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Brad Avy, State Geologist

OPEN-FILE REPORT O-20-12

LANDSLIDE INVENTORY FOR A PORTION OF MARION COUNTY, OREGON

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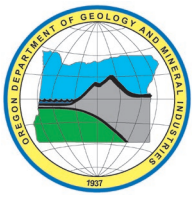

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WHAT'S IN THIS REPORT?

This report updates a landslide inventory for a portion of Marion County, Oregon. This inventory can help communities better reduce risk from landslides.

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GEOGRAPHIC INFORMATION SYSTEM (GIS) DATA

See the digital publication folder for files.
Geodatabase is Esri® version 10.1 format. Metadata is embedded in the geodatabase and is also provided as separate .xml format files.

Marion_County_Landslide_Inventory.gdb
Feature dataset: Historic_Landslide_Points
    Historic_Landslide_Points (points)
Feature dataset: Landslide_Inventory_GIS
    Deposits (polygons)
    Scarp_Flanks (polygons)
    Scarps (Lines)
Feature class:
Marion_Study_Area (polygons)

EXECUTIVE SUMMARY

The geodatabase accompanying this report is an inventory of mapped landslides in a portion of Marion County. The landslide inventory covers approximately 418 square miles, with mapping efforts focused on population centers and roadways (i.e., assets). This inventory was prepared by following the protocol developed by Burns and Madin (DOGAMI Special Paper 42, 2009). The geodatabase includes landslide deposits with associated scarp flanks and internal scarp and head scarp lines, as well as historic landslide points. This Marion County landslide inventory includes 35 historic landslide points and approximately 2,100 landslide deposit polygons.

1.0 INTRODUCTION

This landslide inventory is part of a larger project funded by the Federal Emergency Management Agency (FEMA Grant No. EMS-2018-CA-00014). The inventory shows landslide locations and includes information about each landslide deposit. This report summarizes the study area and the methods used to map the landslide inventory.

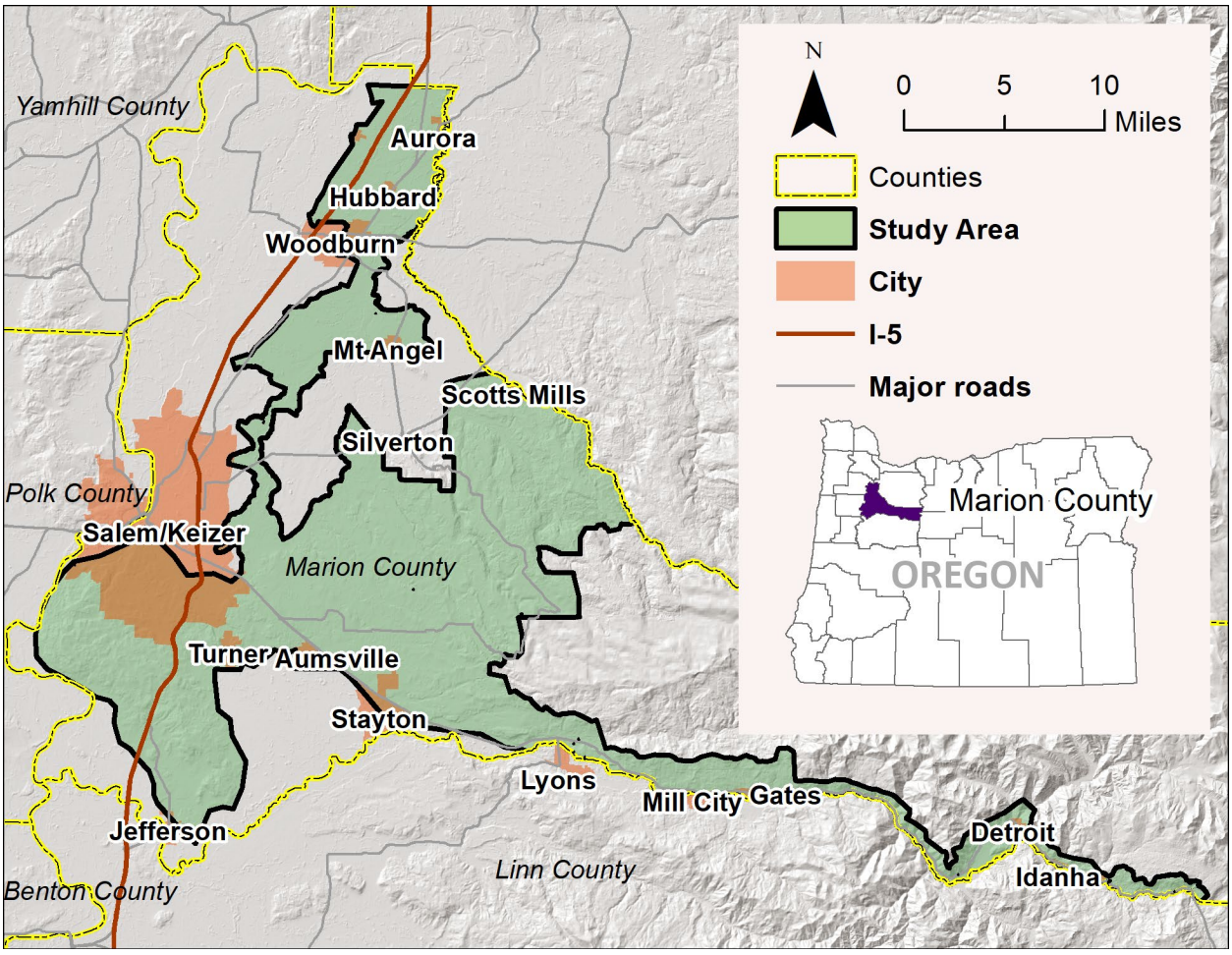
1.1 Study Area

This study mapped landslides in part of Marion County. As shown in **Figure 1**, the study area covers approximately 35% of the county (418 square miles of a total of 1,194 square miles). This area excludes much of the sparsely inhabited Cascade foothills and mountains and federally managed Willamette National Forest and Mount Hood National Forest. The study area for this landslide inventory focuses on area of highest population density, major roadways, and places where landslide hazards may exist due to terrain and geology.

Marion County stretches from the Willamette River as its western bound, into the foothills of the Cascade Range, cresting at the highpoint of Mount Jefferson, and following the canyon of the Santiam River. The county includes a portion of the Willamette Valley as well as the state capitol, Salem. The primary north-south highway in Oregon, Interstate Highway 5, crosses Marion County, and Oregon State Highway 22 crosses into and over the Cascade Mountains, paralleling the Santiam River.

As of the 2010 U.S. Census, Marion County had over 355,000 residents residing in cities, communities, and unincorporated communities as well as rural areas. The majority of the population, over 179,000 residents, live in the vicinity of Salem-Keizer (U.S. Census Bureau, 2012).

Figure 1. Marion County, Oregon, landslide inventory study area extent.



1.2 Previous Landslide Studies in and near the Study Area

Sobieszczyk (2010) mapped landslides in the North Santiam River watershed immediately north of this study area by using the DOGAMI Special Paper 42 methodology (SP-42; Burns and Madin, 2009), including the use of lidar. His map was published at a 1:4,000 scale and includes over 20 attributes per landslide. The nearby City of Silverton has also been mapped using SP-42 methodology (scale 1:8,000) (Burns and Mickelson, 2012). This mapping is included in the compilation dataset Statewide Landslide Information Database for Oregon (SLIDO), release 4 (Franczyk and others, 2019).

In SLIDO, earlier geologic maps identified 98 landslide deposits within the current study area, some of which overlapped or mapped the same feature. The deposit data compiled in SLIDO were mapped at a range of scales (1:24,000 to greater than 1:62,500) and from studies conducted in the 1970s to early 2000s.

A note about SLIDO

SLIDO, the Statewide Landslide Information Database for Oregon, compiles data from an ongoing project to map landslide deposits and landslide points in Oregon. As new areas are mapped, older mapped areas are more accurately mapped, and new landslides occur, SLIDO data change. Always look for the latest release of SLIDO online to be sure you have the latest data. For example, although SLIDO 3.4 was the latest dataset available when this project began, the current SLIDO release is 4.1, which includes the Marion County data in this report.

2.0 METHODS

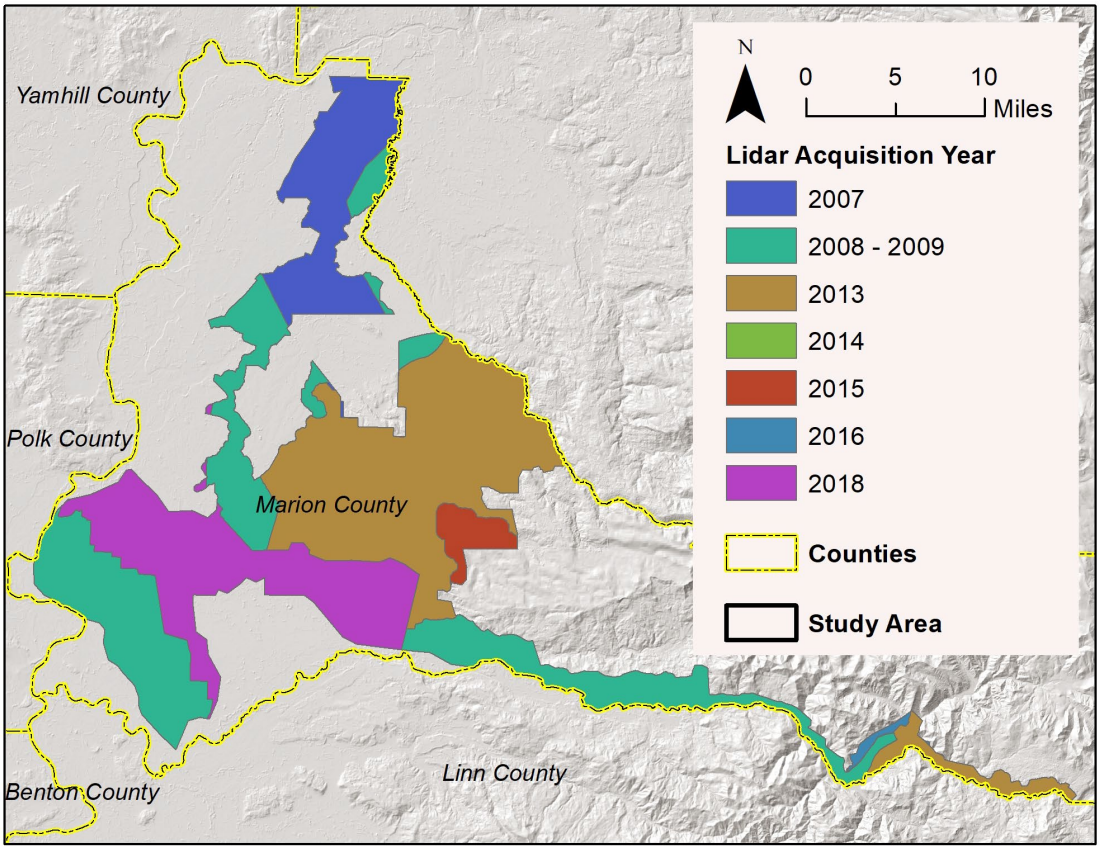
2.1 Landslide Inventory

The geodatabase contains an inventory of mapped landslides in the study area. This inventory was prepared by following the Protocol for Inventory Mapping of Landslide Deposits from Light Detection and Ranging (Lidar) Imagery developed by Burns and Madin (2009), also known as DOGAMI Special Paper 42. The three primary tasks included a compilation of previously mapped landslides (including review of the SLIDO, release 3.4 [Burns and Watzig, 2017]), lidar-based morphologic mapping of landslide features, and review of aerial photographs. Landslides identified using these methods were digitally compiled into the accompanying GIS database at varying scales. The protocol recommends data use at a map scale of 1:8,000. Each landslide was also attributed with classifications for activity, depth of failure, movement type, and confidence of interpretation. The landslide data were displayed or digitized on a base map that consists of an aerial photograph (orthorectified) overlaid on a lidar-derived hillshade image. DOGAMI geologists identified landslides using the most recent, high-resolution lidar data imagery datasets available for the study area. **Figure 2** shows the lidar datasets used for this study.

This landslide inventory is intended to provide users with basic information regarding landslides within the study area. A landslide inventory is one of the essential data layers used to delineate regional landslide susceptibility. This landslide inventory is not regulatory, and revisions can happen when new information regarding landslides is found or when future (new) landslides occur. Therefore, it is possible that landslides within the mapped area were not identified or occurred after the inventory was prepared.

The geologic, topographic, and climatic conditions that led to landslides in the past may provide clues to the locations and conditions of future landslides. It is intended that this inventory will provide useful information to develop regional landslide susceptibility maps, to guide site-specific investigations for future developments, and to assist in regional planning and mitigation of existing landslides.

Figure 2. Lidar data used for this study, shown by acquisition year. Lidar data are available at www.oregongeology.org/lidar.



3.0 RESULTS

We mapped approximately 2,100 landslide deposits, which completely replace the SLIDO 3.4 landslide polygon data for this area. Of the approximately 2,100 deposits, there are 757 debris flow fans, 949 deep landslide deposits (>15 feet in depth) and at least 32 rockfall deposits. We added eight newly identified historic landslide points to the 27 historic landslide points previously published in SLIDO 3.4 (Burns and Watzig, 2017) for a total of 35 historic landslide points.

4.0 ACKNOWLEDGMENTS

This Marion County landslide inventory was completed with support from FEMA Grant No. EMS-2018-CA-00014. We appreciate FEMA Region X's support, and in particular Cynthia McCoy and Rynn Lamb. We would also like to acknowledge Marion County and the Marion County Emergency Management department. We appreciate help from DOGAMI staff including Bill Burns, Matt Williams, Carlie Duda, Robert Hairston-Porter, Laura Gabel, and Deb Schueller.

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