Landslide Hazard Evaluations for Multi-Hazard Risk Mapping in Homer, Alaska

Barrett Salisbury, Ph.D.

Homer Planning Commission Meeting

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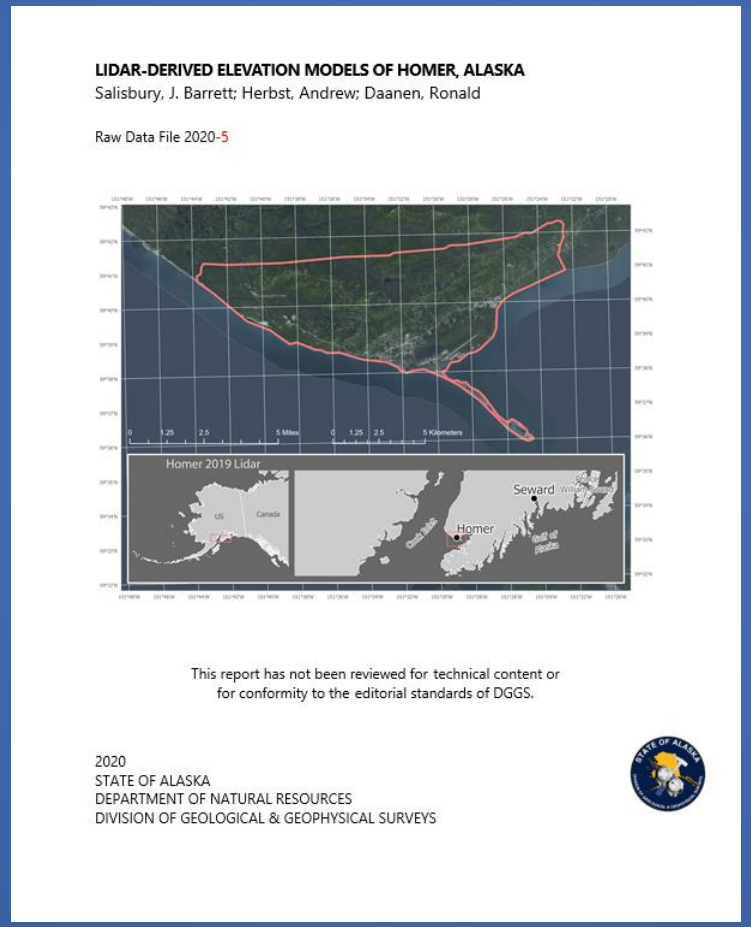
Outline

- Lidar Raw Data File (RDF) publication status
- Landslide Report of Investigation (RI)
  - Overview
  - Debris Flow runout modeling results
  - publication status
  - Questions for the Commission
    - print map sheet extents
    - GIS data sharing plan

Homer lidar RDF

- Report Generation
- FEMA QA/QC review
- *DGGS Review*
- *FGDC Metadata Review*
- Publication



LIDAR-DERIVED ELEVATION MODELS OF HOMER, ALASKA

Salisbury, J. Barrett; Herbst, Andrew; Daanen, Ronald

Raw Data File 2020-5

This report has not been reviewed for technical content or for conformity to the editorial standards of DGGS.

2020
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

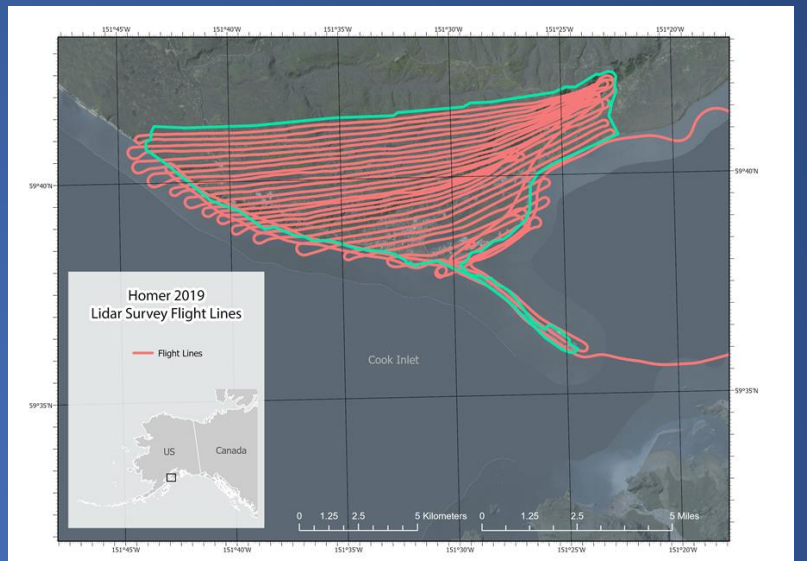


Figure 1. Project flight-lines.

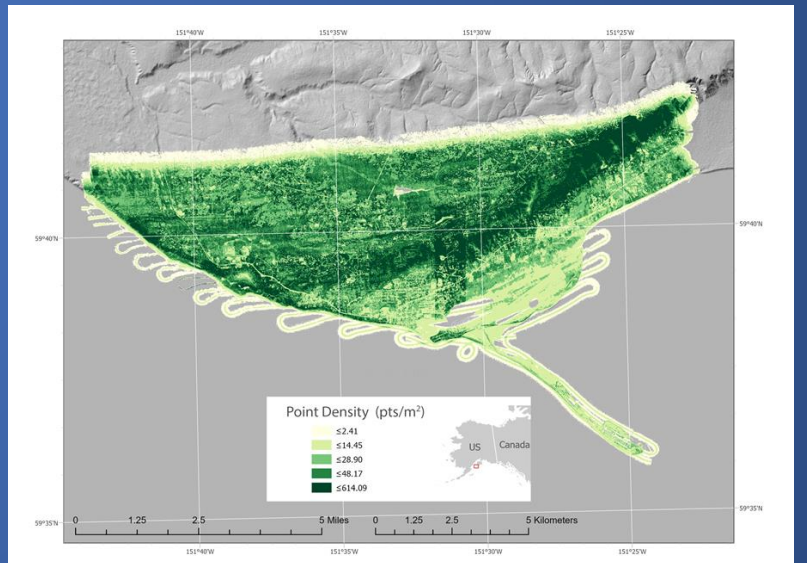


Figure 2. Point density displayed as 1-meter raster for the survey.

Landslide RI Overview

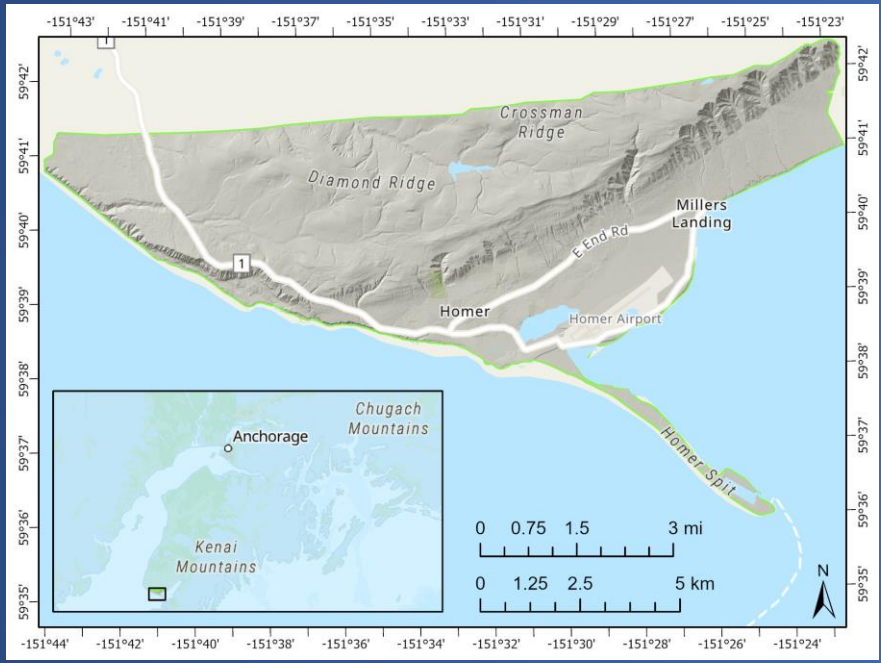


Figure 1 *– 2019 lidar extent and area of interest for Homer slope failure risk assessment. Inset map shows study location on the Western Kenai Peninsula.*

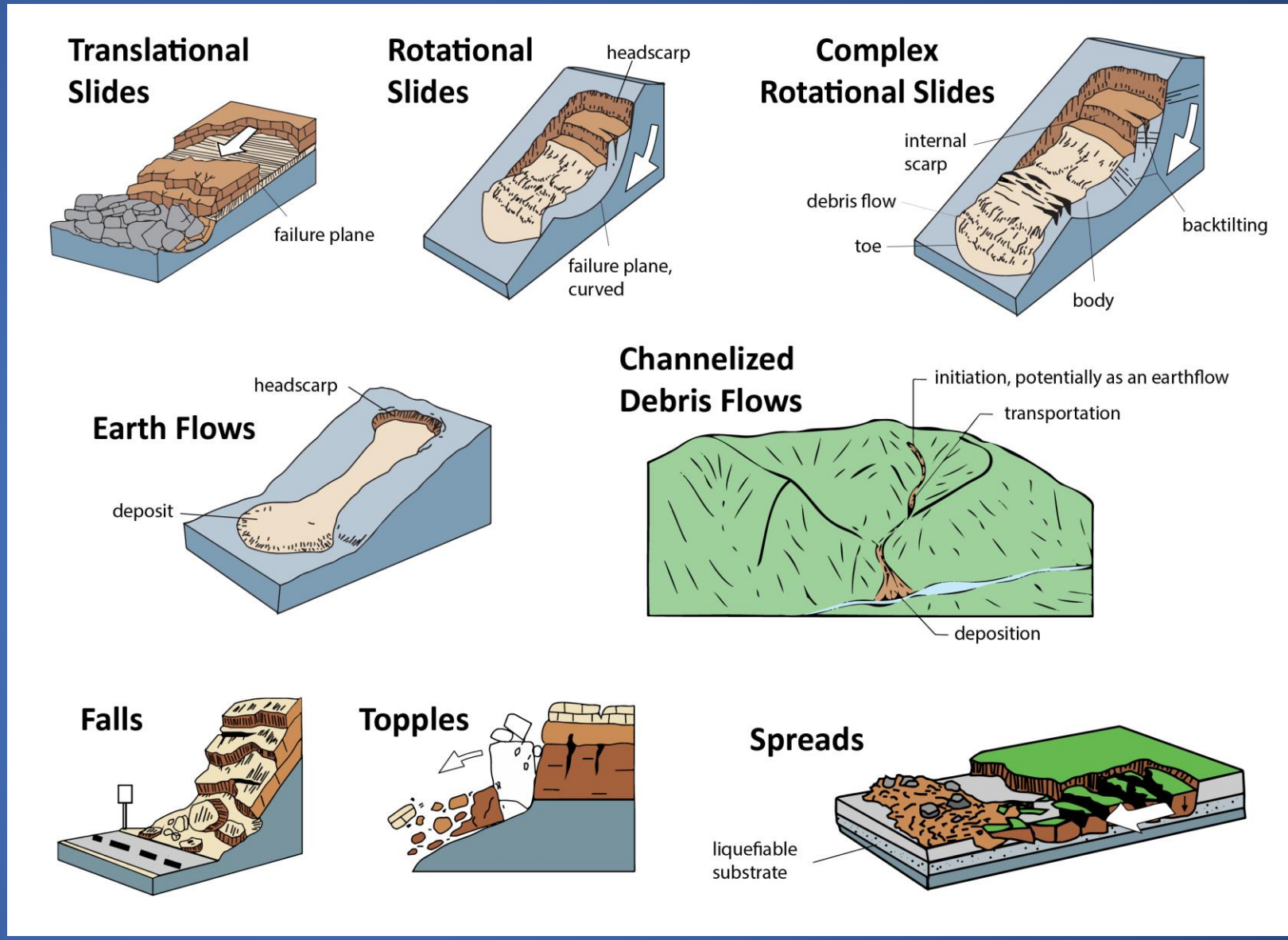


Figure 2 *– Types of slope failures. Modified from Burns and Madin, 2009 and references therein.*

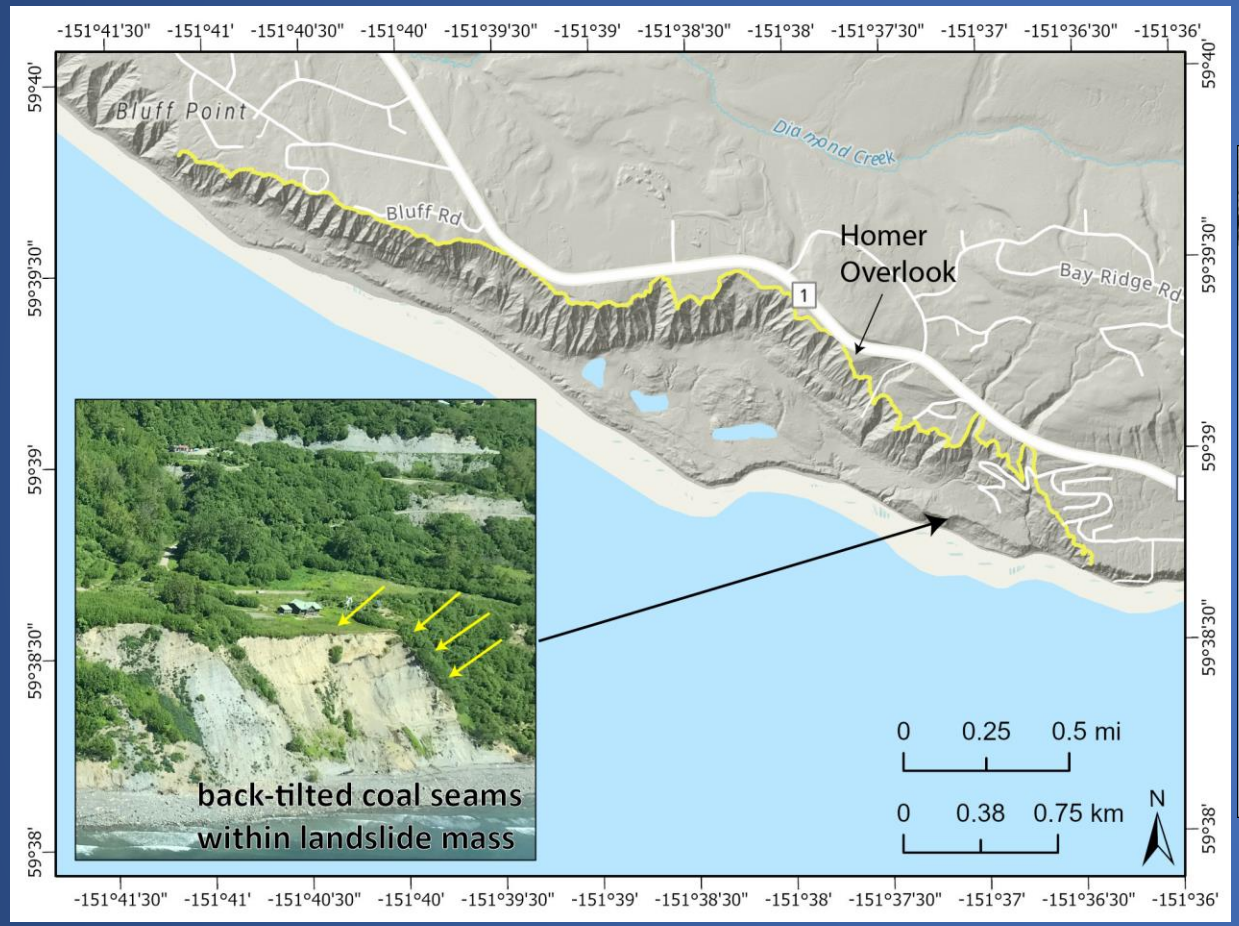


Figure 3 *– Bluff Point landslide headscarp extent (yellow line) along the Sterling Highway. Note that the headscarp outline has undergone significant erosion since formation. Inset: oblique aerial photograph of back-tilted coal seams within the landslide mass.*

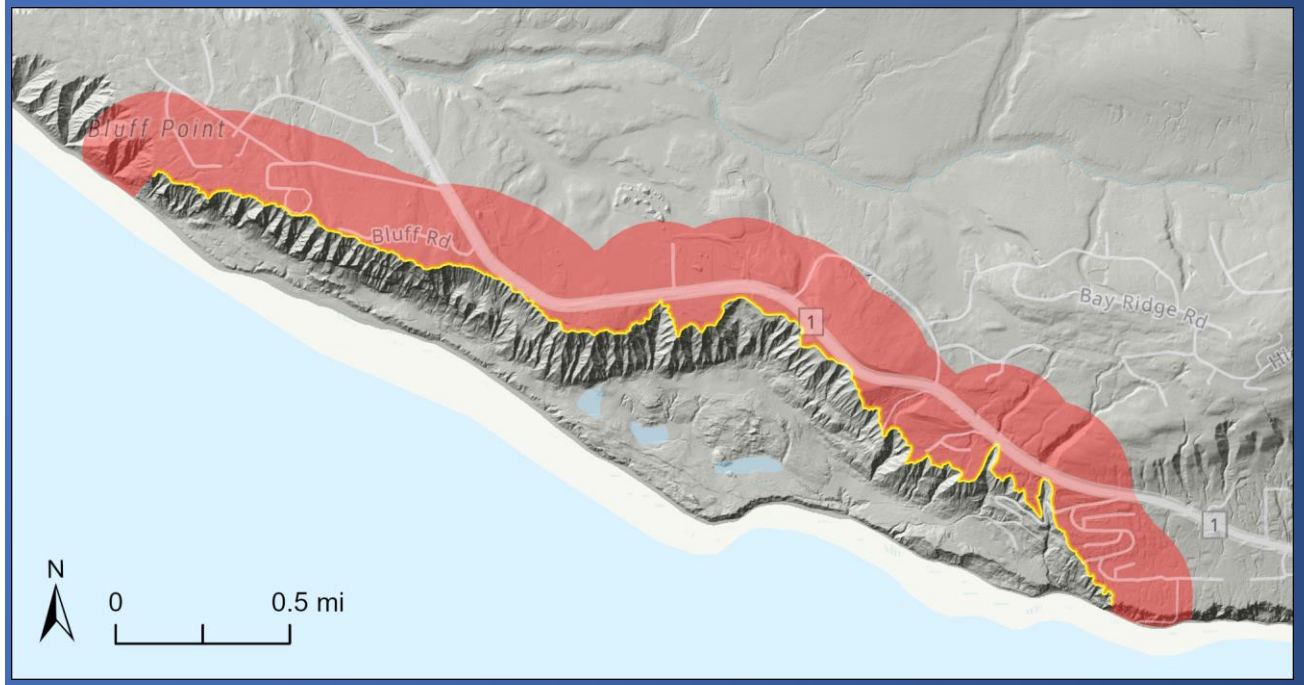


Figure 8 *– Deep-seated landslide susceptibility near the Bluff Point Landslide. Note that the landslide body (southwest of the yellow headscarp line) is also a landslide deposit and is highly susceptible to repeated failure.*

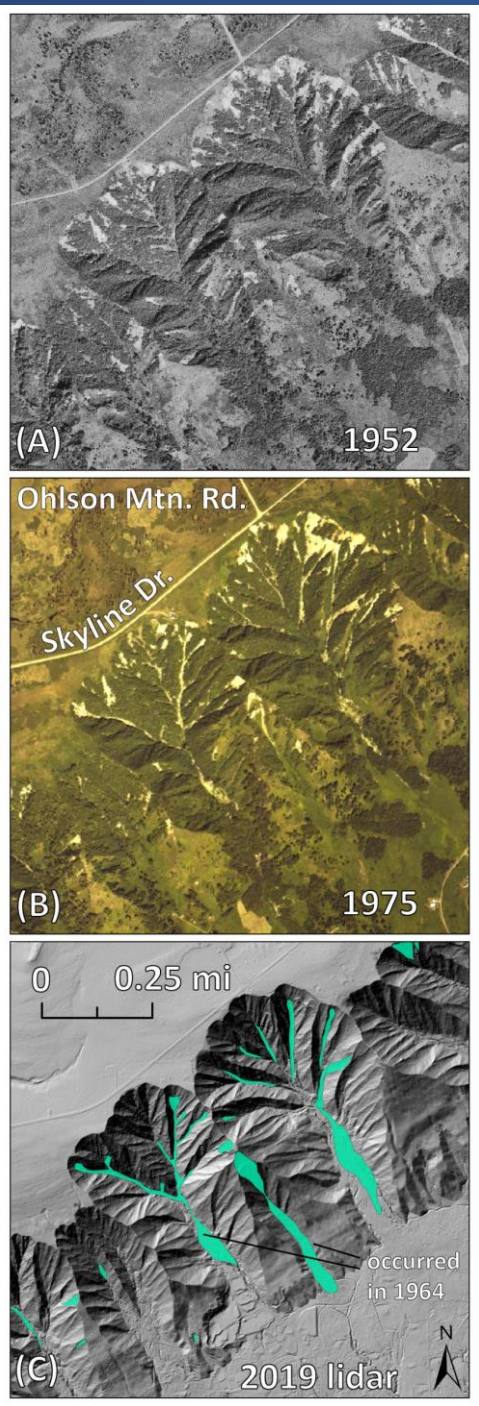


Figure 4 *– A) and B) examples of georeferenced aerial photographs for two steep upland catchments where landslides were mapped by Waller (1966) after the 1964 Great Alaska Earthquake. We used changes in vegetation between air photo pairs to identify landslide, earthflow, and channelized debris flow scars; C) Slope failures that were identified between air photo sets were digitized in the 2019 lidar elevation data using geomorphic characteristics. Note: the channelized debris flow deposit polygons include both the source areas and runout zones (deposits).*

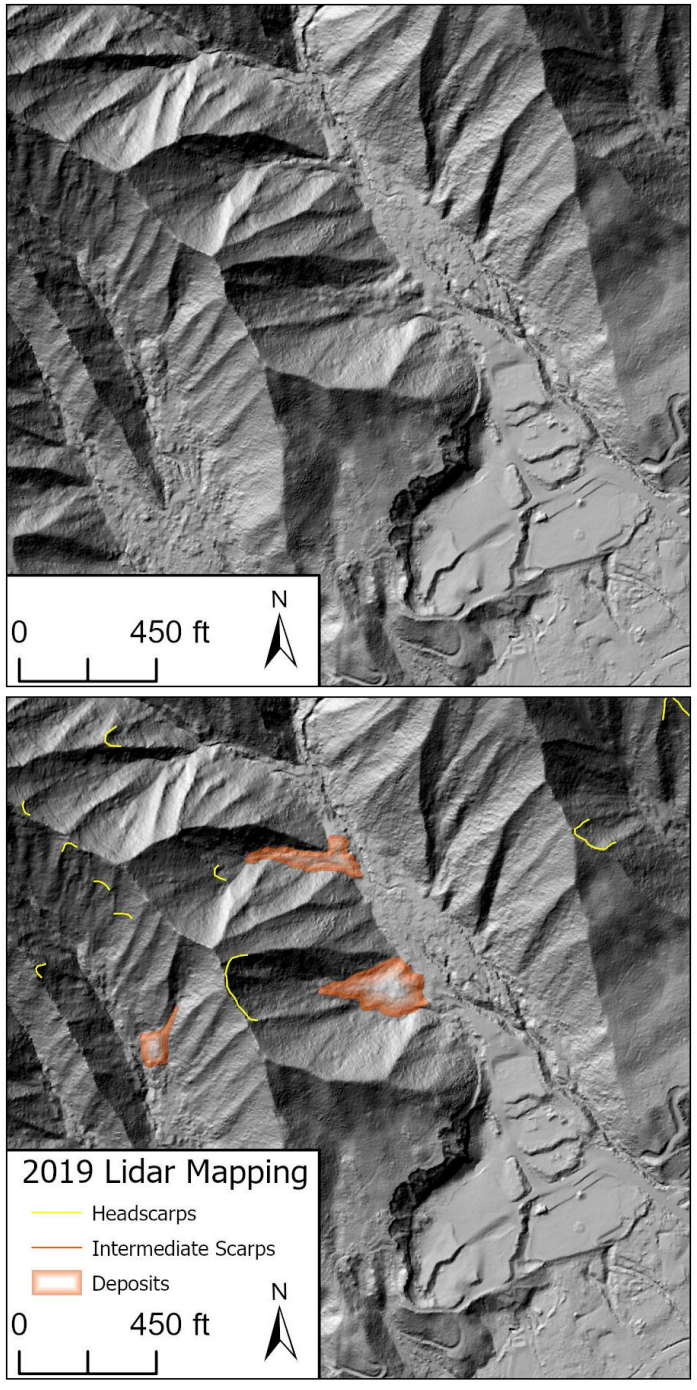


Figure 5 *– Excerpt of 2019 lidar landslide mapping near the end of China Poot Road. These headscarps, intermediate scarps, and deposits were identifiable only in bare-earth lidar (not visible in aerial photography). Note that some headscarps have no accompanying deposits and vice versa.*

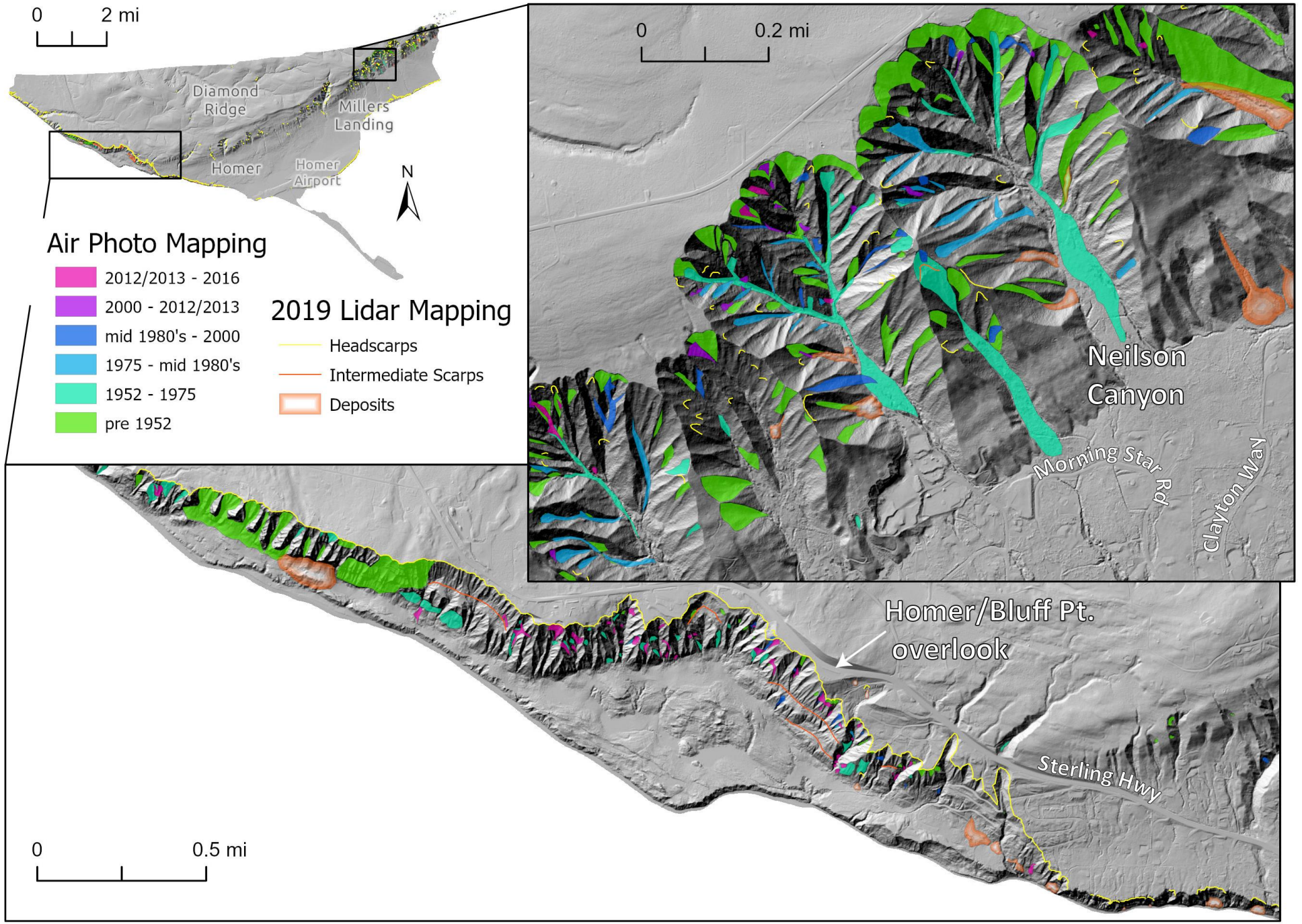


Figure 6 *– Excerpts from the complete landslide inventory database for the Bluff Point area (bottom) and Neilson Canyon area (top right). The entirety of the Bluff Point landslide is technically a deposit but is not explicitly mapped as such for clarity. Earthflow and channelized debris flow scar polygons include both the source area and any associated deposit.*

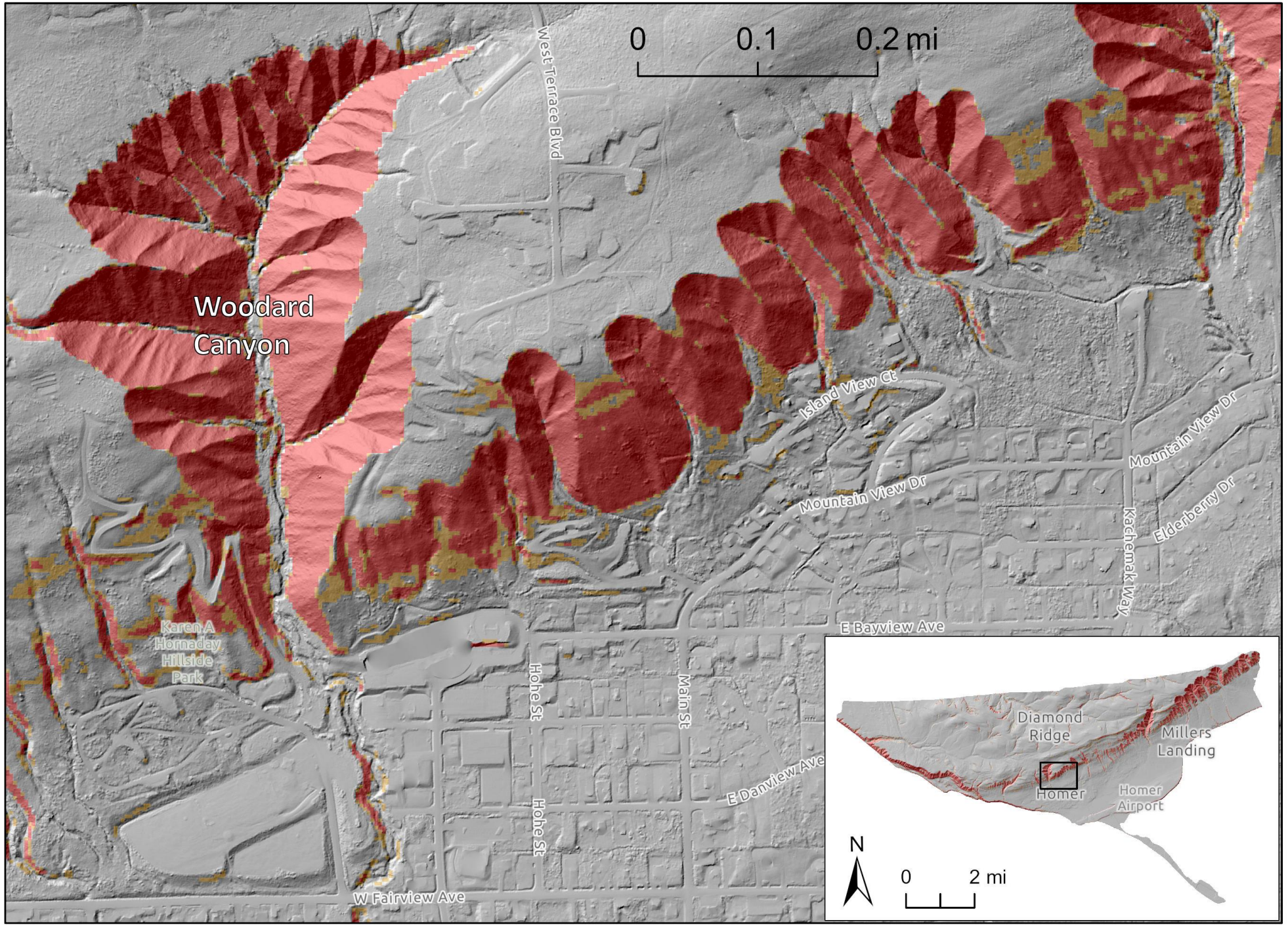


Figure 7 *– Excerpt from the Factor of Safety map highlighting areas of moderate (orange) and high (red) shallow landslide susceptibility at saturated conditions for the area near Woodard Canyon.*

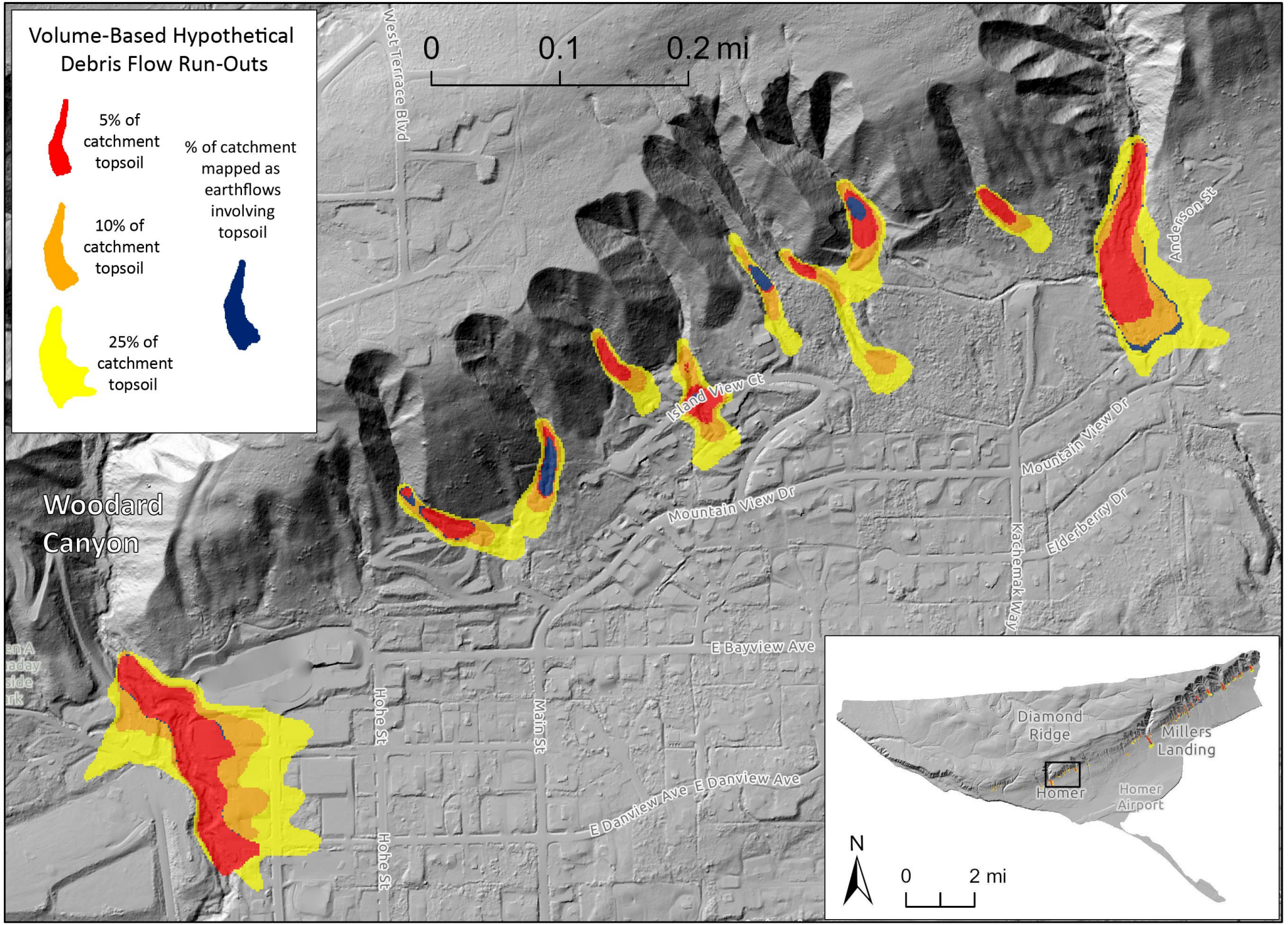


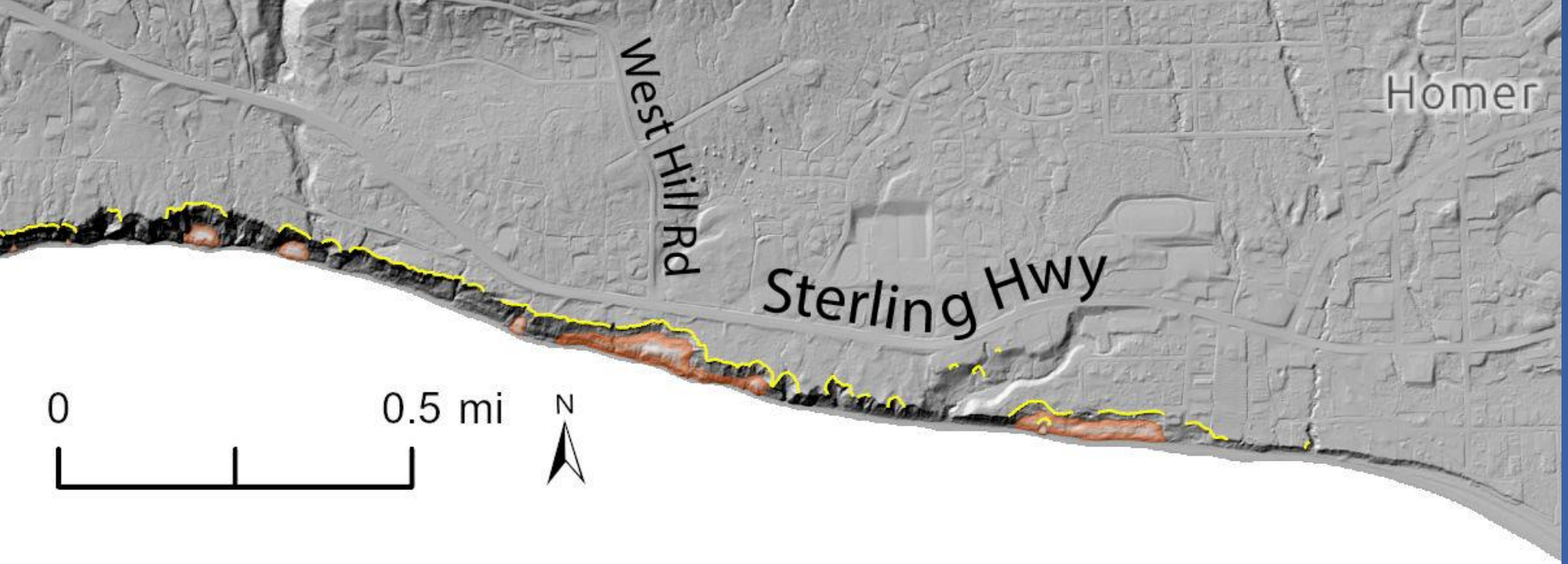
Figure 9 *– Excerpt from the Channelized Debris Flow runout map. Note that the percent of the Woodard Canyon catchment mapped as earthflows involving topsoil is just over 5%, and therefore it is only barely visible between the red and the orange polygons.*

Debris Flow Runouts

- Discussion

Landslide RI

- Publication status
- Print sheet extents
- GIS data-sharing issues



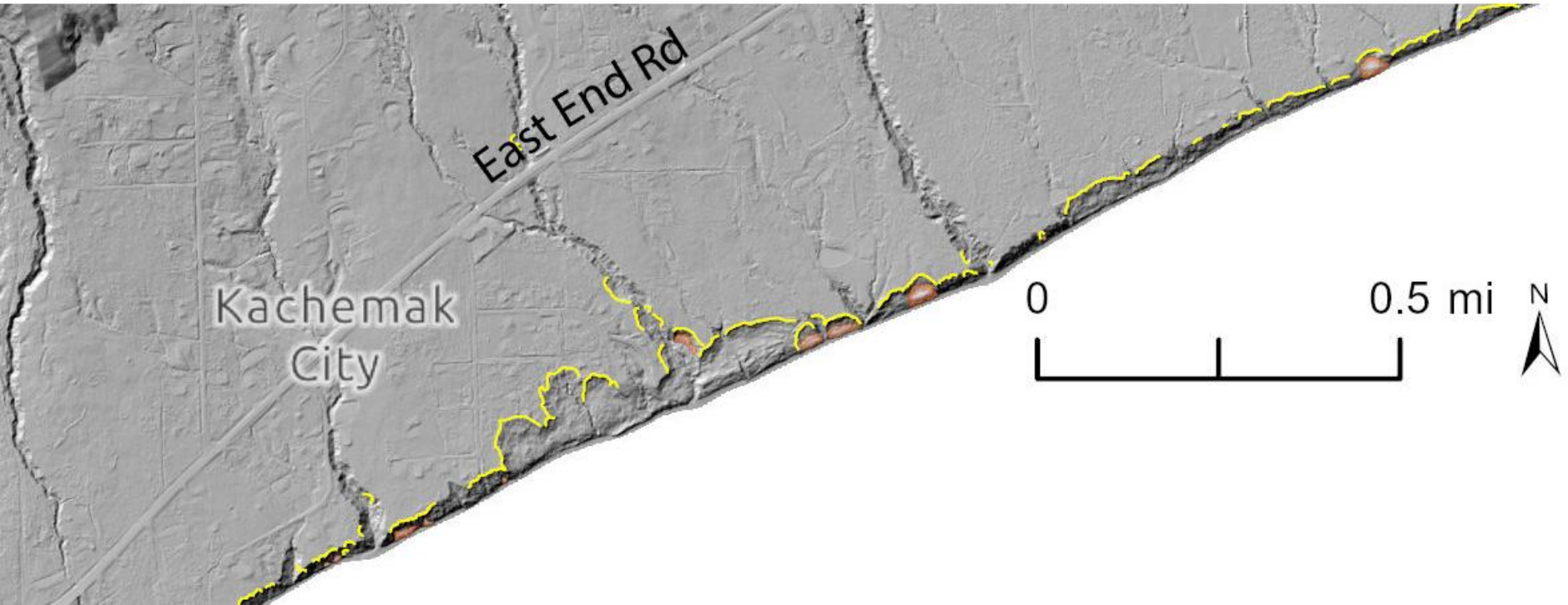


Figure 10 *– Lidar-only analysis of the 2019 coastline indicate that even in areas outside of the Bluff Point coast, much of the coastline is actively unstable. Many clearly defined landslide deposits have been mapped (though there are likely many more deposits that are not explicitly mapped) and further analysis of coastal bluff stability is needed.*