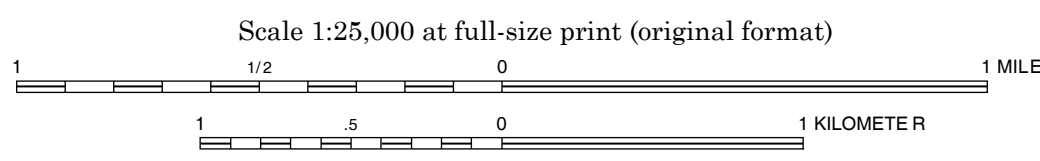


Shallow Landslide Susceptibility Map for Cordova, Alaska

by
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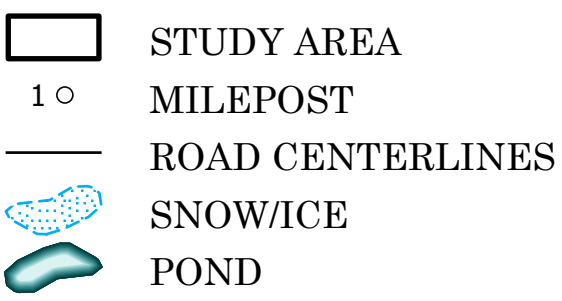
EXPLANATION

This map depicts the relative susceptibility of slopes around the City of Cordova to shallow landslide initiation by combining the mapped landslide inventory (map sheet 1) with calculated factors of safety (FOS) following the methods of Burns and others (2012). FOS is the ratio between forces acting to move material downslope and forces resisting that movement.

$$FOS = \frac{Resisting\ Force}{Driving\ Force}$$

A slope is theoretically stable when the resisting forces are greater than the driving forces ($FOS > 1$), and is theoretically unstable where the driving forces are greater than the resisting forces ($FOS < 1$). Because of natural variability and uncertainties in soil composition and properties, engineering practice typically takes a conservative approach. Slopes with an $FOS < 1.50$ are generally considered to have an inadequate safety margin. Following Burns and others (2012), we classified slopes with an $FOS < 1.25$ as highly susceptible to failure, slopes with a FOS between 1.25 and 1.50 as moderately susceptible, and slopes with an FOS equal to 1.50 or greater as having low to no susceptibility to failure.

Although a few resources exist for surficial soils mapping in the Cordova area, they are scant and lack the necessary detail for FOS calculations. We supplemented the existing data with additional interpretation of lidar data and aerial imagery. We compiled soil engineering properties from several sources; see the report that accompanies this map for a list of these resources and description of the methods. Critical slopes were derived from a digital elevation model produced by Zechmann and others (2024).



SHALLOW LANDSLIDE SUSCEPTIBILITY

- HIGH:** High susceptibility to slope movement, FOS less than 1.25
- MODERATE:** Moderate susceptibility to slope movement, FOS 1.25 – 1.50
- LITTLE TO NONE:** Little to no susceptibility to slope movement, FOS greater than 1.50

LIMITATIONS

This shallow landslide susceptibility map was developed using the best available data with input from many sources. Several limitations are worth noting and underscore that this hazard map was designed for regional application and should not be used as an alternative to site-specific studies.

- This map is based on calculated factors of safety (FOS). The level of detail and accuracy of the final susceptibility map may be affected by the following:
 - FOS calculations were done per soil unit, and are strongly influenced by the accuracy and resolution of the input data for soil unit extents, material properties, depth to failure, depth to groundwater, and slope angle. Material properties were estimated based on soils data from several sources and are conservative estimates. Slope angle was derived from a lidar digital elevation model.
 - FOS calculations were done per individual cell without regard for the adjacent cells. We resampled slopes to 3-meter (~10-foot) resolution and applied focal statistics to reduce the "noise" of processing interpolation and local overestimation in areas of steep slopes with low relief; however, some localized overestimation is still possible.
 - Local conditions may vary substantially from the values used to make this map.
- Lidar provides a snapshot view of the landscape at the time of data collection; therefore, maps based on lidar data interpretation may become less accurate as new landslides occur or improved technology becomes available.
- The lidar-based digital elevation model cannot distinguish between natural elevation changes and man-made structures. Although we removed buildings, some may remain and may show higher susceptibility due to their apparent near-vertical slope. Road embankments were not removed.
- This map is intended for regional-scale purposes and to assist state and local agencies in land-use planning. The map does not replace site-specific investigations and is not suitable for land-use regulation, building-code development, or to answer legal questions. It should not be used to assess the hazard to any one property. However, the map can serve as a useful tool for estimating the regional slope failure hazard and as a starting place for future site-specific maps.
- This map does not predict landslides; it simply shows areas that might be more susceptible compared to areas that are less susceptible.
- DGGS is not a regulatory agency; therefore, this map is non-regulatory.

REFERENCES CITED

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