Alaska Landslide Inventory Geodatabase

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Alaska Landslide Inventory (ALI)

- Documenting, assessing, understanding, and quantifying landslide hazards.
- Improving geologic hazard communication and coordination among agencies, local governments, and communities.

ALI

- Compile, consolidate, continuously update, and distribute landslide information to the public.
- One-Stop-Shop
- Building ALI on a PostgreSQL Geodatabase
- ESRI technology
    - Allow multiple editors to populate the gbd (real-time)
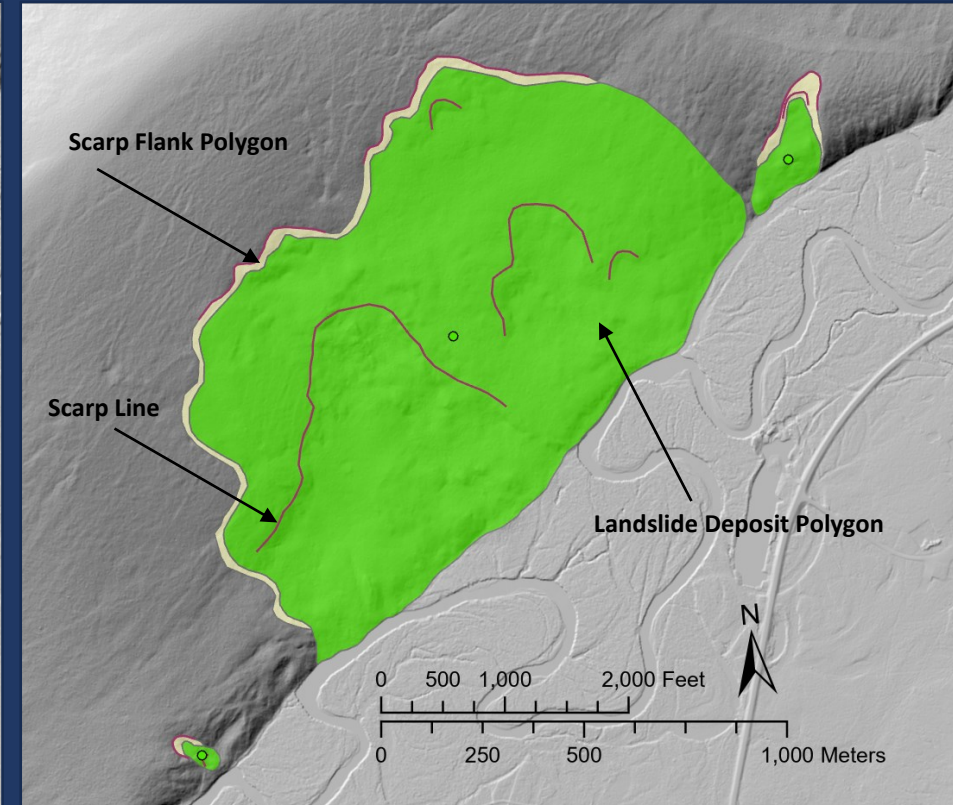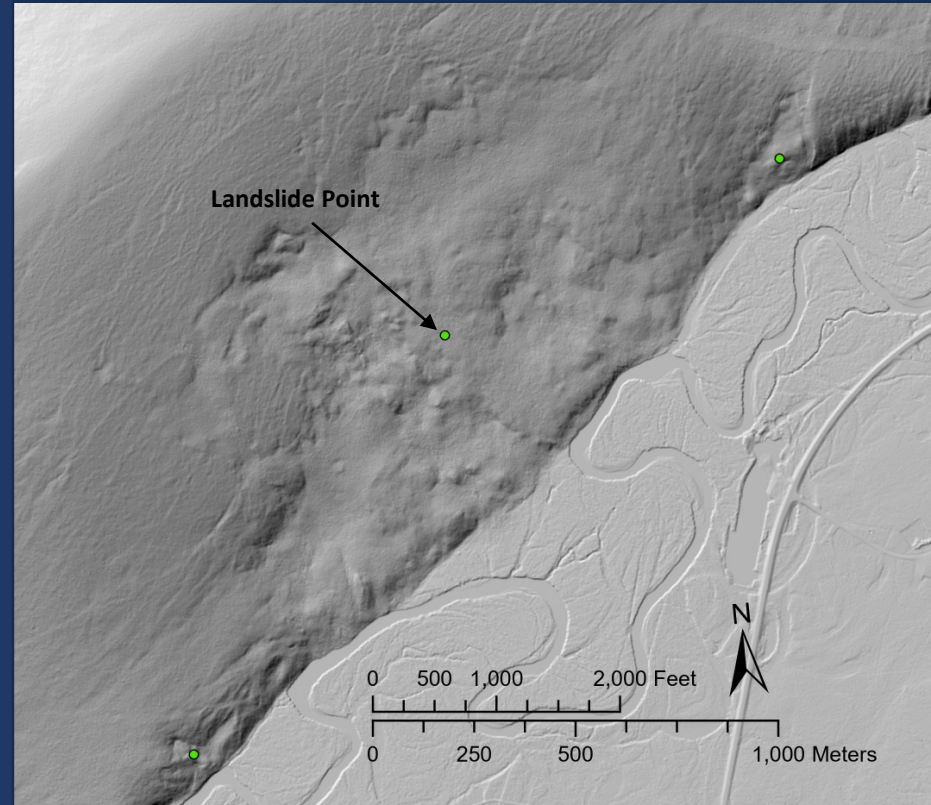   - Custom web apps created by DGGS
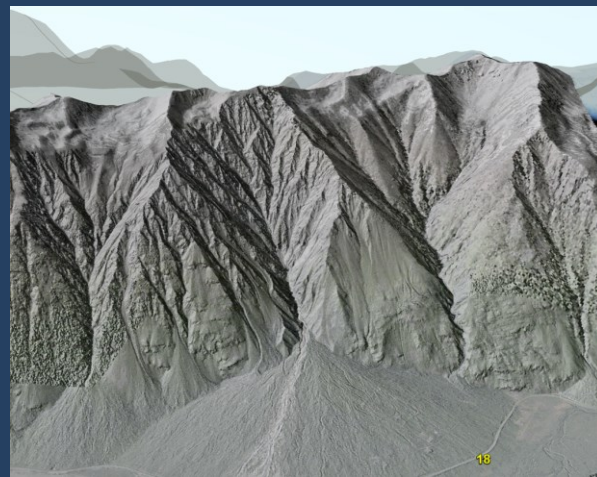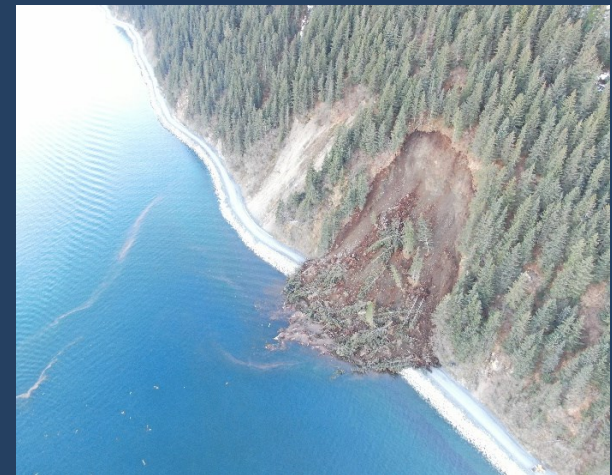
Alaska Landslide Inventory (ALI) Geodatabase

Geodatabase

- **Four feature classes**

  - **landslide_points** : a point for each landslide polygon, with matching attributes

  - **scarp_lines**: polylines that trace the landslide scarp(s), this includes head scarps and other internal scarps

  - **scarp_flank_polys**: polygons that trace the outlines of the exposed flanks, where present these polygons share an edge with a scarp_line and a landslide_deposits_poly

  - **landslide_deposits_polys**: polygons that trace the outline of the landslide deposit, or the entire landslide footprint (scarp, flank, and deposit)


Schwarber, J.A., Darrow, M.M., Daanen, R.P., Stevens, D.S.P., and Presler, P.J., 2022, Preliminary landslide inventory of parts of the Fairbanks North Star Borough, Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2022-1, 80 p., 2 sheets, scale 1:50,000. https://doi.org/10.14509/30841

ALI Data Dictionary (Polygons and Points)

Field Name	Description	Data Type	Example Values
landslide_deposits_id	Primary key. Unique identifier *(this is copied to the scarp polyline and the scarp& flank polygon)*	GUID	{1051D9B2-9B8D-4997-9E3C-3EEE0836B781}
landslides_id	Id of parent object *(overall landslide footprint)*	GUID	{1051D9B2-9B8D-4997-9E3C-3EEE0836B781}
category	The category of the feature *(landslide or rockfall)*	string: 50	landslide rockfall
symbol	The symbol code used to draw this feature.	string: 254	03.04.05
label	Text that will display on a map	string: 50	*various*
name	Name of landslide	string: 254	Beach Road.
movement_category	Type of landslide, more specific than "category"	string: 50	slide flow spread fall topple complex avalanche
movement_type	Type of landslide, more specific than "movement_category"	string: 50	slide, debris slide, rotational slide, debris slide, translational slide, earth slide, rotational *others, see domain*
movement_code	Abbreviation that represents movement_ type	string: 10	DS-R *other, see suggested values*
landslide_features	Description or list of features associated with the landslide	string: 4096	Rotational landslide Antiscarps Mainscarp *various*
number_fatalities	Number of fatalities associated with the landslide	long	0 1
structural_damage_notes	Notes describing the structural damage associated with the landslide	string: 4096	two houses damaged road fully blocked
age_range	Age range of the landslide	string: 50	historic (< 150 yrs) pre-historic (> 150 yrs)
date_movement	Date landslide occurred/last movement	date	6/1/2022
year_movement	Year deposit last moved	string: 4	2022
slope_angle	Slope Angle	float	0-90
azimuth	Compass direction	float	0-360

| Field Name	Description	Data Type	Example Values
head_scarp_height	Head scarp height in units of meters	double	8
failure_depth	Failure depth in units of meters	double	4
volume	Volume of landslide deposit in units of cubic meters	double	123,000
landslide_depth_type	Type of landslide depth	string: 10	shallow deep
reactivation	Multiple occurrences?	string: 10	no yes
map_unit	Short plain-text key (identifier) for the map unit	string: 10	Kgbf Pzg
soil_type	Description of the soil	string: 254	clean sand, few cobbles highly weathered bedrock, boulder size
field_verified	Was the feature field verified?	string: 10	no yes
field_verified_observer	Name of the person who field verified the feature	string: 254	Nicolazzo, J.A. Larsen, M.C.
mapper	Name of the person who located or digitized feature	string: 254	Nicolazzo, J.A.
notes	Notes associated with the feature	string: 4096	General notes in free text
data_sources	Foreign key to data_sources table's 'source' field	string: 150	Foster, 1992 Day and others, 2007
data_sources_method	The method the data source used for in this database.	string: 150	Feature unmodified from source material Feature modified from source(s) New feature based primarily on field mapping *others, see domain.*
distribution_policy	Flag indicating to whom and how this feature can be made available.	string: 50	internal use only public, full data access *others, see domain*
existence_confidence	Indicates the mapper's relative confidence and/or certainty in the interpreted existence of a feature.	string: 50	certain probable questionable
identity_confidence	Indicates the mapper's relative confidence in the identity of the features as indicated by values in the following fields, category, type, and symbol. See attribute	string: 50	certain probable questionable

POPULATING ALI

Geologic Map of Anchorage 48K, 1961, Grantz

Geologic Map of Valdez B-1,1981 Yehle
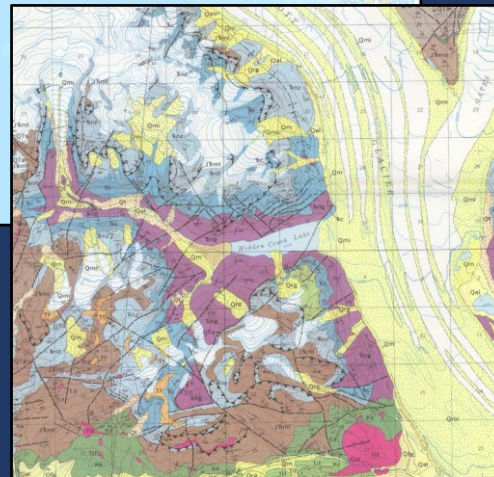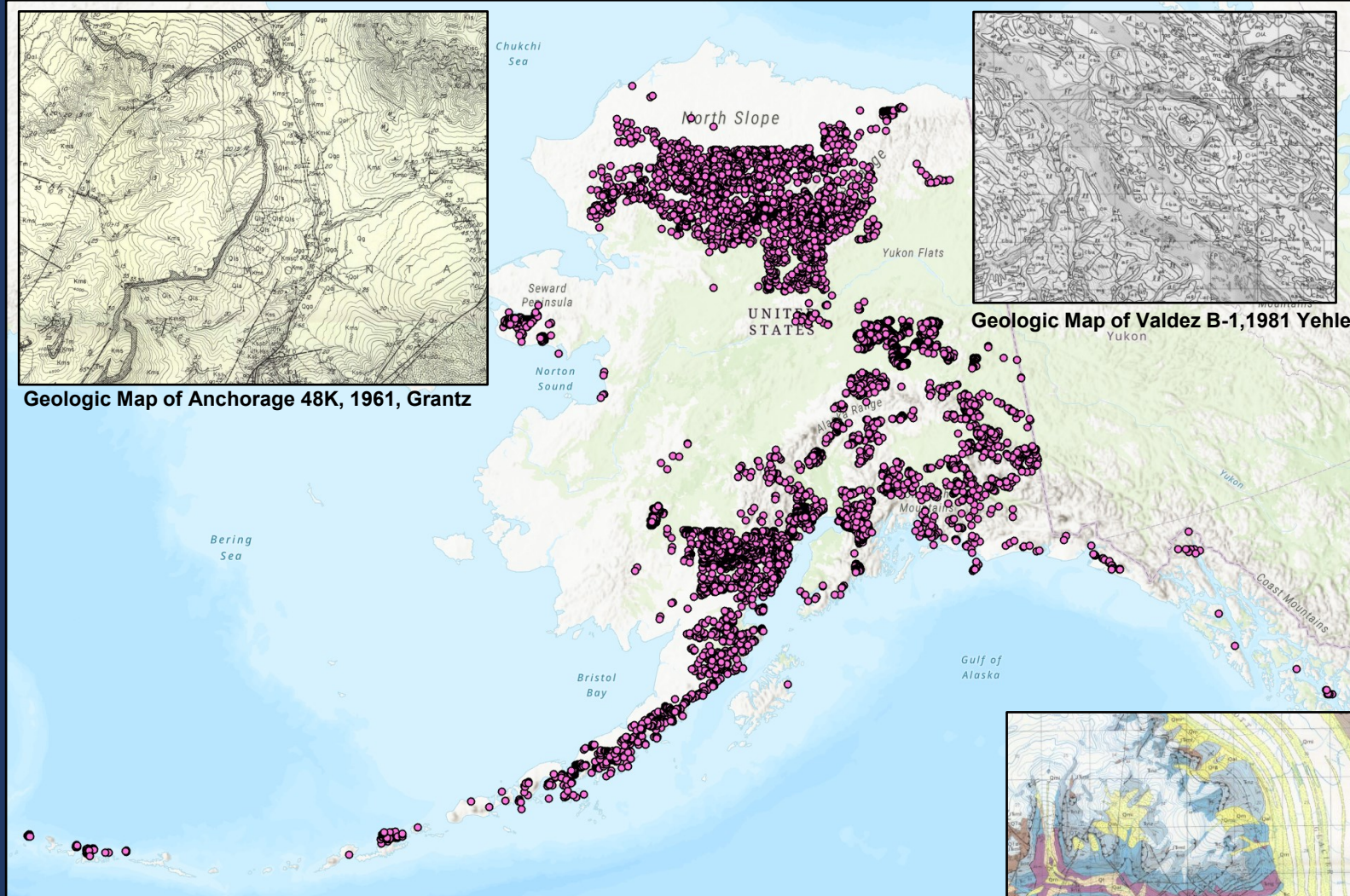
Geologic Map of the McCarthy 63K, 1972

- Approximately 1,000 published DGGS and USGS maps reviewed
  - 286 maps contained "Landslide" in the legend
- 10,873 points were generated (not all landslides)
  - 7,158- Generic Landslide
  - 2,217-Creep
  - 1,338-Debris Flows
  - 157-Rockfall
  - 3-Complex
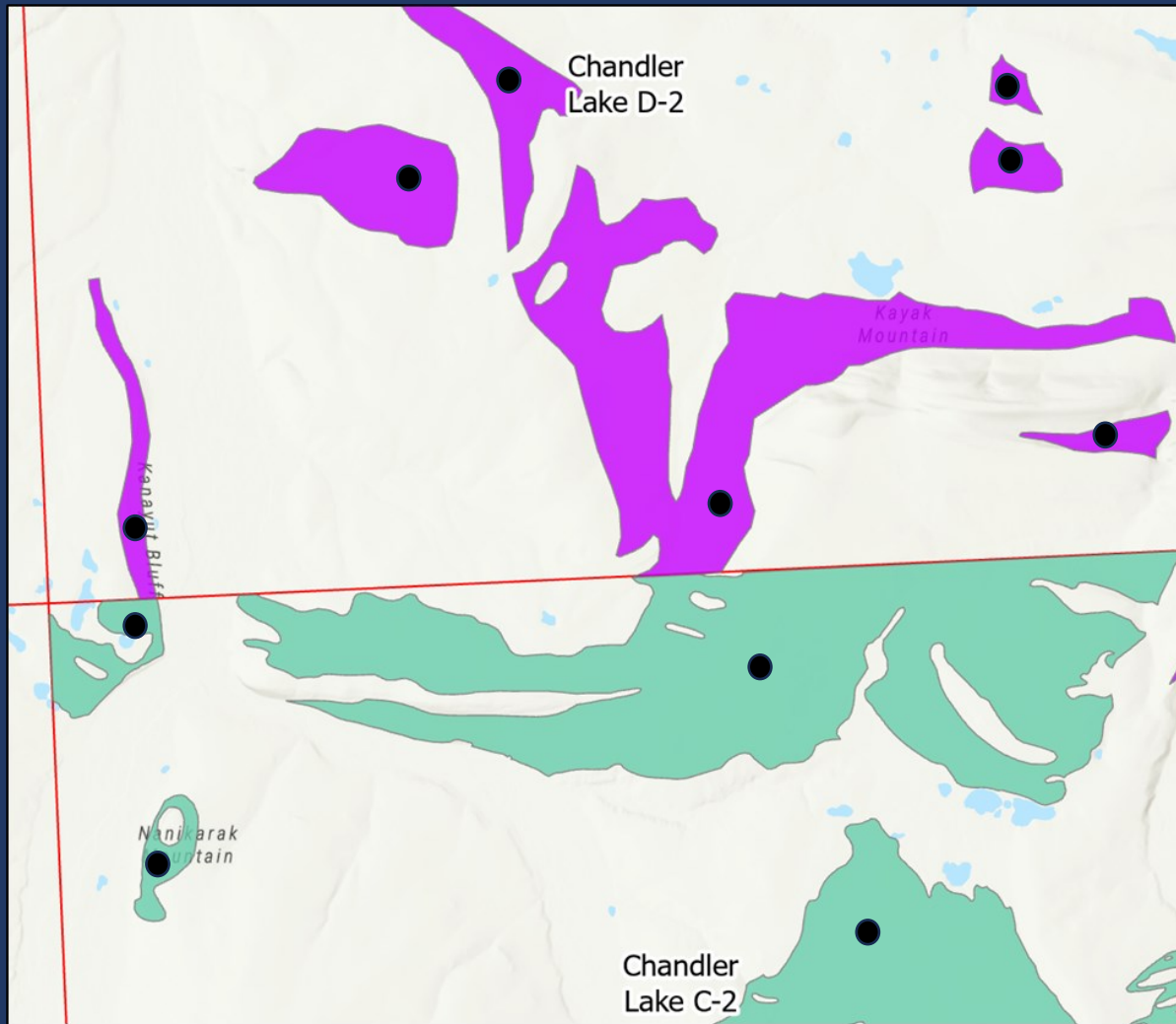
Example of mapping differences between adjacent quadrangles the polygons in the Chandler Lake D-2 quadrangle (top of image) are from data source MF-1121 mapped by Hamilton in 1979, and the polygons in the Chandler Lake C-2 quadrangle (bottom of image) are from data source PIR 2009-007 mapped by Harris, et al,. in 2009.

Mapping procedures and challenges
- Different scaled maps (250k, 100K, 63K, 48K, 15K, etc..)
- Landslide classification and labeling

s	Solifluction deposits
fl	Flow deposits
ls	Landslide deposits

df	Debris-flow deposits
ls	Landslide deposits

Qf1	Debris-flow deposits
Qsl	Undifferentiated landslides

Examples of existing published map legends containing landslides and their assigned unit classification

State of Alaska Department of Transportation & Public Facilities

Geotechnical Asset Management (GAM)
- Unstable Slope Management Program (USMP)
  - Rock/Soil/Embank database
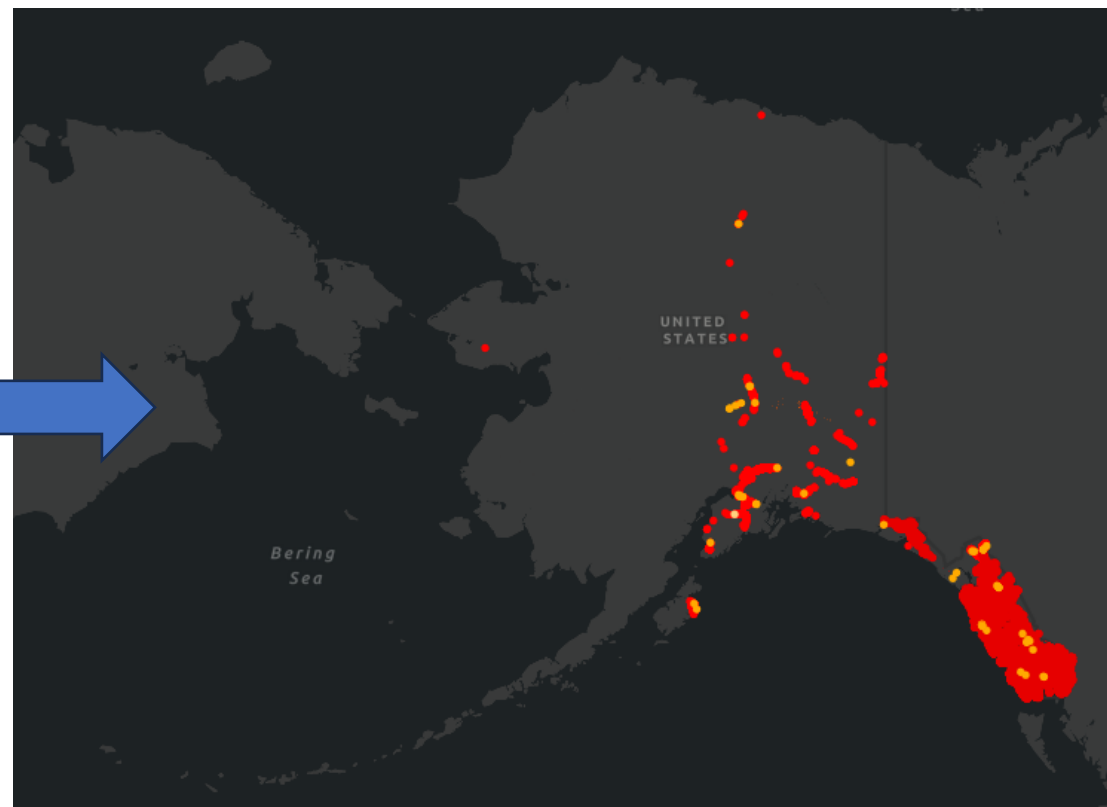
Division of Geological & Geophysical Surveys
Alaska Landslide Inventory
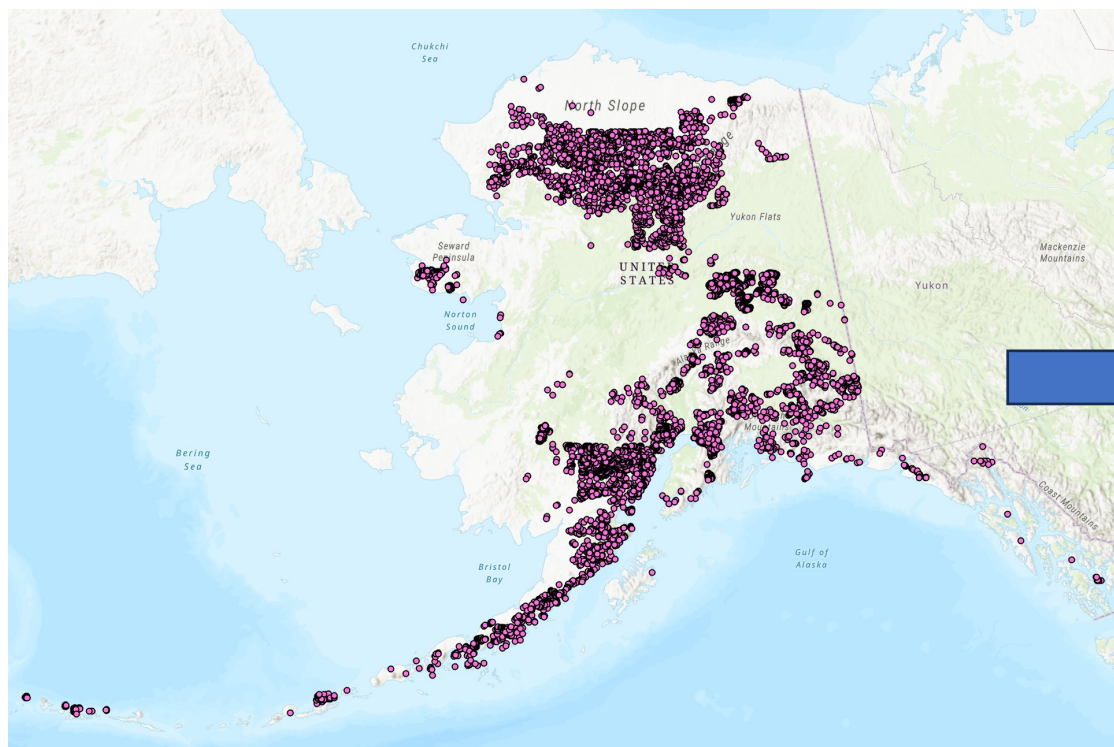
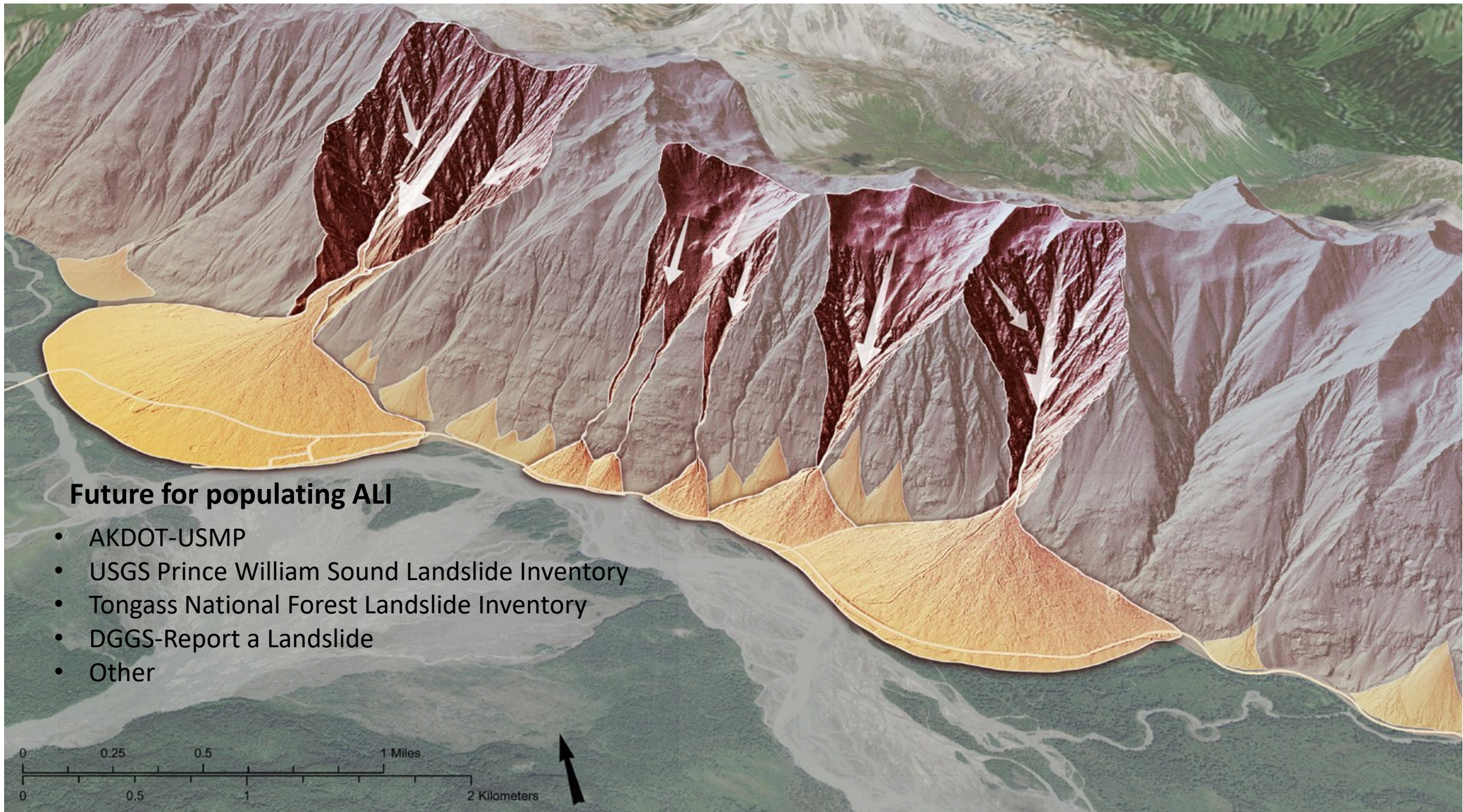**U.S. Geological Survey**
U.S. Landslide Inventory

U.S. Landslide Inventory | U.S. Geological Survey (usgs.gov)

Future for populating ALI

- AKDOT-USMP
- USGS Prince William Sound Landslide Inventory
- Tongass National Forest Landslide Inventory
- DGGS-Report a Landslide
- Other

"*If I had an hour to solve a problem and my life depended on it, I would spend the first 55 minutes defining the problem.*"
Albert Einstein

Opportunities