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Channelized Debris Flow Susceptibility and Inundation Modeling Map on Wrangell Island, Alaska

by
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2026

Scale 1:25,000 at full-size print (original format)
Scale ~1:26,600 when reduced to 48-inch sheet

EXPLANATION

This map depicts modeled channelized debris flow initiation and transport potential within watershed catchments, and the potential extent of debris flow inundation on Wrangell Island. The modeling follows the method by Burns and others (2022) and is based on a digital terrain model (DTM) derived from 2023 lidar data (Zechmann and others, 2023).

Channelized debris flow initiation potential is based on the slope angle and curvature characteristics of the input DTM, and the distance of each raster cell to an identified drainage channel. These factors define the portions of each watershed most likely to contribute to a channelized debris flow. The initiation model does not consider the volume of material that could accumulate over time, or how long it might take for material to accumulate again after an event. Transport potential is estimated from the gradient and curvature of drainage channels, and represents the likelihood that a debris flow, once initiated, will continue moving downslope. Initiation and transport are combined to produce the Initiation and Transport Potential per Watershed shown on this map. A watershed may be susceptible to producing a debris flow but lack the volume or growth necessary for the model to produce a deposition extent.

Deposition occurs where the slope flattens and the transport potential changes from High or Moderate to Low or Very Low to None. Two inundation scenarios are shown: a Typical event and an Extreme event. The Typical event represents a relatively common debris flow that might occur every few years to decades. The Extreme event is produced by scaling the Typical event parameters to represent a rare, high-volume event that might occur once per thousand years or less frequently.

STUDY AREA
POND
1 MILEPOST

ROAD CENTERLINES
Active
Inactive
Closed
Status Unknown

LIMITATIONS

This debris flow 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.

- 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.
- Debris flow modeling is based on estimated growth factors and volumes. Actual debris flow behavior may differ from the modeled results.
- Buildings, bridges, culverts, changes in topography, and mitigation measures can alter debris flow paths.
- The modeling does not account for differences in material composition. For example, woody debris entrained within the debris flow slurry can affect flow behavior and runout length and width.
- 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 hazard and as a starting place for future site-specific maps.
- This map does not predict debris flows; 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.

CHANNELIZED DEBRIS FLOW SUSCEPTIBILITY AND INUNDATION

INITIATION AND TRANSPORT POTENTIAL PER WATERSHED

- **HIGH**
- **MODERATE**
- **LOW**
- **VERY LOW to NONE**

DEPOSITION EXTENT

- **EXTREME EVENT** High volume, low frequency
- **TYPICAL EVENT** Low volume, high frequency

REFERENCES CITED

Burns, W.J., Franczyk, J.J., Calhoun, N.C., 2022, Protocol for channelized debris flow susceptibility mapping: Oregon Department of Geology and Mineral Industries Special Paper 53, 89 p. https://pubs.oregon.gov/dogami/sp/SP-53/p-SP-53.htm

Zechmann, J.M., Wikstrom Jones, K.M., and Wolken, G.J., 2023, Lidar-derived elevation data for Wrangell Island, Southeast Alaska, collected July 2023: Alaska Division of Geological & Geophysical Surveys Raw Data File 2023-28 v. 1.1, 14 p. https://dggs.alaska.gov/pubs/id/31098

ACKNOWLEDGMENTS

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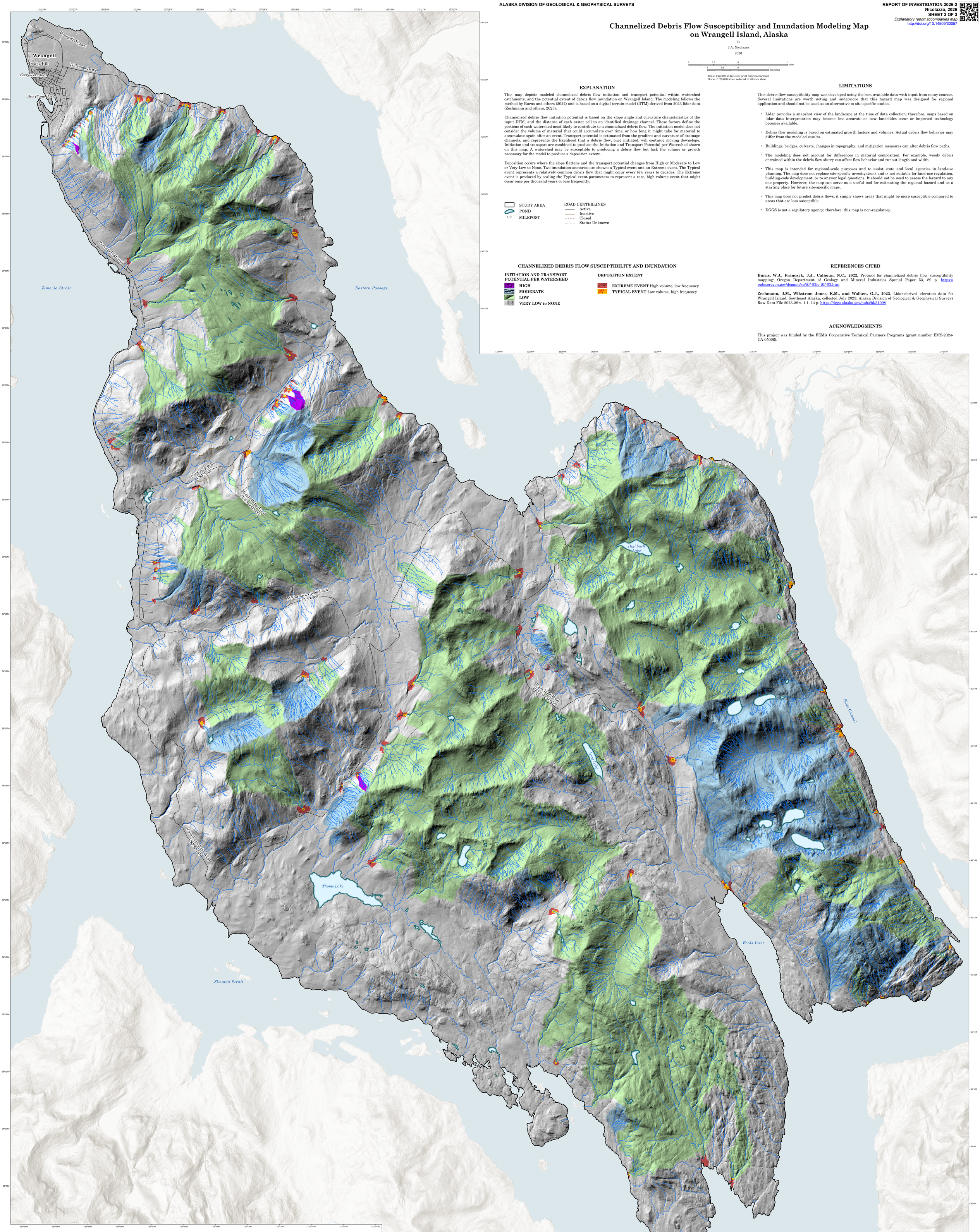

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Map Location

Location of Map Area

N

Base maps:
Lidar-derived hillshade from Zechmann and others (2023)
Reference layer beyond lidar extent:
Esri's World Hillshade and World Terrain Base
Map Coordinate System:
NAD 1983 (2011) UTM Zone 8N
Vertical Datum:
NAVD88

Software:
ArcGIS Pro 3.6.2
GIS data layers and Cartography by:
J.A. Nicolazzo
Cartographic review by:
A.E. Macpherson