STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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Channel Migration Screening Overview Map of Oregon

2017

INTERPRETIVE MAP 56

Statewide Subbasin-Level Channel Migration Screening for Oregon

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Plate 1

ABOUT THIS PUBLICATION

Channel migration is a geomorphic process by which a stream moves laterally across its floodplain over time. The dynamic forces of erosion and deposition drive the reconfiguration of alluvial channels through scouring of banks and buildup of bars. Channel migration is a known natural hazard in Oregon that poses significant risk to property and infrastructure situated near streams that exhibit certain geomorphic characteristics. However, from a hazard mapping standpoint channel migration has received relatively little attention when compared to other hazards such as landslide, earthquake, tsunami, and flooding. Recent events have highlighted the need for identification and mapping of channel migration zones, but no statewide screening had been performed to determine areas of varying susceptibility, needed to help prioritize mapping efforts.

In August 2014, the Oregon Department of Geology and Mineral Industries (DOGAMI) was commissioned by the Oregon Department of Land Conservation and Development to perform statewide, subbasin-level screening of channel migration susceptibility for first-order streams.

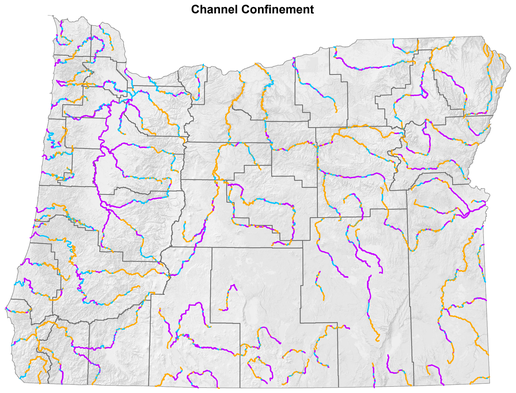
The study objectives included:

1) Classification of first-order streams into segments of high, medium, and low channel migration susceptibility for each of the 86 sub-basins (8-digit hydrologic unit [HUC-8], as defined by the U.S. Geological Survey [USGS]) within or intersecting Oregon.
2) Recommendations for further mapping and assessment based on classifications.
3) Development of a geodatabase containing the classified stream segments and associated metadata.
4) Documentation of methodology and results in a technical report.

A total of 6,913 stream miles were evaluated: 2,553 miles (37%) were classified as having high channel migration susceptibility, 1,542 miles (22%) as moderate susceptibility, and 2,818 miles (41%) as low susceptibility.

Channel migration screening took into account three physical characteristics, shown below. See the accompanying text report for more detail.

Channel Confinement

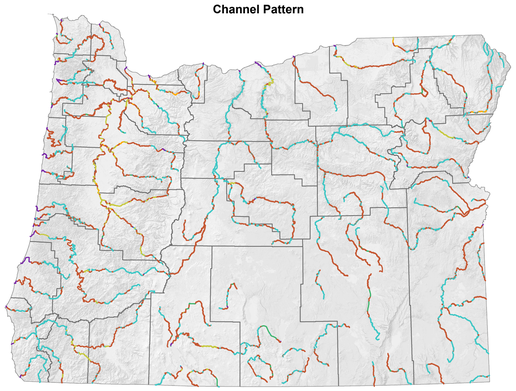


Channel confinement is characterized as the ratio of the width of the valley floor width to width of the active channel. This was determined through visual assessment and spot measurements using the best available topographic data. Stream segments were classified as follows: confined (<2), moderately confined (≥2 and ≤4), or unconfined (>4).

Channel Confinement

Class	Ratio of Valley Width to Channel Width
Confined	Width <2
Moderately Confined	Width ≥2 and ≤4
Unconfined	Width >4

Channel Pattern

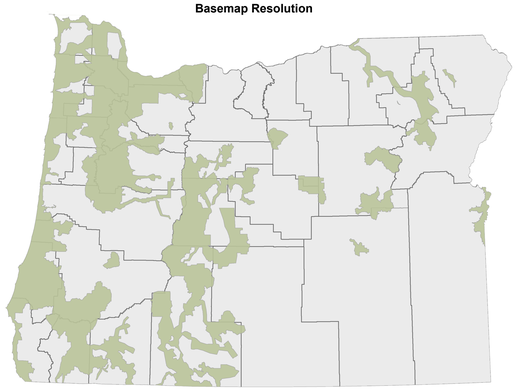


Channel pattern recognition is a visual exercise open to some interpretation on a segment-by-segment basis. The pattern of a given segment is determined by various factors, including topography, gradient, vegetation, human-made construction, and geology. These factors and conditions on the ground leave room for some interpretation between classes (see Figure 4.2 of the accompanying report for detailed pattern types).

Channel Pattern

- Braided
- Meandering
- Anastomosing
- Bedrock
- Deltaic
- Straight

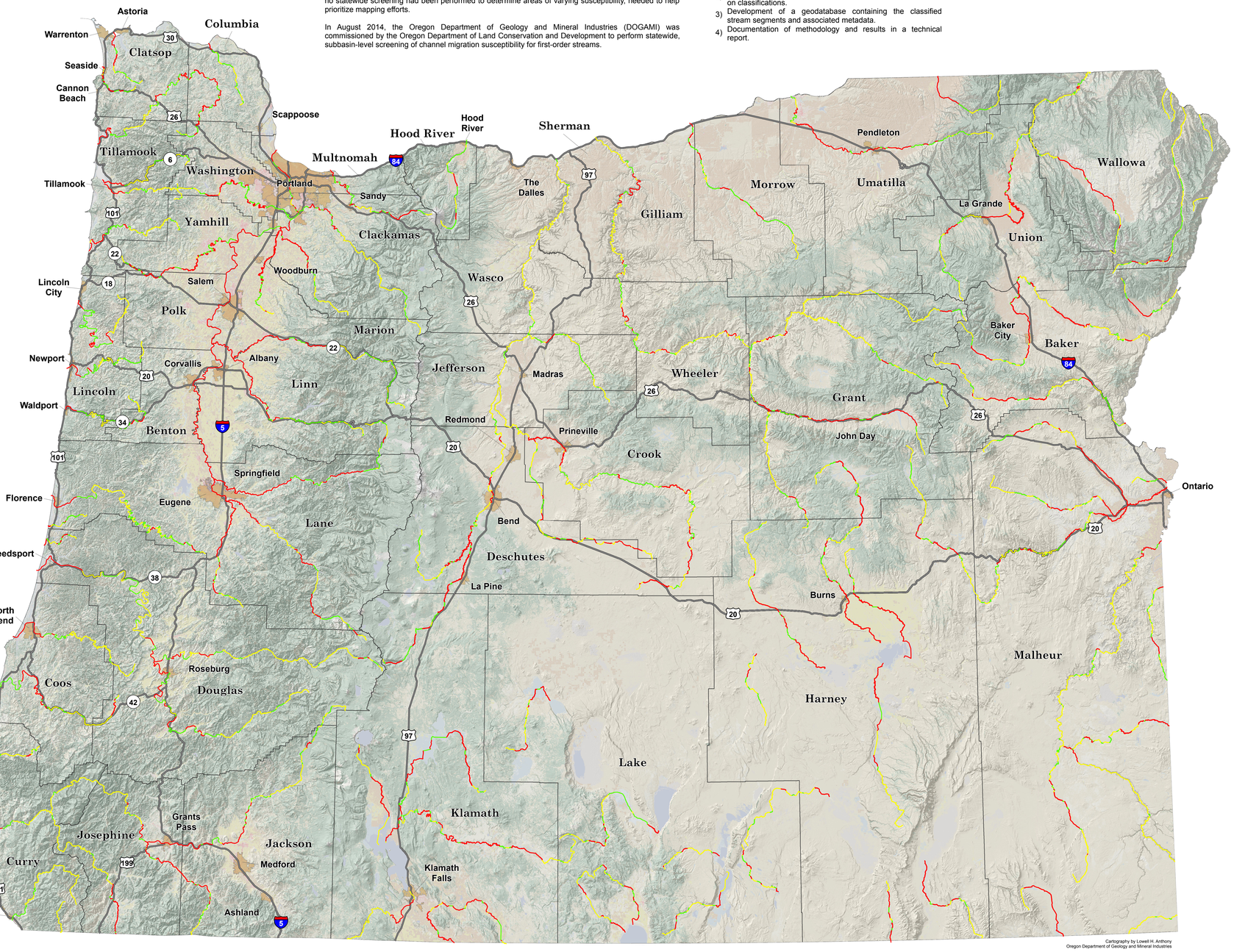
Basemap Resolution



Lidar technology provides very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. Outside of lidar coverage areas, channels were assessed using the U.S. Geological Survey National Elevation Dataset 10-m digital elevation model.

Basemap Resolution

- 1-m digital elevation model based on 2014 lidar imagery (OLC)
- 10-m USGS digital elevation model

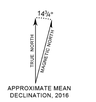


LIMITATIONS

This product should be used as a prioritization tool only and cannot replace recommended additional mapping activities, such as planning-level or detailed channel migration zone (CMZ) mapping, or site-specific studies.

This effort uses a slightly different approach to define CMZ susceptibility compared with previous screening methodologies developed by Washington Ecology (Legg and Olson, 2015). The main difference is its use of channel pattern as a proxy for erosion potential. Evaluation of channel pattern is highly subjective, such that geomorphologists may yield a variety of conclusions as to stream classification. Erosion potential, which is a combination of channel gradient and stream discharge, is a more quantifiable characteristic of fluvial systems that can be determined with greater repeatability. Future efforts should explore erosion potential as another classification parameter.

While regionally significant, the streams included here represent a small fraction of those present in Oregon. Additional screening is needed to achieve a comprehensive prioritization strategy for channel migration management. It is recommended that streams screened in future efforts be selected on the basis of drainage area (i.e. larger drainage areas are given greater weight) and considerations of current and future land use.



APPROXIMATE MEAN DECLINATION, 2016

Channel Migration Susceptibility

- Low Susceptibility
- Moderate Susceptibility
- High Susceptibility

LOCATION MAP

Scale 1:8,000,000

0 11 22 33 44 55 66 77 88 99 110 220 330 mi
0 22 44 66 88 110 220 330 440 550 km

SOURCES

Land cover data: Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States--Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5.

Hydrographic data. U.S. Geological Survey, 2015, National hydrographic dataset, The National Map, 3D Elevation Program. https://nhd.usgs.gov/NHD_High_Resolution.html.

Lidar data 2005-2104), Oregon Lidar Consortium (OLC), Puget Sound Lidar Consortium.

Transportation data (2013), Road Inventory and Classification Services (RICS) Unit, Oregon Department of Transportation (ODOT); edited by DOGAMI for spatial accuracy.

Urban growth boundary data (2014). Oregon Department of Land Conservation and Development (DLCD).

REFERENCE

Legg, N. T., and Olson, P. L., 2015, Screening tools for identifying migrating stream channels in Western Washington: Geospatial layers and visual assessment: Washington State Department of Ecology, Publication 15-06-003, 40 p.

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