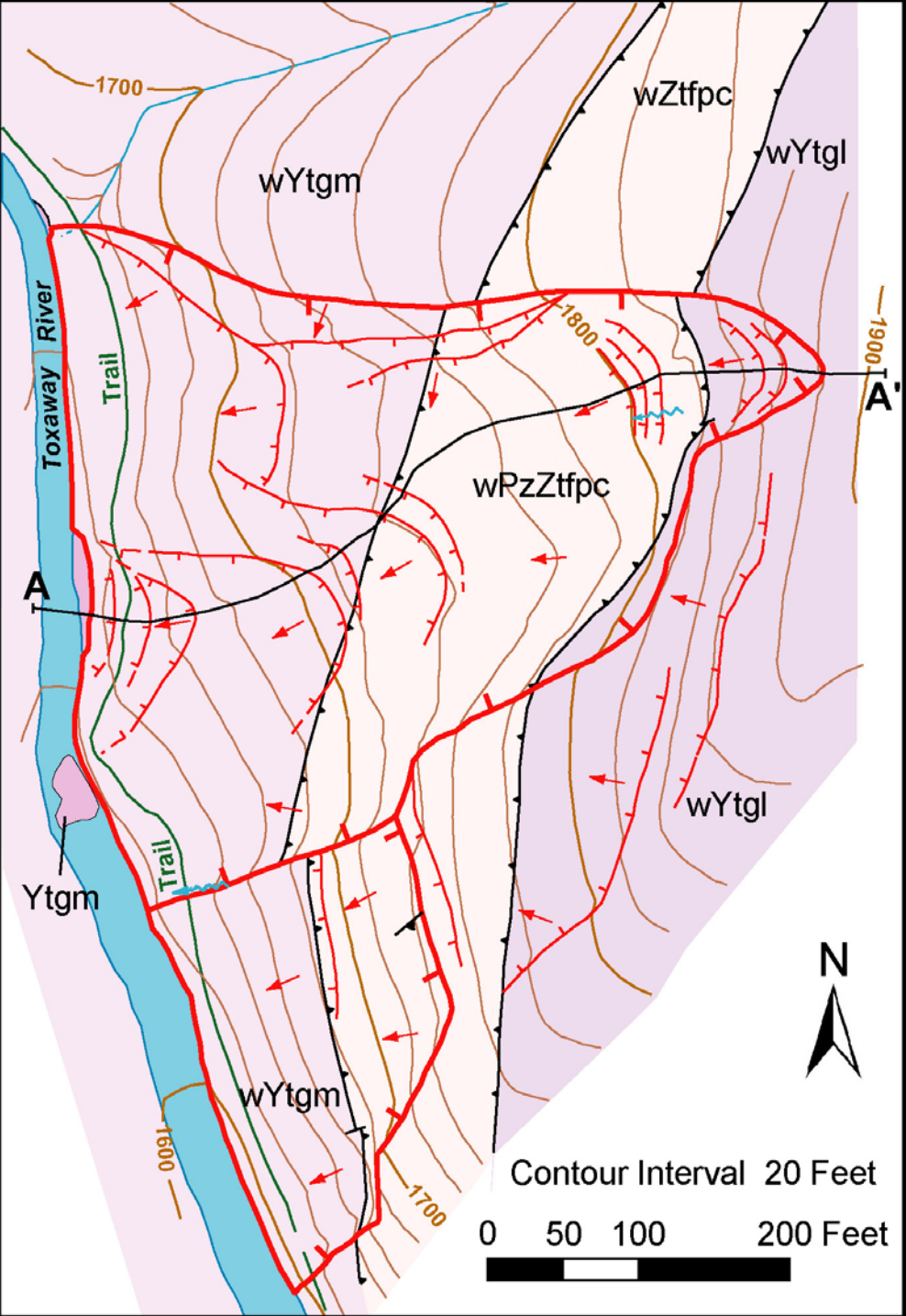
~ 298,938 cfs

~ 50 mph

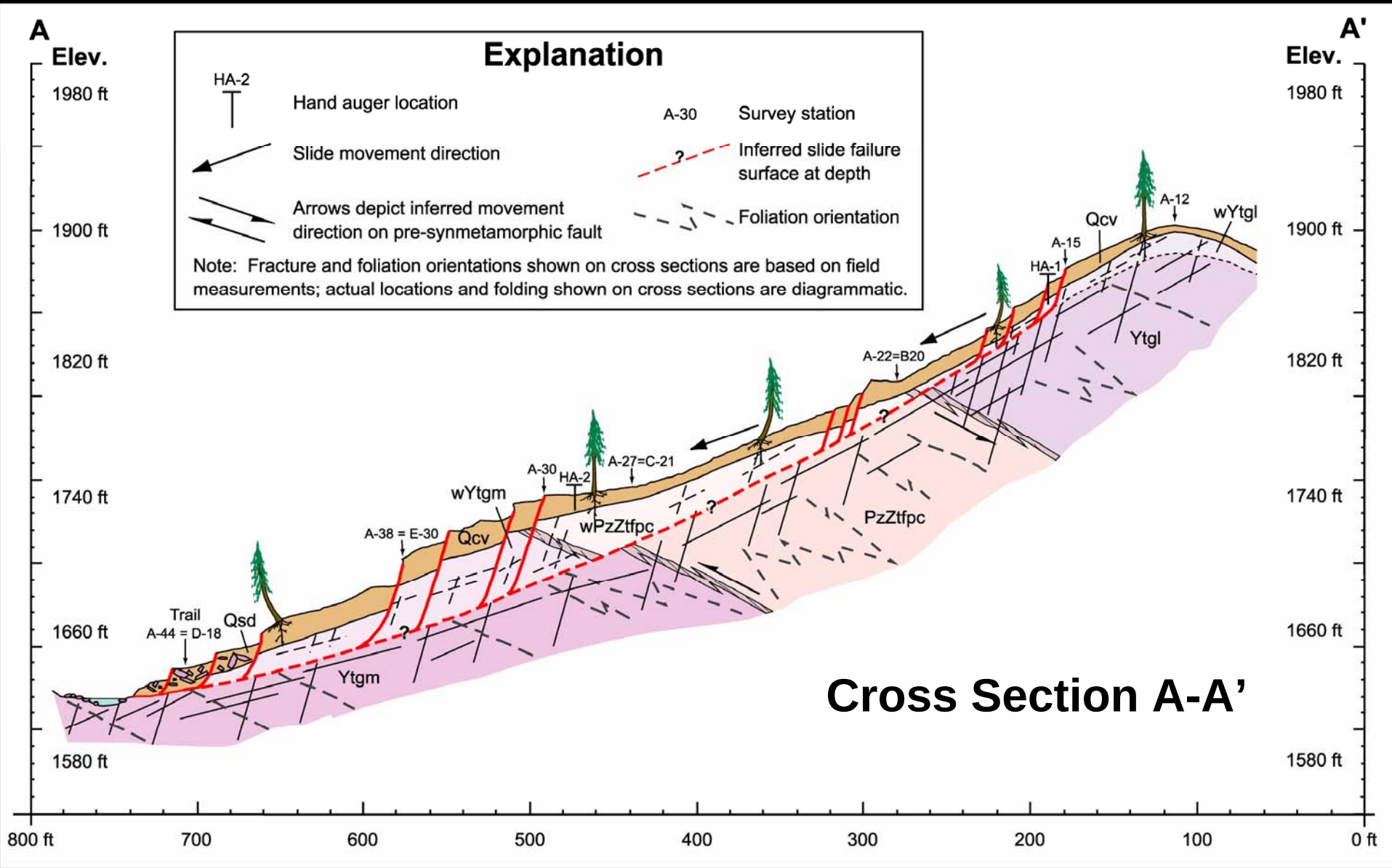
2.1 mi. - Wintergreen Falls

5.7 mi - Lake Jocassee

6.9 mi - N.C. / S.C. Line



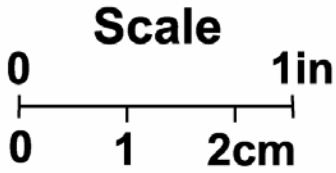
Geologic and Geomorphic Setting


A
A'
Elev.
Elev.
Explanation
HA-2
Hand auger location
A-30
Survey station
Slide movement direction
Inferred slide failure surface at depth
Arrows depict inferred movement direction on pre-synmetamorphic fault
Foliation orientation
Note: Fracture and foliation orientations shown on cross sections are based on field measurements; actual locations and folding shown on cross sections are diagrammatic.
1980 ft
1900 ft
1820 ft
1740 ft
1660 ft
1580 ft
800 ft
700
600
500
400
300
200
100
0 ft
Trail
A-44 = D-18
Qsd
Ytgm
A-38 = E-30
Qcv
wYtgm
A-30
HA-2
A-27=C-21
wPzZtfpc
PzZtfpc
A-22=B20
HA-1
A-15
Qcv
A-12
wYtgl
Ytgl
Cross Section A-A’

Tree Increment Borings

Control Tree

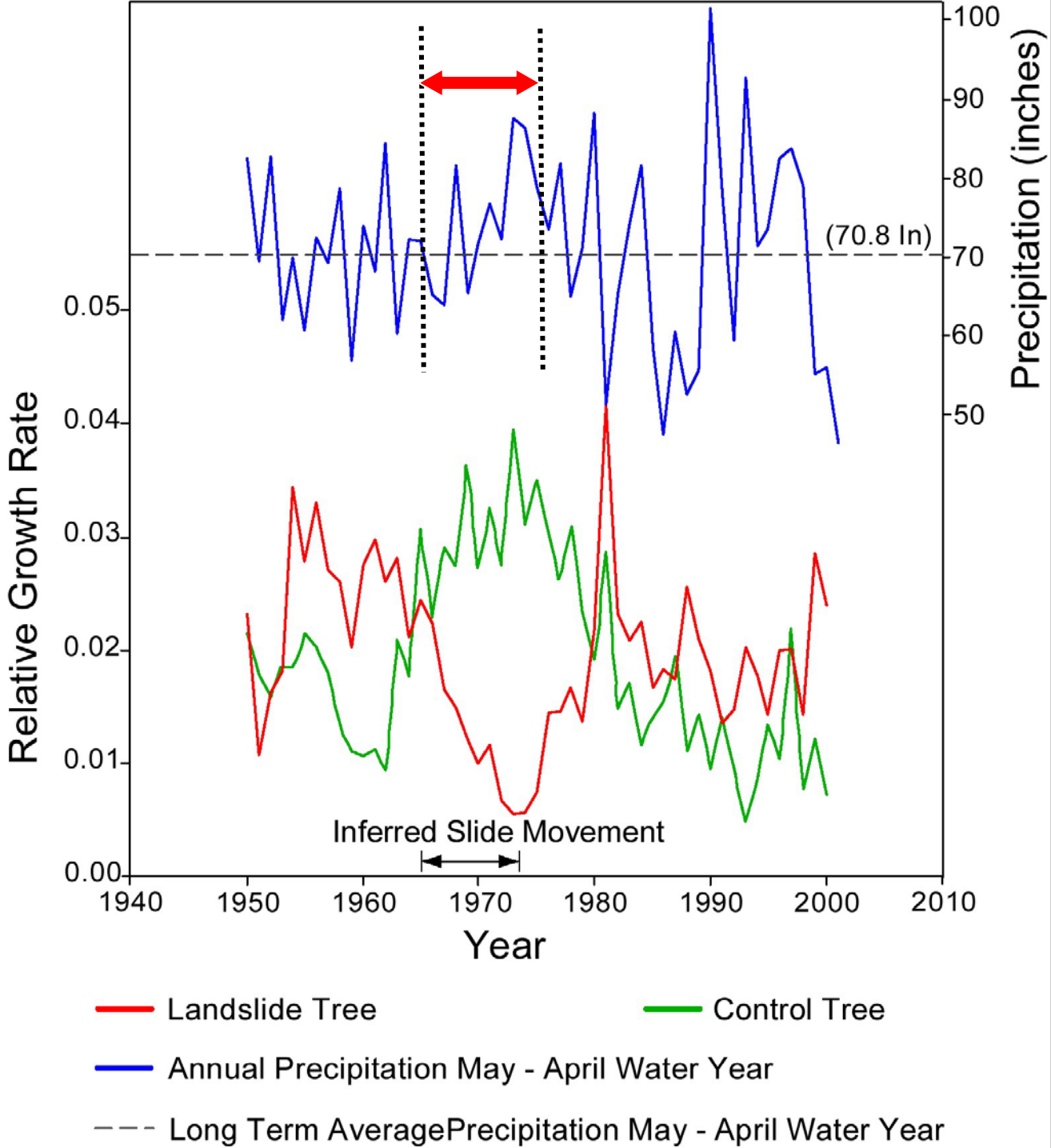
Landslide Tree

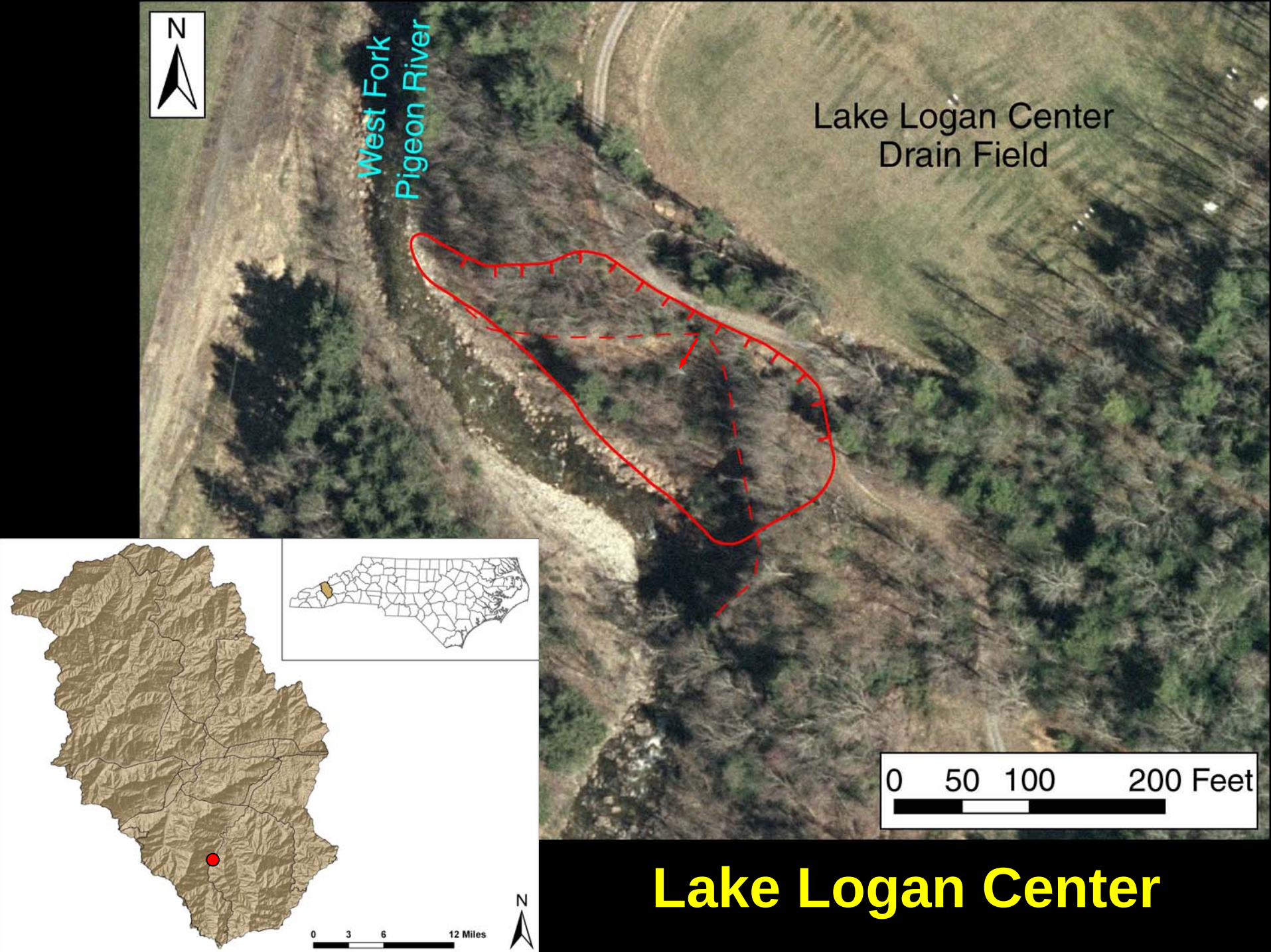


Increment core from control tree: *Tsuga canadensis* (eastern hemlock) - sample LSC-D1-C1

Increment core from landslide tree: *Tsuga canadensis* (eastern hemlock) - sample LS-D1-C1

Tree Increment Borings

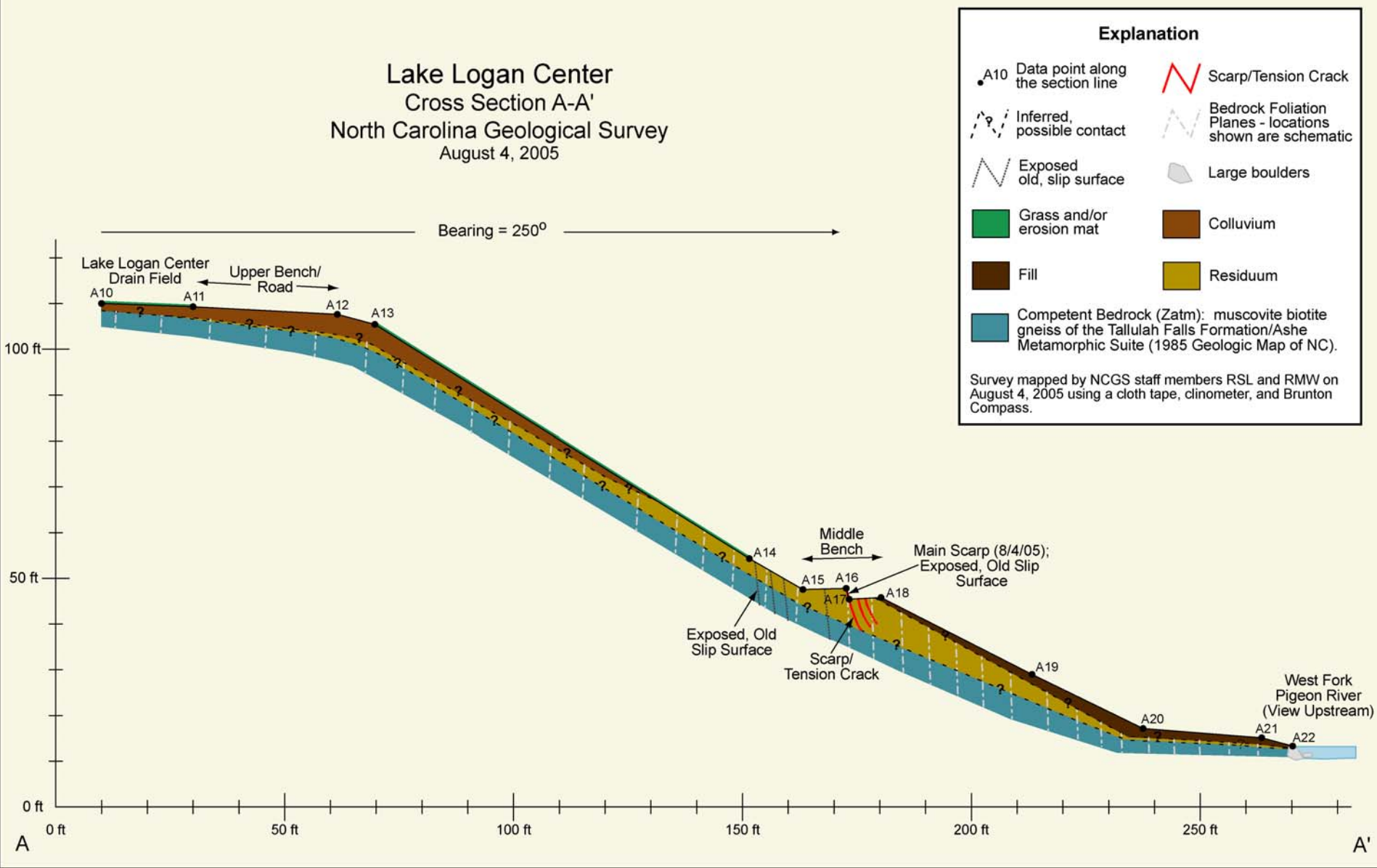




Lake Logan Center

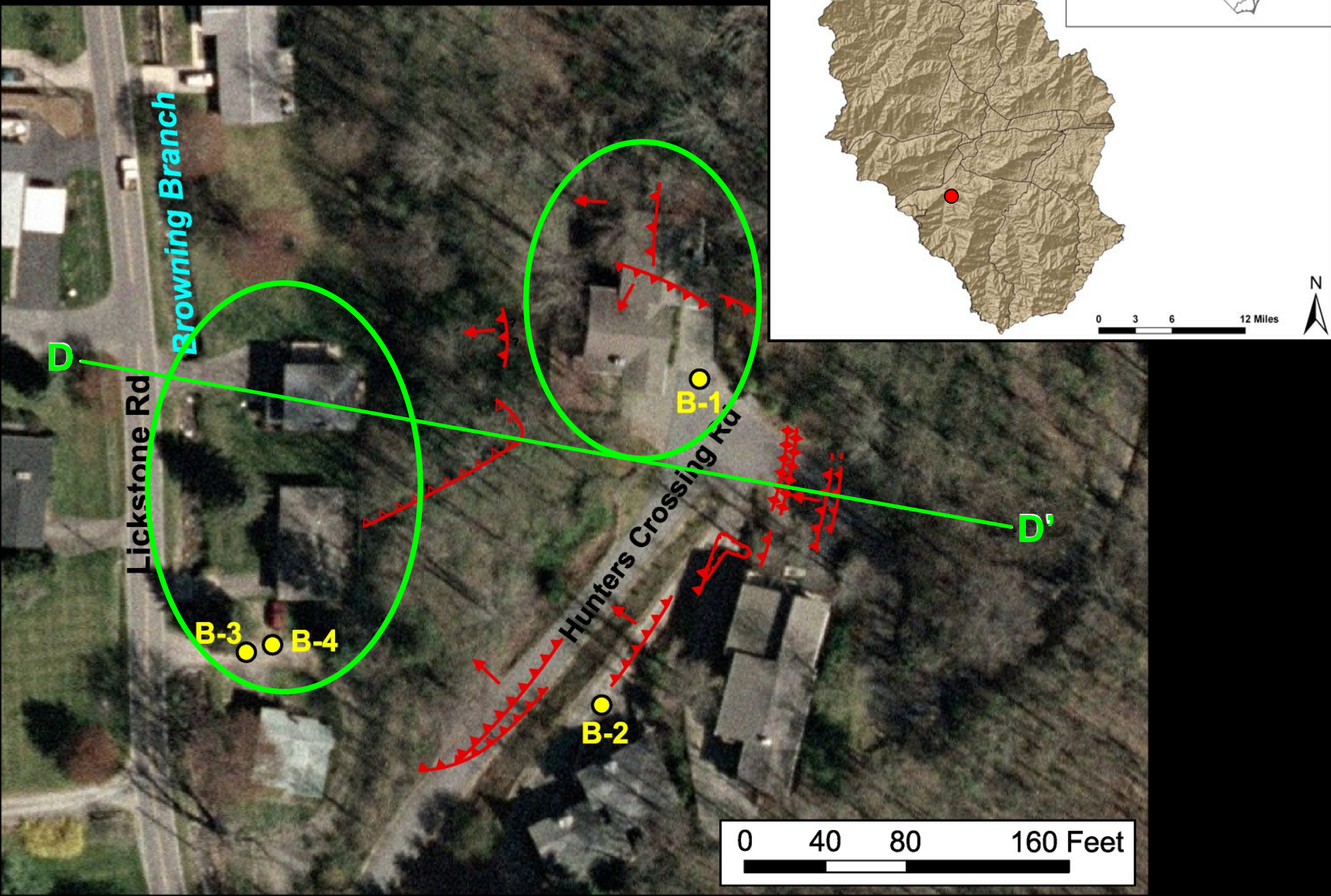

N
West Fork
Pigeon River
Lake Logan Center
Drain Field
New Road
Alignment
Middle
Bench
Lower
Bench
0 50 100 200 Feet

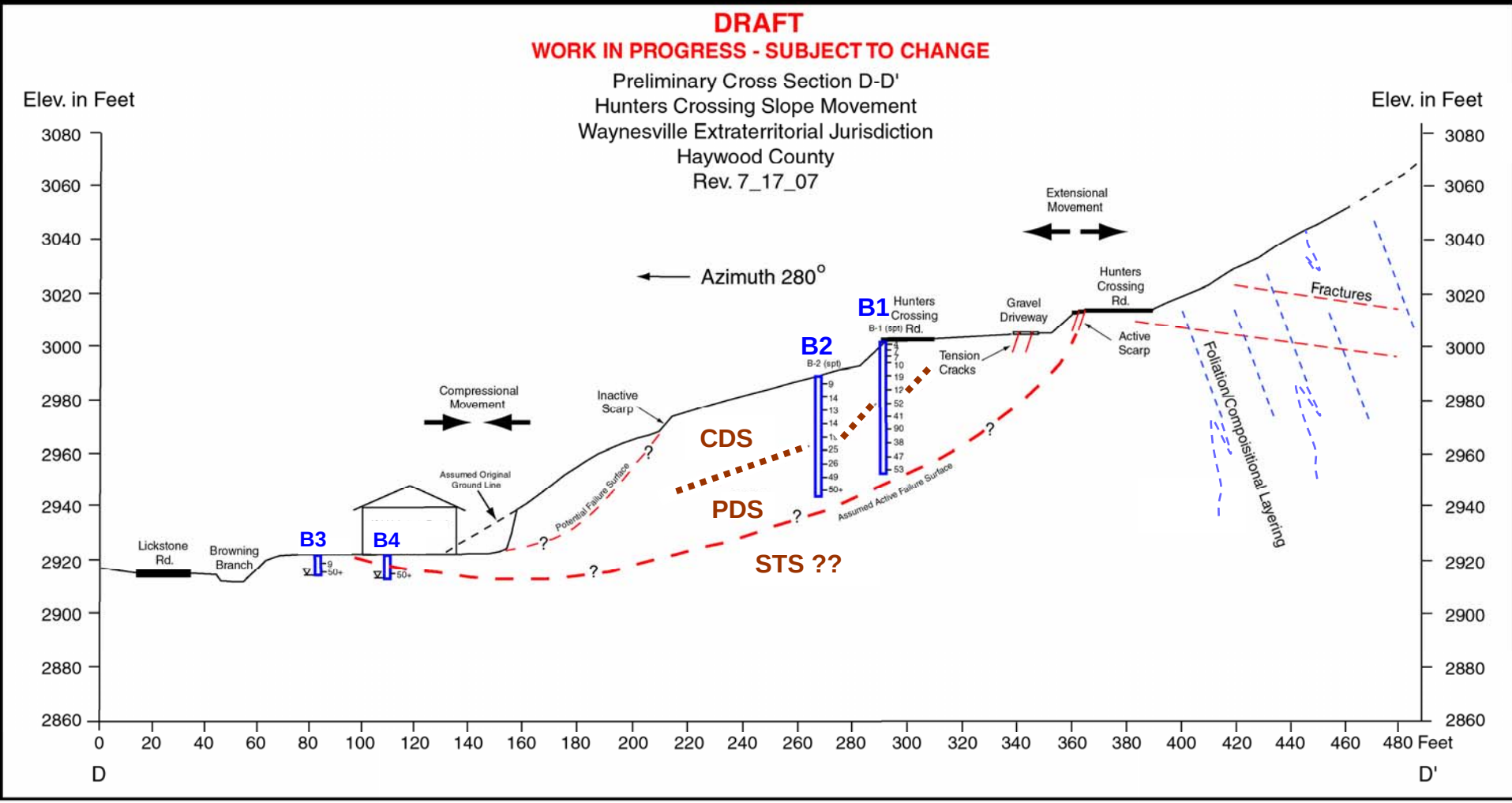
Lake Logan Center
Cross Section A-A'
North Carolina Geological Survey
August 4, 2005

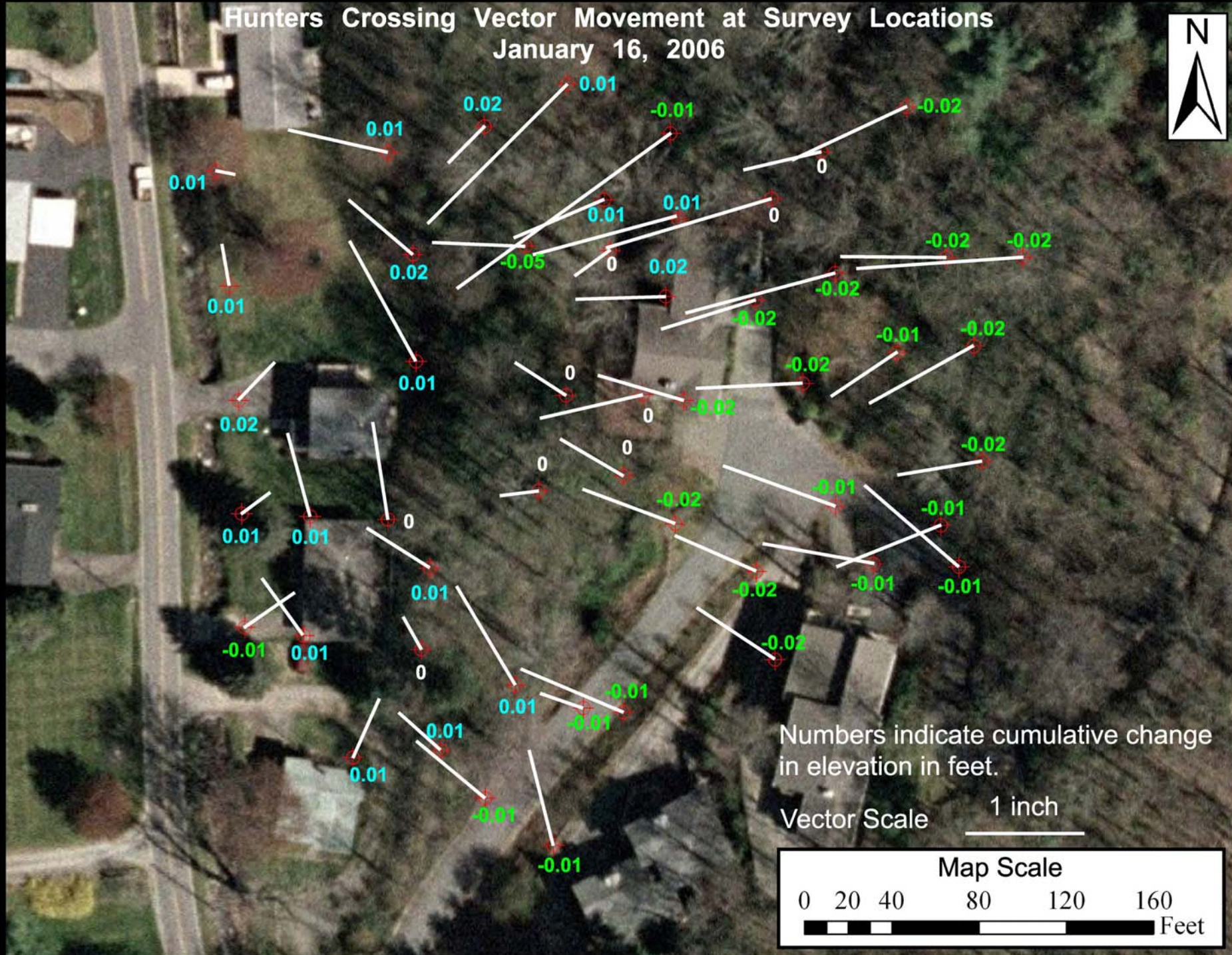


Geologic Setting

Hunters Crossing




DRAFT
WORK IN PROGRESS - SUBJECT TO CHANGE
Preliminary Cross Section D-D'
Hunters Crossing Slope Movement
Waynesville Extraterritorial Jurisdiction
Haywood County
Rev. 7_17_07
Elev. in Feet
Elev. in Feet
Azimuth 280°
Extensional Movement
Compressional Movement
Inactive Scarp
Assumed Original Ground Line
Potential Failure Surface
Assumed Active Failure Surface
Tension Cracks
Gravel Driveway
Hunters Crossing Rd.
Active Scarp
Fractures
Foliation/Compositional Layering
Lickstone Rd.
Browning Branch
B1
B2
B3
B4
CDS
PDS
STS ??
3080
3060
3040
3020
3000
2980
2960
2940
2920
2900
2880
2860
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 Feet
D
D'


Hunters Crossing Vector Movement at Survey Locations
January 16, 2006
N
0.01
0.02
0.01
-0.01
-0.02
0.01
0
0.01
0.01
0
-0.02
-0.02
0.02
-0.05
0
0.02
-0.02
0.01
-0.02
-0.01
-0.02
0.01
0
-0.02
0.02
0
0
0
-0.02
-0.02
-0.01
-0.01
0.01
0.01
0
0.01
-0.02
-0.01
-0.01
-0.01
-0.01
0.01
-0.02
-0.01
0
0.01
-0.01
-0.01
0.01
0.01
-0.01
0.01
Numbers indicate cumulative change in elevation in feet.
Vector Scale
1 inch
Map Scale
0 20 40 80 120 160
Feet


Nov. 30, 2005
Dec. 21, 2005

Similarities

Geomorphology

- Toe of slope in subtle concavity
- Stream/creek that encroaches on toe of failure
- West- to southwest-facing slopes

Similarities (Cont)

Geology

- Steeply dipping discontinuities
- Residual soil = SM with high mica content
- Basal sliding surface at or above contact with hard bedrock

Future Work

- Identifying topographic signatures using LiDAR
- Analysis of Clay Mineralogy
- Subsurface Exploration??

Questions ??

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