

# Areas of Landslides Marshall Quadrangle, North Dakota

**Christopher A. Maike  
&  
Fred J. Anderson**

**2024**

## UNIT DESCRIPTIONS

### QUATERNARY SYSTEM

#### RECENT/PLEISTOCENE

##### **Qlsa** Areas of Recently Active Landslides

Landslide areas showing movement between 2008 and 2021.

##### **Qls** Landslide Deposits

A mass of material that has moved downslope. Includes earth flows, slumps, and areas of soil creep.

Landslides identified on this quadrangle were mapped from stereo pairs, black and white 1:20,000 scale aerial photographs flown in June to September 1958 by the United States Department of Agriculture (USDA). Additional data sources include digital orthophotography from the USDA National Agriculture Imagery Program (NAIP) flown in August 2022 and the North Dakota Geological Survey LiDAR Map Series, which compiles raw data flown in November 2021 from the North Dakota State Water Commission.

Areas of recently active landslides (Qlsa) mapped on this quadrangle were identified from changes between the 2008 and 2021 LiDAR elevation datasets observed on an elevation subtraction raster. Noise introduced from data precision (typically within a foot between the LiDAR datasets) is removed on this raster by excluding the signal from elevation change in the +/- 1 foot interval. Geologists interpret areas of landslide movement in geomorphic context (typically a decrease in elevation near a landslide headscarp paired with an increase in elevation downslope near the toe) and delineate those areas within the larger landslide dataset. Landslides not identified as recently active may have also experienced movement relatively recently, but did not show discernible signs of movement during the 2008 to 2021 window between LiDAR collects.

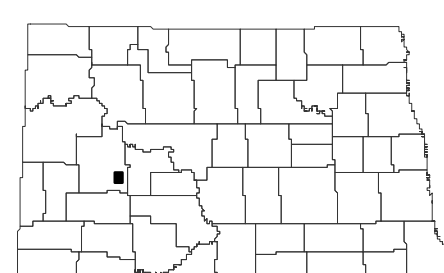
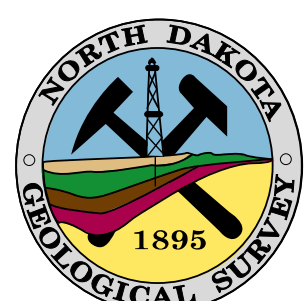
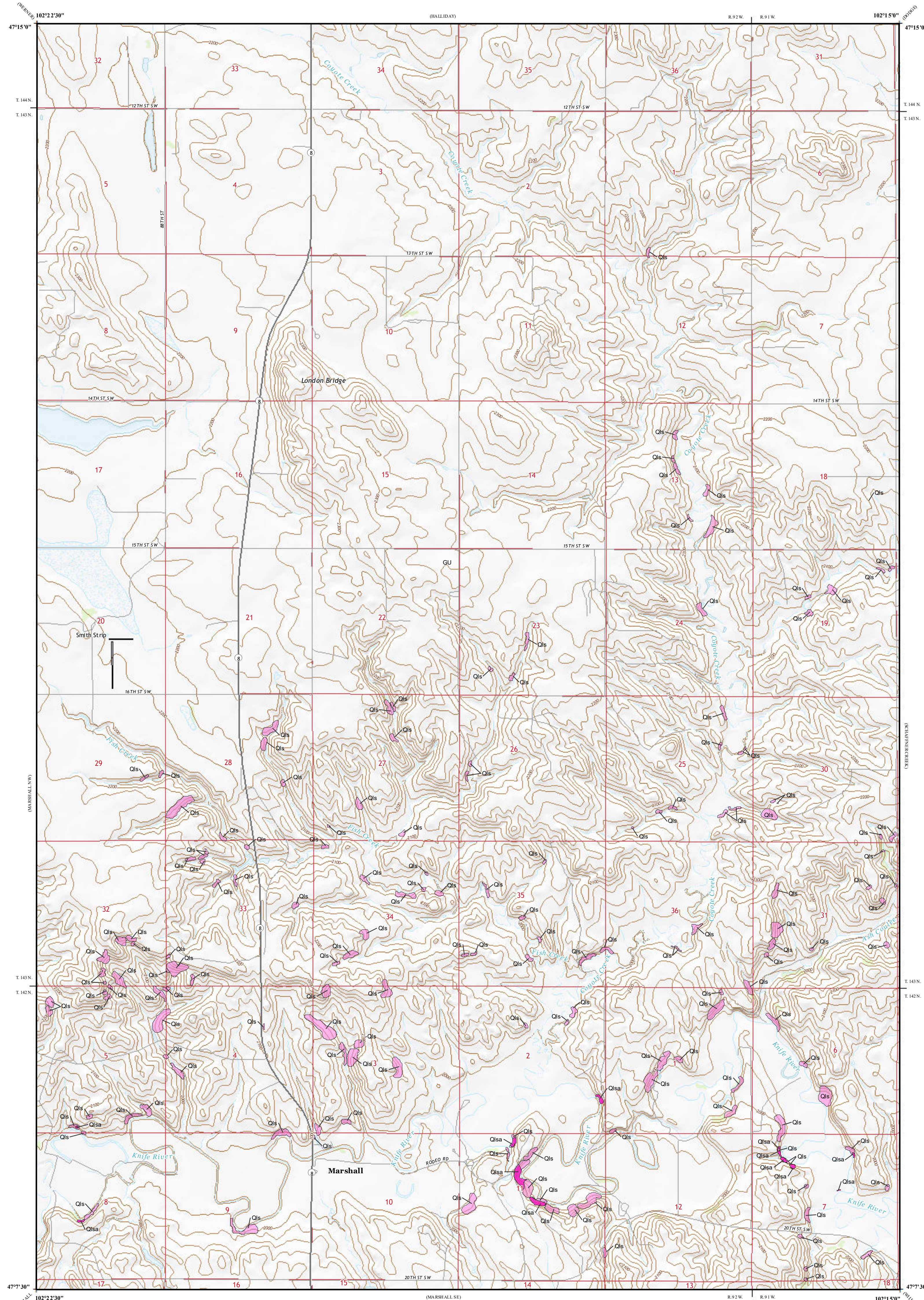
#### ROAD CLASSIFICATION

- Expressway Local C connector
- Secondary Hwy Local Road
- Ramp 4WD
- Interstate Route US Route State Route

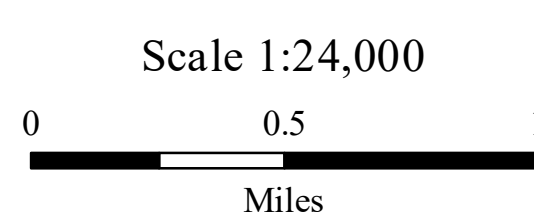
#### Slope Failure Statistical Summary

Map Unit	No. of Landslides	Mapped Landslide Area		Map Area %
		acres	m <sup>2</sup>	
Total Landslides (Qls & Qlsa)	174	259	1,048,159	0.8
Recently Active Landslides (Qlsa)	12	10	41,347	0.1

*3.9% of the mapped landslide area was active between 2008 and 2021*



Marshall Quadrangle, North Dakota



Lambert Conformal Conic Projection  
North American 1983 Datum  
USGS 7.5 Minute Topo Map

Standard Parallels 47° 73' 0" N, 47° 15' 0" N  
NGVD 1988  
Contour Interval 20 Feet

