

USGS Cooperative Landslide Hazard Mapping and Assessment Program

Award Number: G24AP00421

Title: North Dakota Phase III Landslide Inventory: Mapping Active Landslides in the
Belfield 1:100,000 Quadrangle

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Abstract

The first North Dakota Geological Survey landslide inventory map (about 300 1:24,000 scale quadrangle maps) was published in 2003 during Phase I of the North Dakota Geological Survey's landslide mapping program. The landslides were delineated by hand using stereo projection of black and white 1:20,000 scale aerial photographs taken during the 1950s and 1960s. Phase II started around 2017 with the goal of mapping landslides for the entire state using LiDAR, and now Phase III is mapping active landslides utilizing repeat LiDAR coverages. Geologists at the North Dakota Geological Survey calculate the difference between the two LiDAR collects to locate movement and, once determined to be a landslide, delineate the feature. This award would fund Phase III in the Belfield 1:100,000 quadrangle in western North Dakota. This area contains extensive critical energy infrastructure (oil well pads and pipelines) and encompasses a region that is very landslide dense. Mapping active landslides provides a dataset that the public, government, and industry leaders can use to make informed decisions concerning private and industry infrastructure installation. Alongside commercial applications, further development of our statewide active landslide dataset creates an invaluable asset for studying the nature of landslide occurrence. The Belfield 1:100,000 area now has multiple LiDAR datasets, one of which is 3DEP.

Goals and Objectives

The goal of this grant is to complete Phase III of our NDGS landslide mapping program for the Belfield 1:100,000 quadrangle. Successfully completing this goal results in all active landslides mapped that have occurred between the two LiDAR collects (flown between 2015 and 2021).

Risk Reduction Priority Areas Funded

Risk Reduction Priority Area: P1 Landslide Inventory (Hazard Mapping)

Accomplishments

Phase III mapping of our NDGS landslide mapping program for the Belfield 1:100,000 quadrangle was completed on time. This grant funded the mapping of 322 active landslides across thirty-two 1:24,000 scale maps. These slides were identified from the difference raster created from the difference between two LiDAR collects.

Unmet Results

This project had no unmet results.

Summary

Mapping 322 active landslides in the Belfield 1:100,000 quadrangle added to our statewide landslide inventory. This contributes to the Risk Reduction Priority Area concerning hazard mapping. The North Dakota statewide landslide mapping program is a multi-year project, and the grant money helped fund a portion of the state's program. In addition to adding to the statewide dataset, the maps produced through this grant are also published on our online download portal:

<https://www.dmr.nd.gov/ndgs/landslides/>

From the grant money, thirty-two 1:24,000 scale maps and one 1:100,000 scale map were produced. The maps also show existing landslides that were not active during the 2015-2021 window. The maps and resulting shapefiles will be a great addition of data to end-user utilizing the landslide data.

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