

GIS Project:
Current Bridge Conditions in the State of
Oregon
CE 413

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Introduction

The purpose of this term project is to evaluate the bridges located in the state of Oregon. In particular, I want to evaluate the bridges by their current structural conditions. Oregon is a coastal state, so it has many rivers running through it and as a result there are many bridges throughout the state. I am hoping to produce a map displaying all the bridges and have them represented as a color (green, yellow, and red) meaning (good, okay, and bad) in terms of condition. Additionally, I would like to sort this data by county in hope to find a possible correlation between location and condition of the bridges in various counties.

Site Description

This report will be specifically be analyzing the state of Oregon. Oregon can be divided up into 6 different geographical areas: The Coast Range, the Willamette Lowland, the Cascade Mountains, the Klamath Mountains, the Columbia Plateau, and the Basin and Range Region. The state of Oregon is made up of 96,003 square miles of land and 2,383 square miles of water coverage, making it a total combined area of 98,386 square miles. The coordinates of Oregon are as such: Longitude: 116° 45'W to 124° 30'W, Latitude: 42°N to 46° 15'N. Oregon is about 401 miles from east to west and 294 miles from north to south. The highest point in Oregon is Mount Hood, at 11,239 feet above sea level, and the lowest point in Oregon is Sea level with the Pacific Ocean. Oregon experiences wide variety of weather with Monthly average temperatures range from a high of 82.6 degrees to a low of 32.8 degrees.



Figure 1 Site view of the state of Oregon

Data

The main research data is coming from the Oregon spatial data library to get the location and conditions of bridges in Oregon. The remaining data is coming straight from ARCGIS living atlas. This living atlas data includes: “USA states” and “USA counties”. This data then can be refined into the desired location of analysis in this case, the state of Oregon, which will be explained in much further depth in the methodology.

Methodology

The goal of this project is to analyze the current condition of bridges in the state of Oregon. The process begins with downloading the shapefile data “bridges_2020” from the Oregon Spatial Data Library (OSDL). This data provides all the bridge locations, conditions, size, etc. in the state of Oregon. This data will be what the main report is built around and will allow for in depth analysis for the bridge condition report.

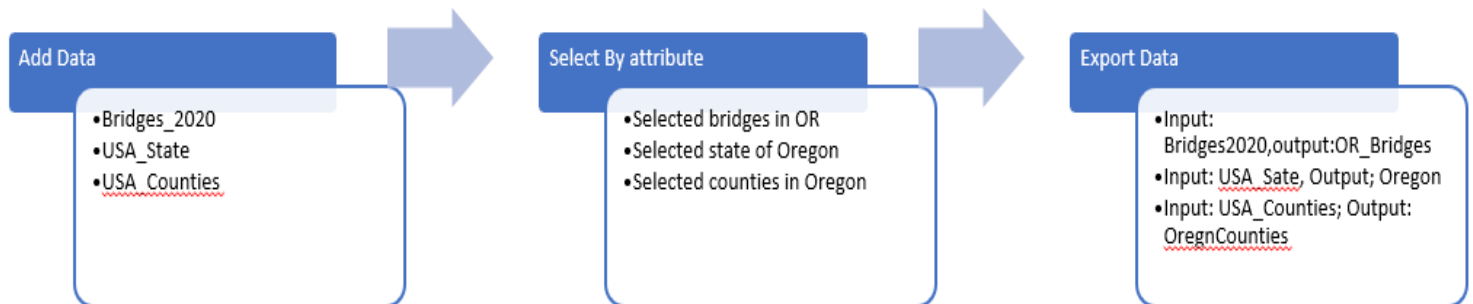


Figure 2 Methodology of setting up data

After importing the three data files, the first thing is then to isolate the data so that it is focusing on Oregon. In order to do this, the first step is (select by attribute) and choose “USA-states” as the data. Then create new selection and state name is (equal to) Oregon. This will then pick the entire state of Oregon and then (export feature) and save as “Oregon”. Now that Oregon is a feature piece, the next step is getting the Oregon counties. The process is similar to above, (select by attribute) and choose “USA-counties” as the data. Then create new selection and state name is equal to Oregon. This will select all Oregon counties and then (export feature) as “Oregon Counties”.

Now, the original data sets “USA-States” and “USA-Counties” can be turn off and now there is just a map of Oregon and its counties. To have better visualization, go the attributes of the new data and pick colors that will show good contrast as shown in Figure 3.

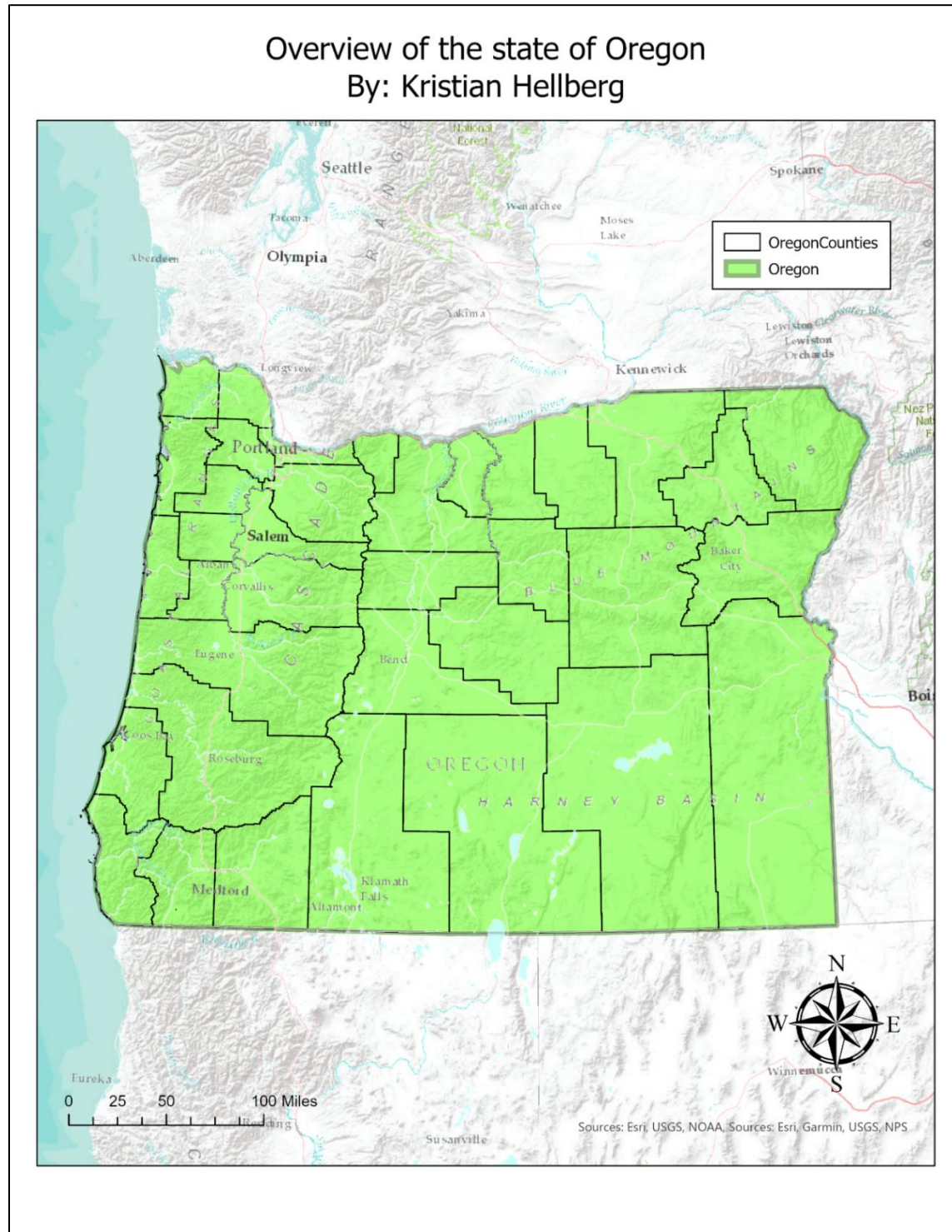
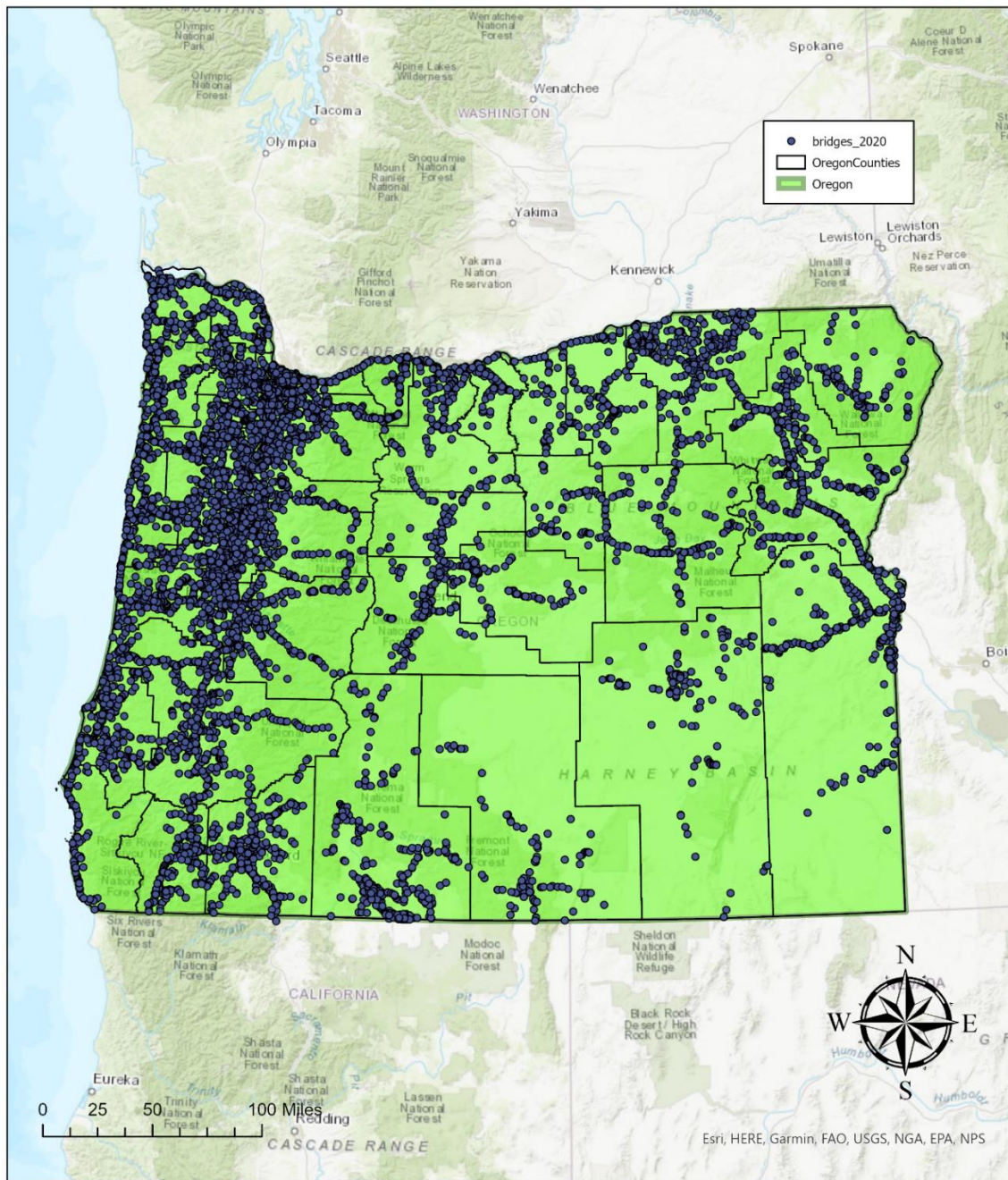


Figure 3 State of Oregon with counties

Once the new “Oregon state” and “Oregon counties” features are made, the bridge data can be added in and a map will appear (Figure 4) with all three data features and the analysis can then begin.

Existing bridges in the state of Oregon

By: Kristian Hellberg



* This map displays all the bridges located in the state of Oregon as of 2020.

Figure 4 All three data features being displayed

To begin into the analysis of bridge conditions in Oregon, the bridge data needs to be separated by current conditions. In order to achieve this data, the (select by attribute)

tool is needed and then select the “bridges-2020” data. Then create new selection where bridge conditions are equal to good. This will select all the good condition bridges in OR and then (export feature) as “goodCondition”. Repeat the following steps for both “fair” and “poor” bridge conditions. Once the three new features are created, the next step is to change the (symbology) of the points. To make it easy visually, change the good condition to green, fair to yellow, and poor to red.

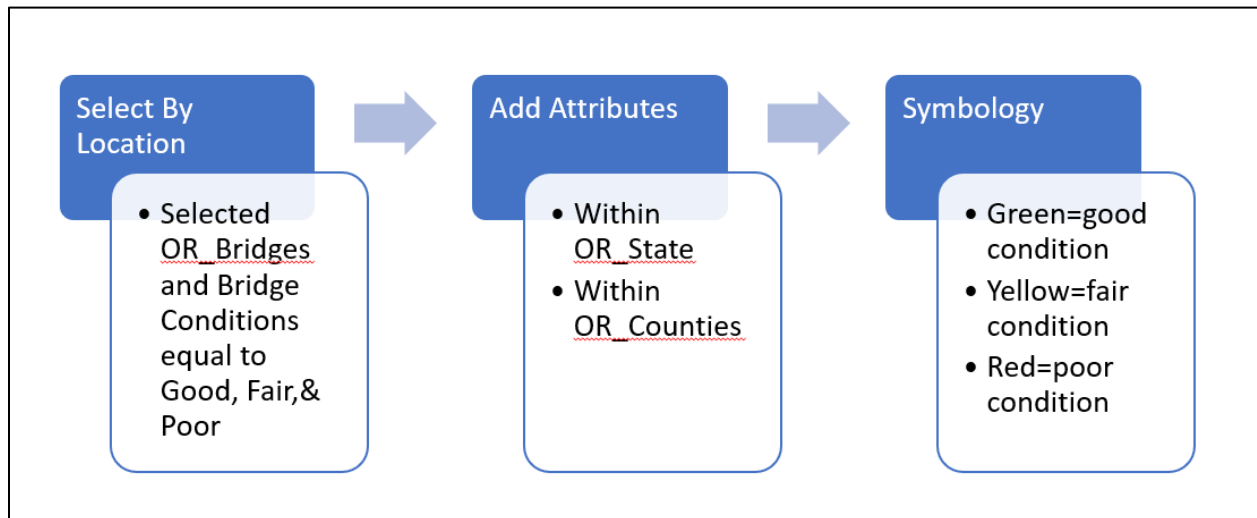
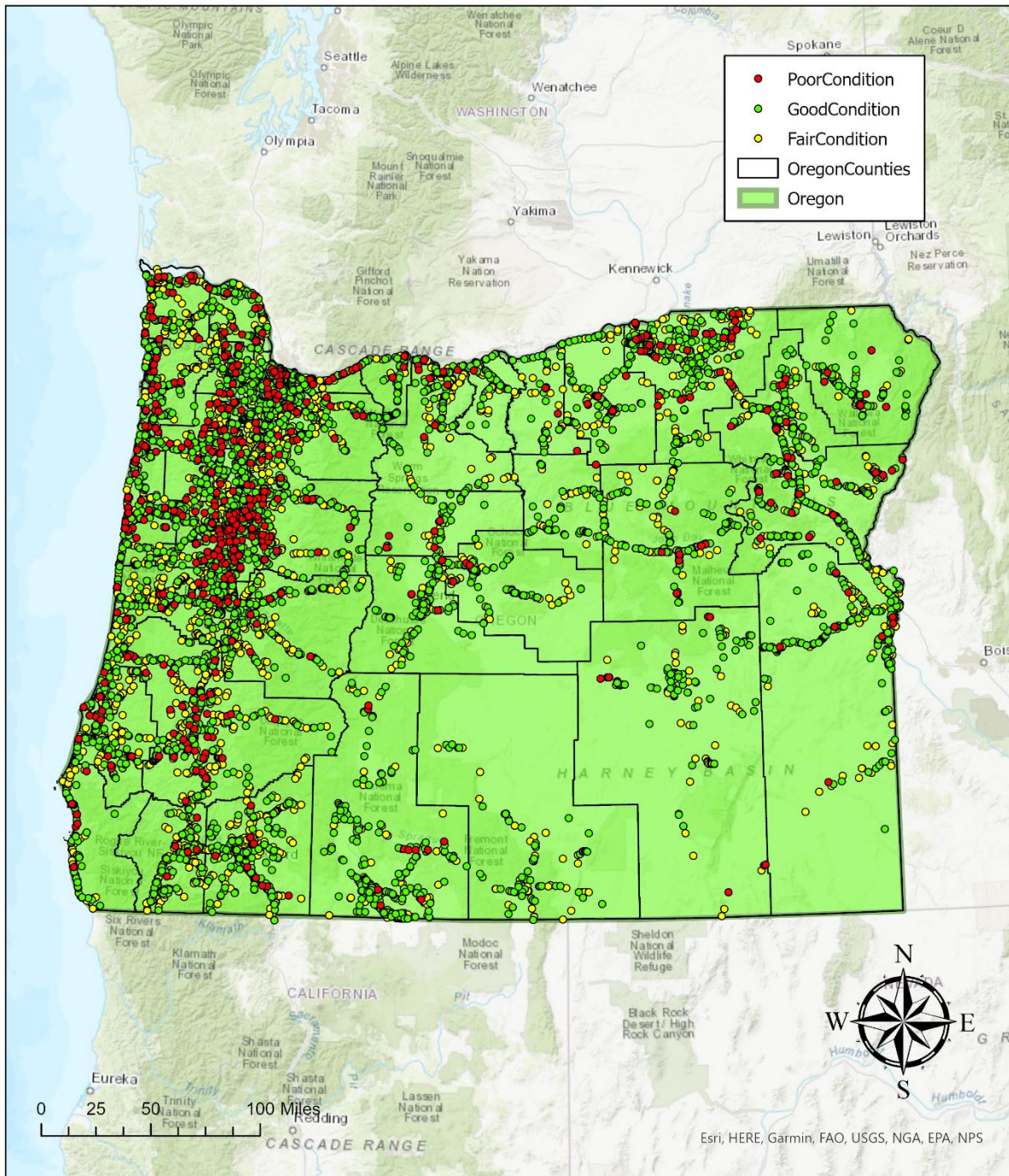


Figure 5 Methodology of sorting bridge conditions

Once the symbology of the points are changed the map (Figure 6) should now show better understanding of the bridge conditions in Oregon. The layers of the various bridge conditions can be turned on and off to better study the three current conditions of bridges (figures 7-9).

Current bridge conditions in the state of Oregon

By: Kristian Hellberg

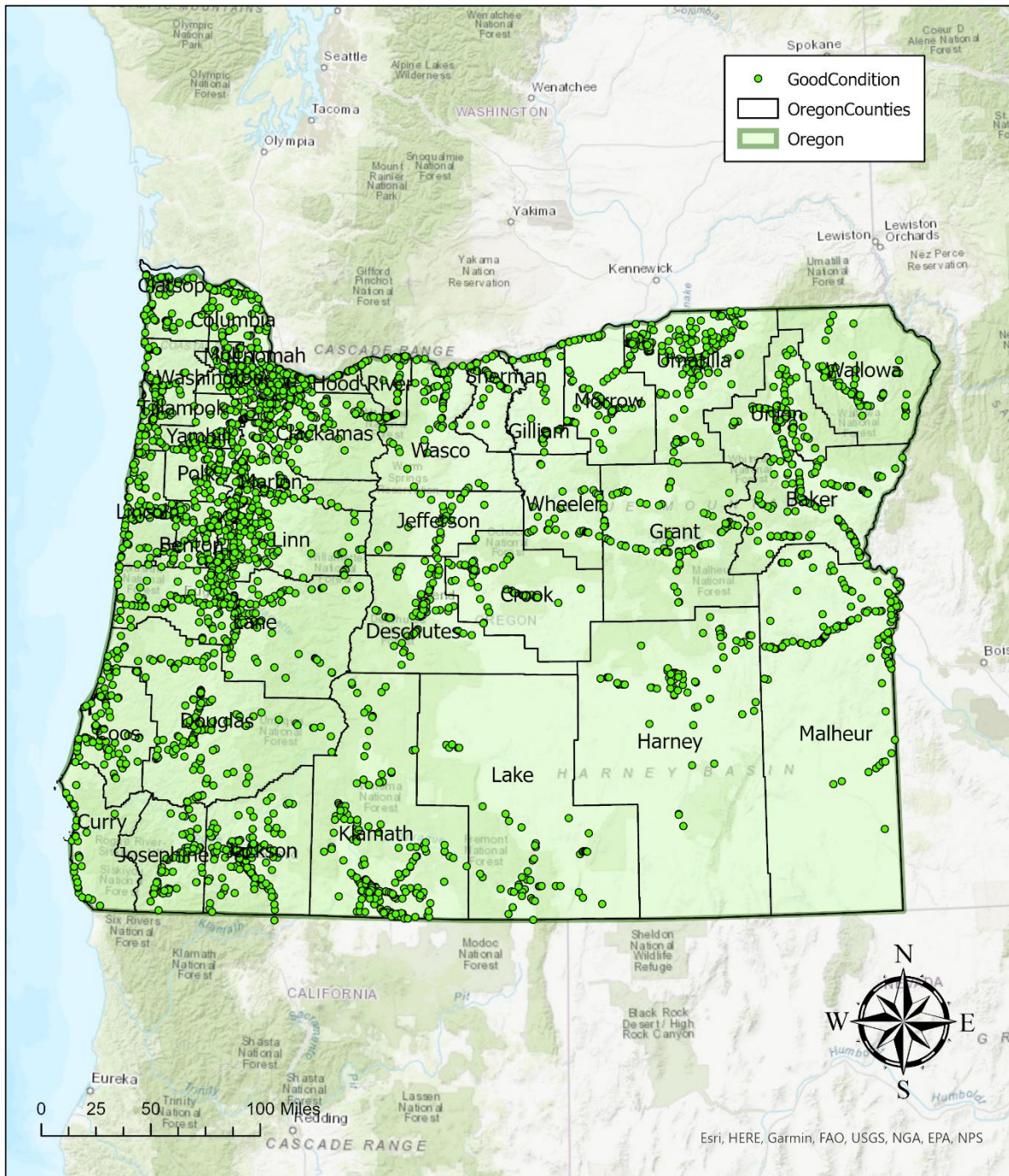


* This map displays all the current conditions of bridges located in the state of Oregon as of 2020.

Figure 6 Current bridge conditions in Oregon

Good bridge conditions in the state of Oregon

By: Kristian Hellberg

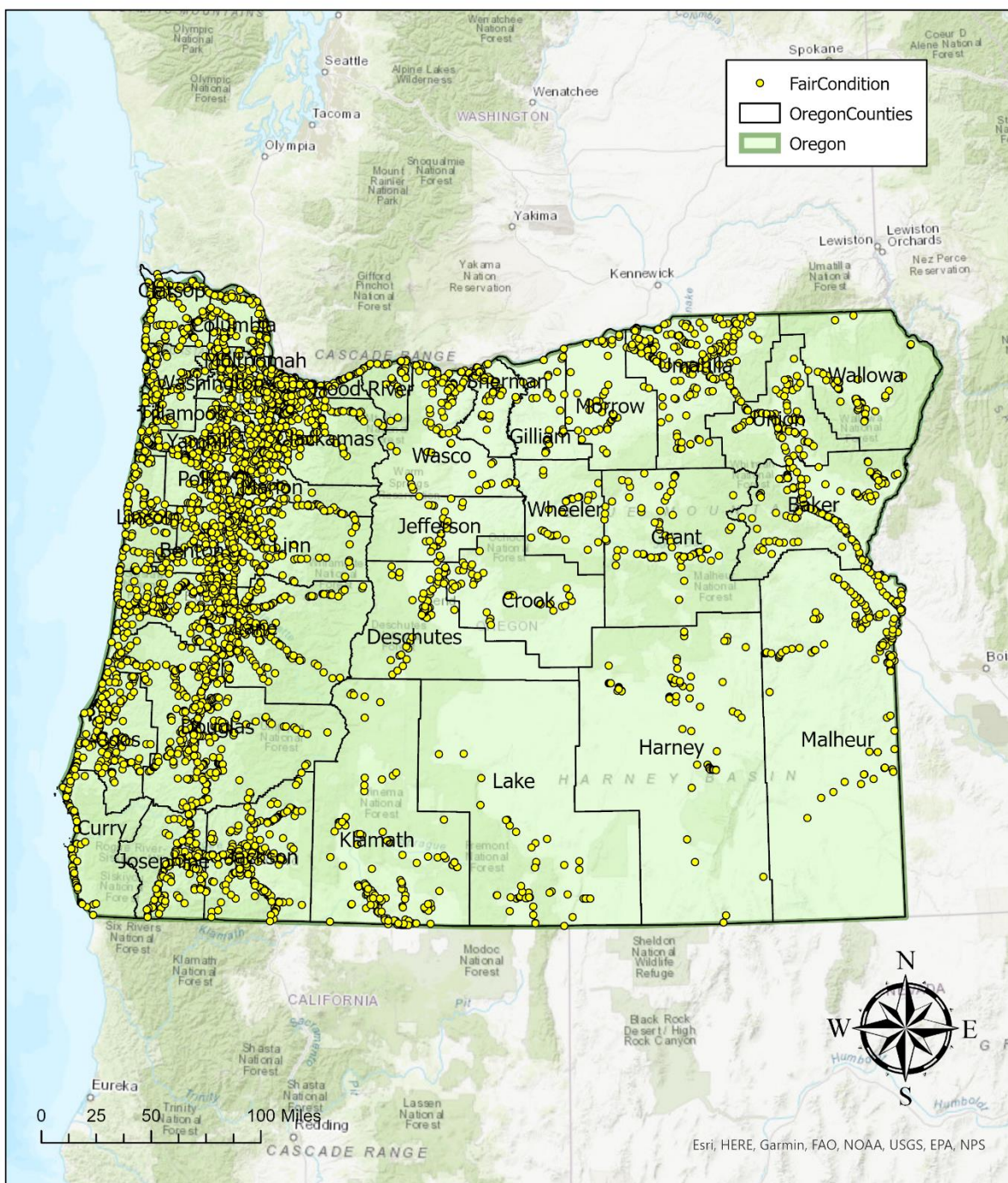


* This map displays all the good bridge conditions located in the state of Oregon as of 2020.

Figure 7 Good bridge conditions

Fair bridge conditions in the state of Oregon

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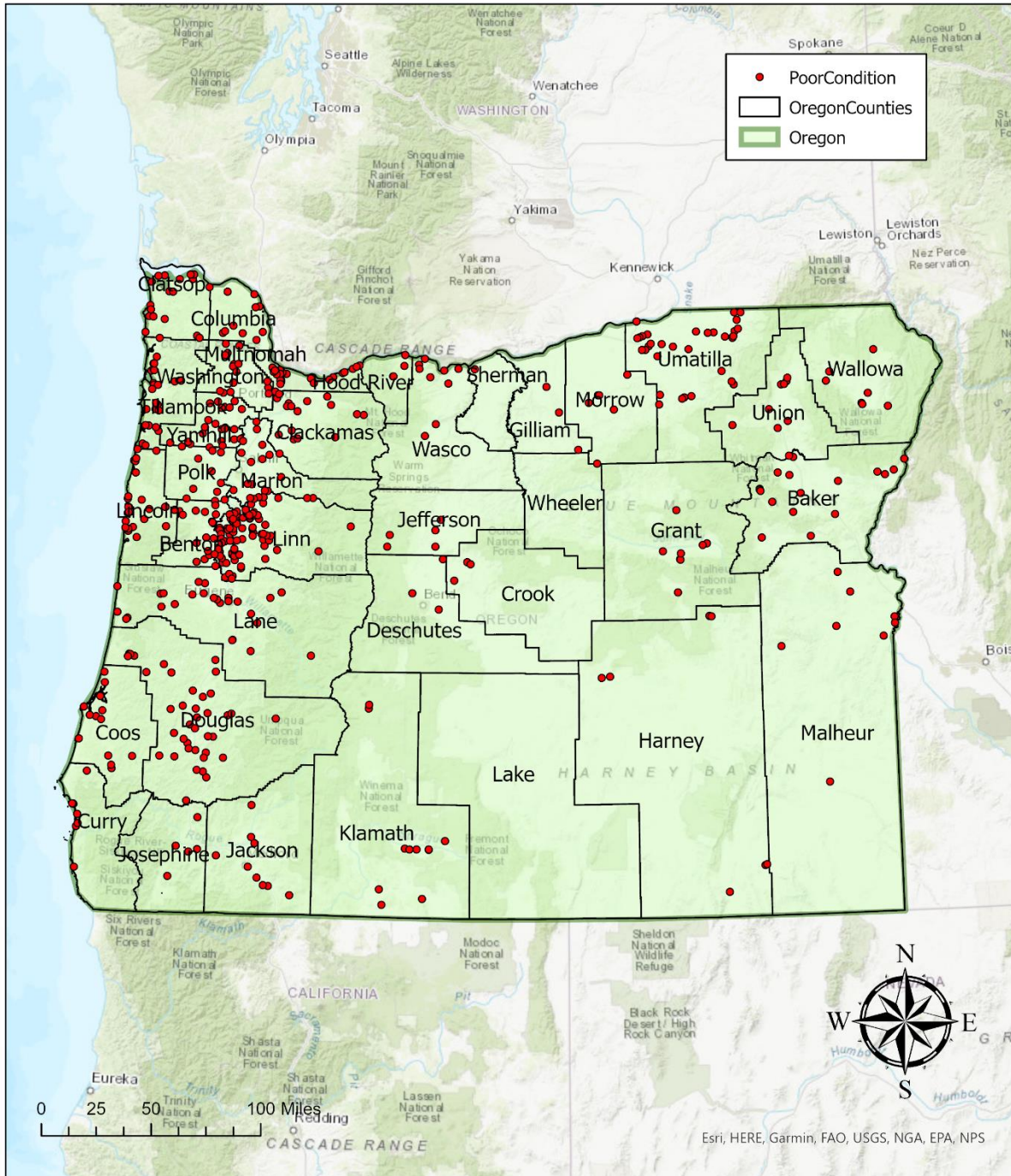


* This map displays all the fair bridge conditions located in the state of Oregon as of 2020.

Figure 8 Fair bridge conditions

Poor bridge conditions in the state of Oregon

By: Kristian Hellberg



* This map displays all the poor bridge conditions located in the state of Oregon as of 2020.

Figure 9 Poor bridge conditions

Results

The bridge conditions data that was obtained by the methods described in the methodology above allow for great visualization and the information needed to best understand Oregon's current conditions of its bridges. The data revealed that Oregon has 10,764 bridges located throughout the state. Of these bridges over 50% of them are in currently fair conditions, with approximately 5% being in bad condition. The table below (figure 10) shows a more accurate count on the total bridges and their condition.

	Bridge Condition			
	Good	Fair	Poor	Total
Oregon Bridges	4082	6145	537	10764
Percentage	37.92%	57.09%	4.99%	100.00%

Figure 10 Oregon bridge analysis overview

In a visual analysis of the bridges, a majority of these bridges can be found on highways and in particular Interstate-5 which holds a majority of the bridges. In addition, a visual analysis shows that a majority of the poor condition bridges can also be found on Interstate-5. Since interstate-5 is a major North and South interstate that runs along the west coast it sees a lot of traffic and use. This high usage may be the biggest factor to why the majority of poor condition bridges can be found on interstate-5. The following figures (Figures 11-14) help better show this conclusion and in addition display a bar graph that displays every county and their bridge count and conditions.

Current overview of bridge conditions in Oregon and table comparison.
By: Kristian Hellberg

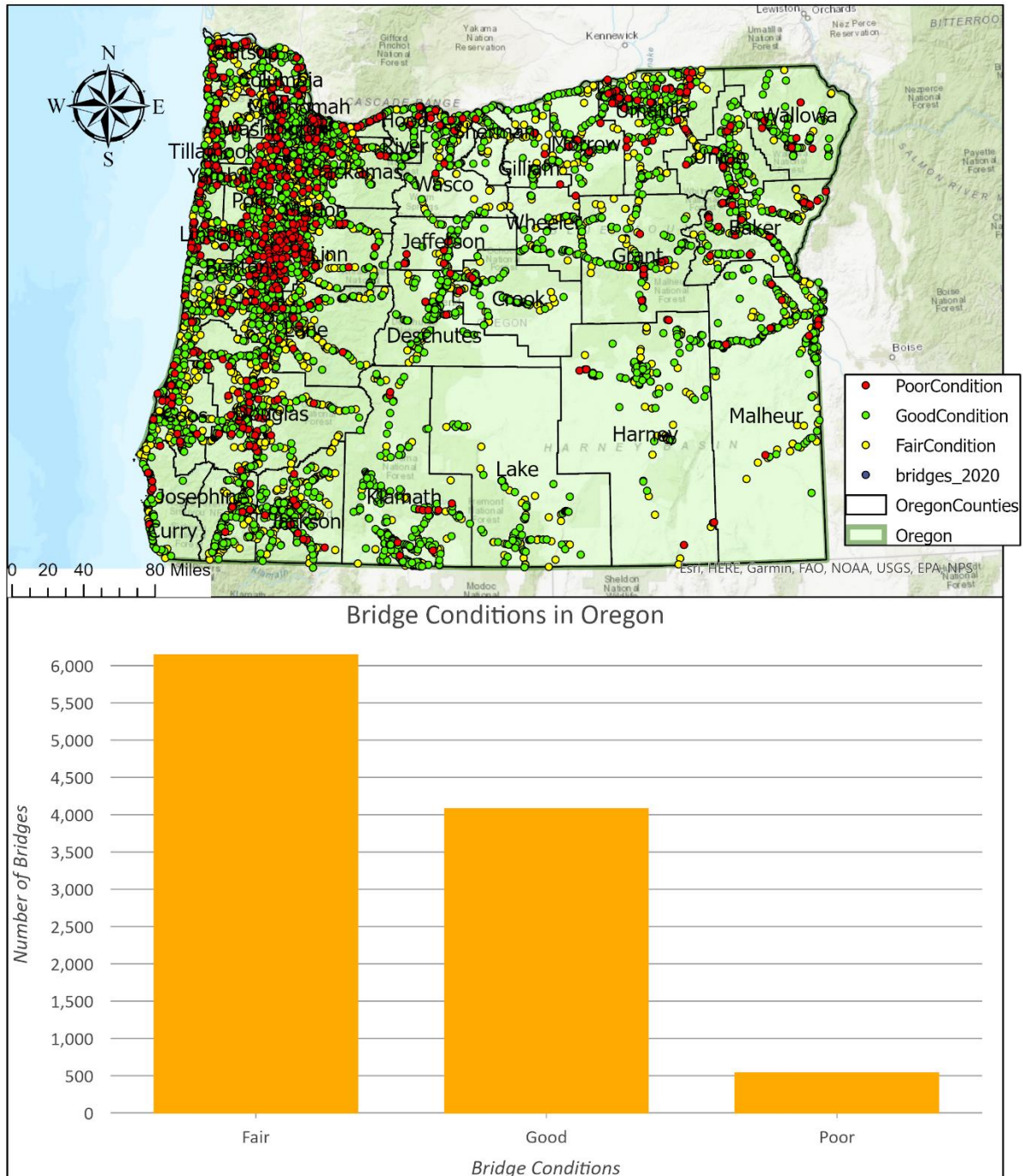


Figure 11 Overview of bridge conditions

Good Condition bridges comparison by county in the state of Oregon. By: Kristian Hellberg

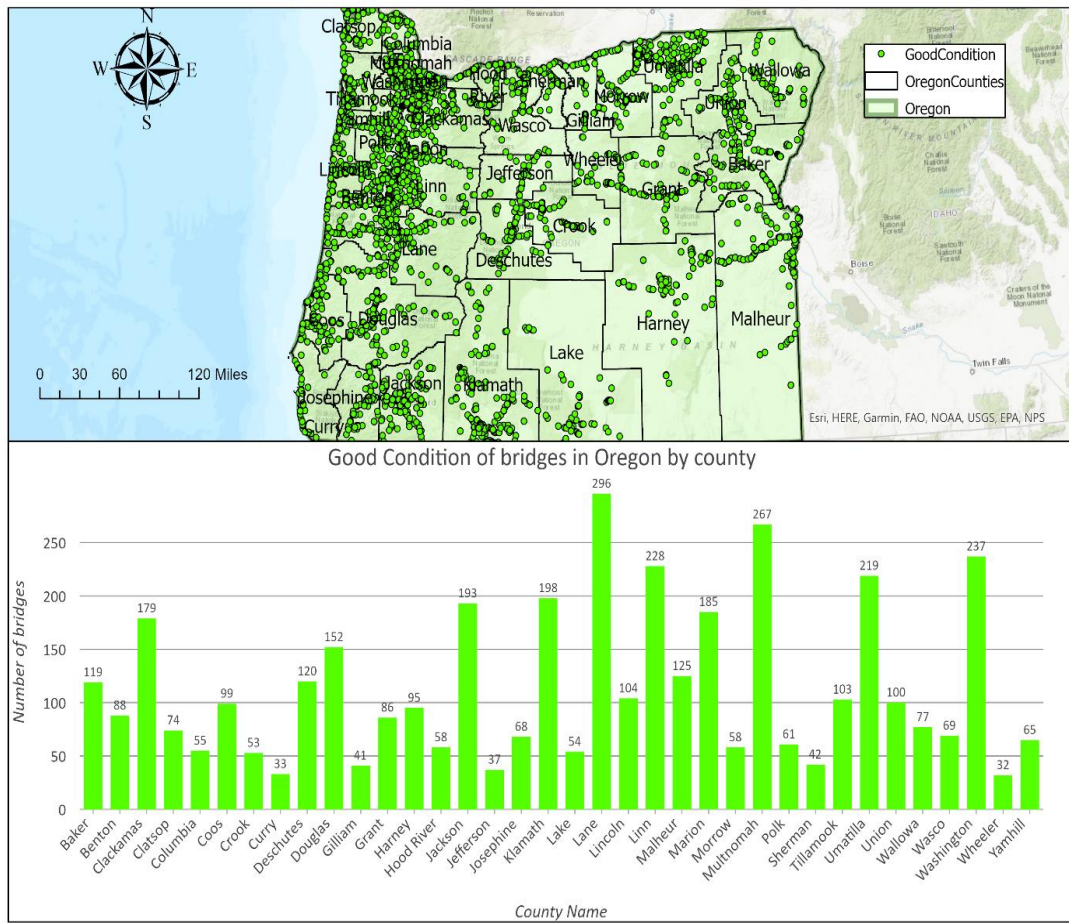


Figure 12 Good bridge comparison

Fair Condition bridges comparison by county in the state of Oregon. By: Kristian Hellberg

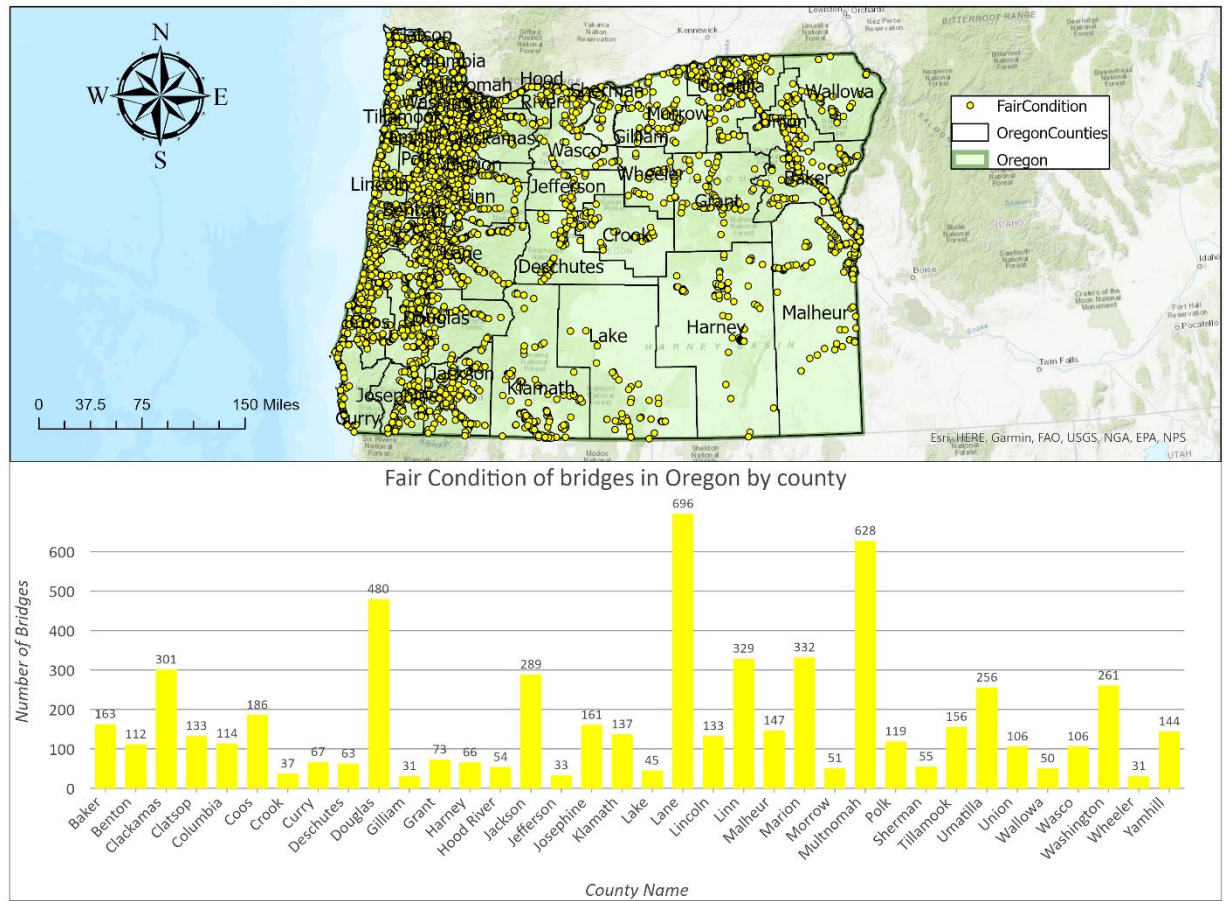


Figure 13 Fair bridge comparison

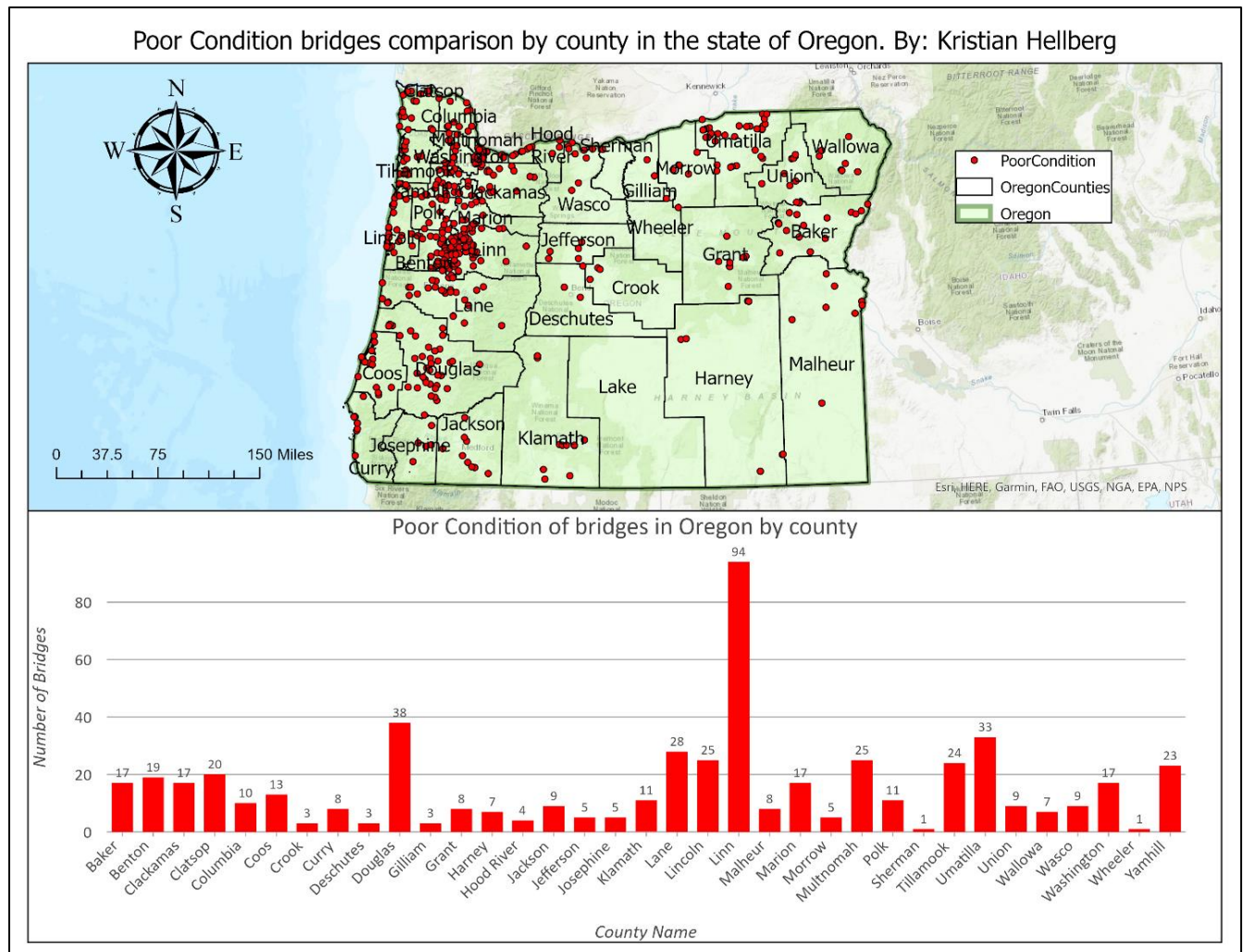


Figure 14 poor bridge comparison

In addition to just analyzing bridge conditions individually, I combined all the conditions together in a table (Figure 15) and sorted them by county. Having the data sorted by county allowed a better visualization and comparison of bridge condition by county. The data also supported my claim by showing the counties with the largest number of bridges all have interstate-5 running through them. To examine further data and my claim, I picked out Lane county to analyze, because it has the most bridges with in. Lane county shows a majority of its bridges falling along interstate-5, but the majority of poor bridges in Lane county can be found on back roads and not main highways.

In Conclusion, Oregon has many bridges located throughout the state, but the majority of these bridges can be found on Interstate-5. The majority of bridges are also in “fair” condition with them reaming being a in “good” condition with only 5% being in “poor” condition. The majority of “Poor” condition bridges can also be found along the Western half of the state, which is along the coast which sees more weather compared to the

Eastern half of the state. So, it would be safe to say that the main reason bridges are in poor condition can be caused by constant weather and high usage which occurs the most on the Western half of the state compared to the Eastern half.

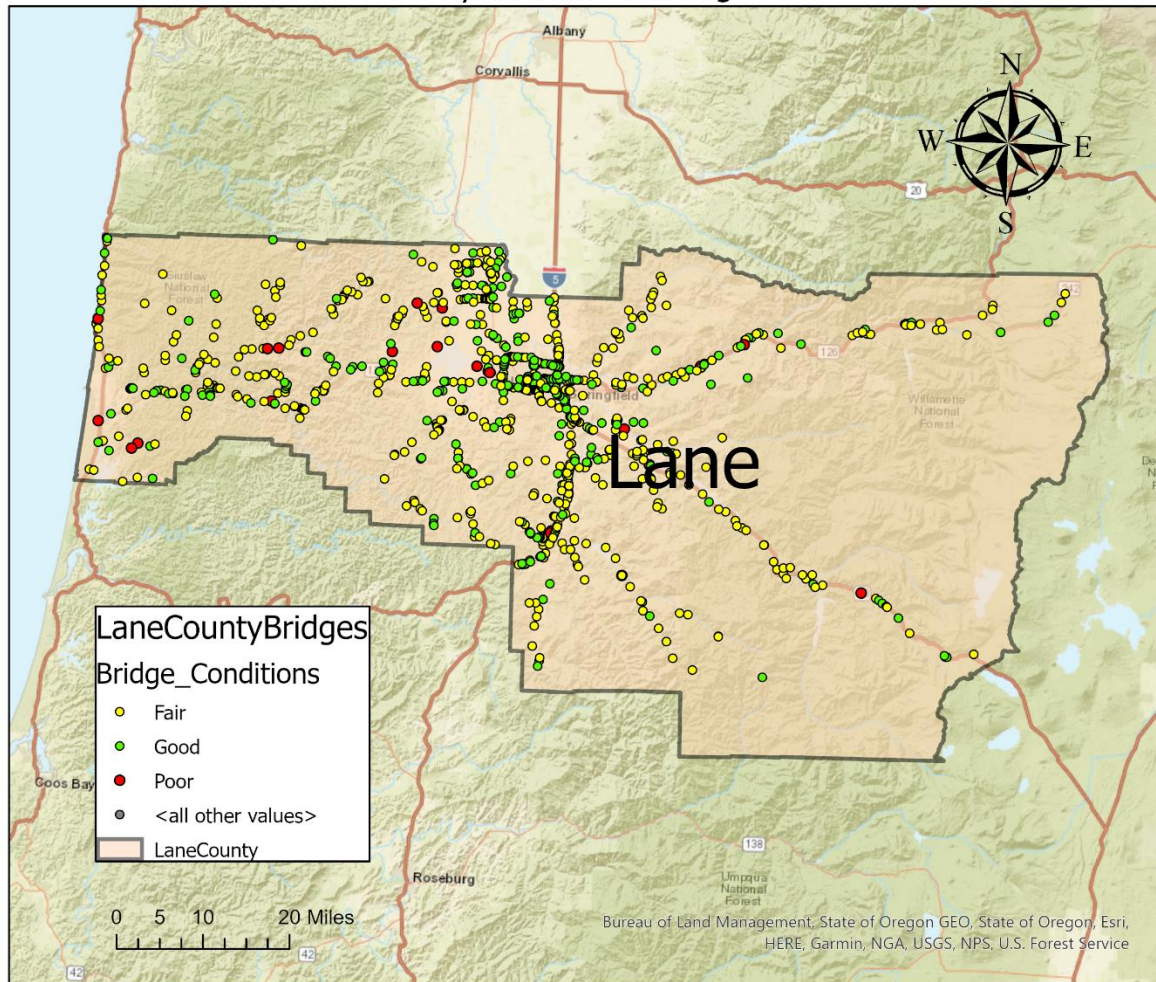
	Bridge Conditions					
County	Poor	Fair	Good	Total		
Baker	17	163	119	299		
Benton	19	112	88	219		
Clackamas	17	301	179	497		
Clatsop	20	133	74	227		
Columbia	10	114	55	179		
Coos	13	186	99	298		
Crook	3	37	53	93		
Curry	8	67	33	108		
Deschutes	3	63	120	186		
Douglas	38	480	152	670		
Gilliam	3	31	41	75		
Grant	8	73	86	167		
Harney	7	66	95	168		
Hood River	4	54	58	116		
Jackson	9	289	194	492		
Jefferson	5	33	37	75		
Josephine	5	161	68	234		
Klamath	11	137	208	356		
Lake	0	45	55	100		
Lane	28	696	296	1020		
Lincoln	25	133	104	262		
Linn	94	329	228	651		
Malheur	8	147	125	280		
Marion	17	332	185	534		
Morrow	5	51	58	114		
Multnomah	25	628	267	920		
Polk	11	119	61	191		
Sherman	1	55	42	98		
Tillamook	24	156	103	283		
Umatilla	33	256	219	508		
Union	9	106	100	215		
Wallowa	7	50	77	134		
Wasco	9	106	69	184		
Washington	17	261	237	515		
Wheeler	1	31	32	64		
Yamhill	23	144	65	232		
Sum:	537	6145	4082	10764		

KEY	
Poor Bridge Conditions	
Fair Bridge Conditions	
Good Bridge Conditions	

Figure 15 Table of all bridge conditions

Lane County current bridge conditions

By: Kristian Hellberg



Lane county bridge conditions

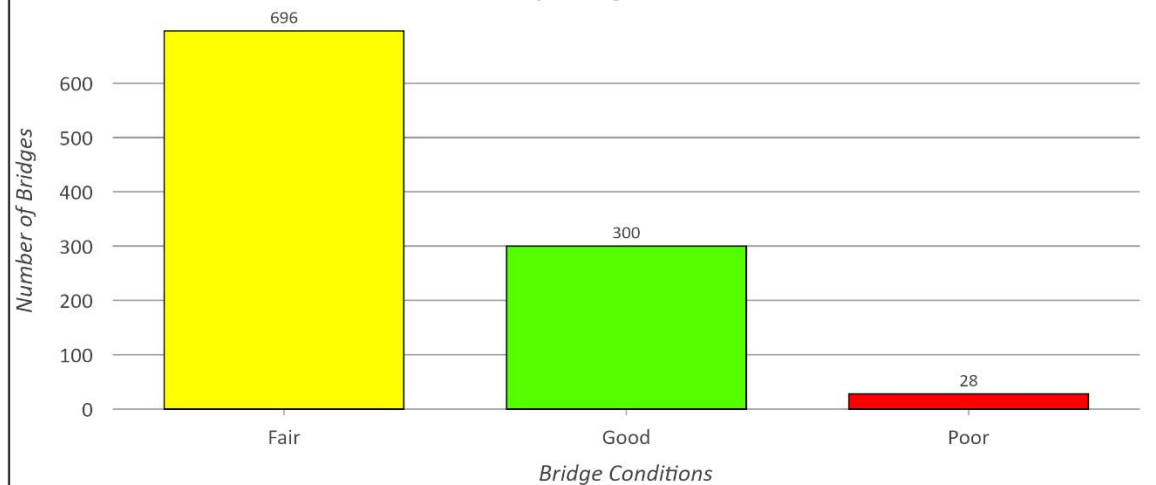


Figure 16 Lane County bridge conditions

References

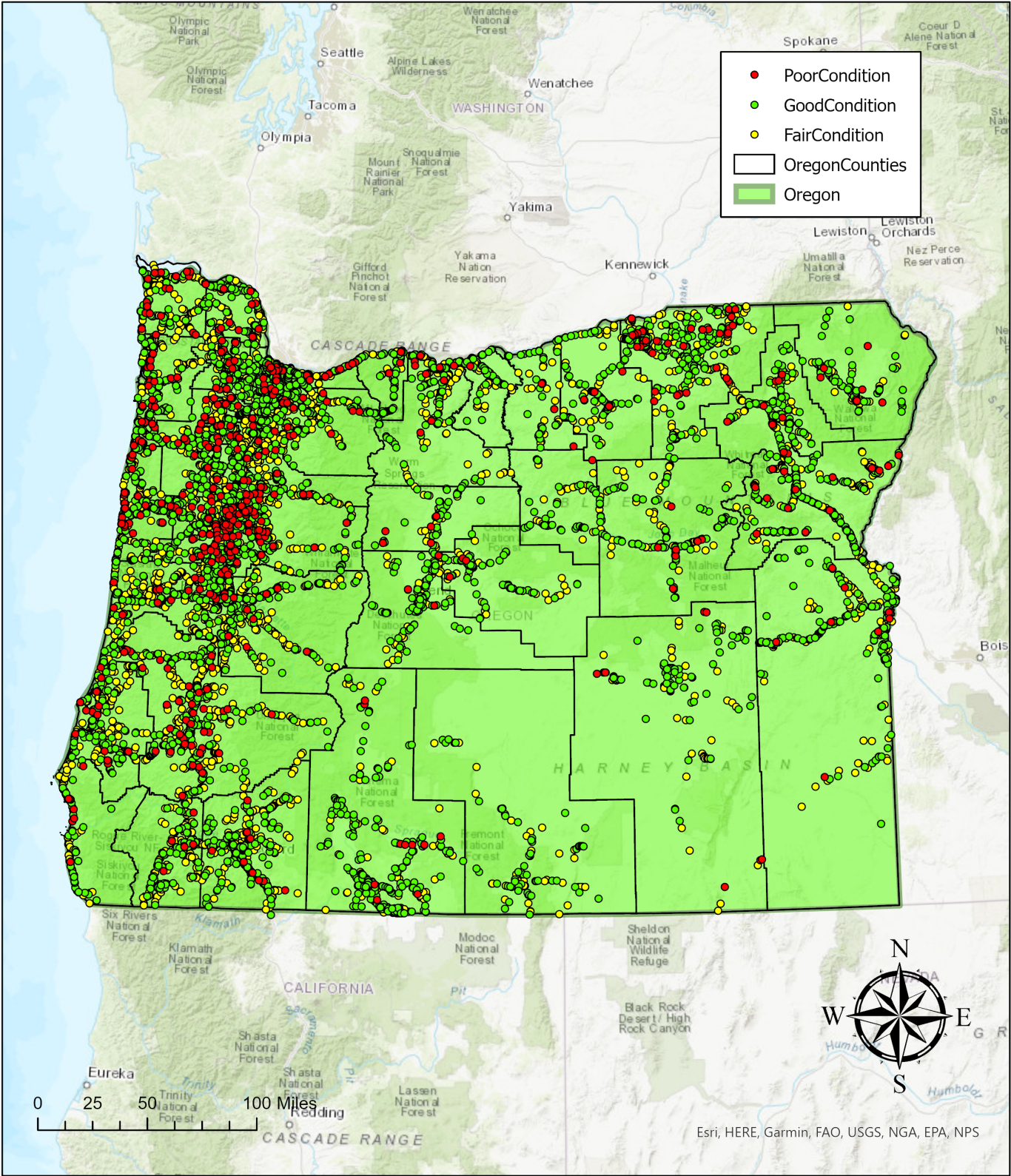
“Functional Classification.” *Oregon Department of Transportation : Functional Classification : Data & Maps : State of Oregon*,
www.oregon.gov/odot/Data/Pages/Functional-Class.aspx#NHS.

NETSTATE, LLC: www.n-state.com. *Oregon Geography from NETSTATE*,
www.netstate.com/states/geography/or_geography.htm.

Oregon Spatial Data Library,
spatialdata.oregonexplorer.info/geoportal/details?id=35006b91eff3444c92f53d312b0c0e73.

Current bridge conditions in the state of Oregon

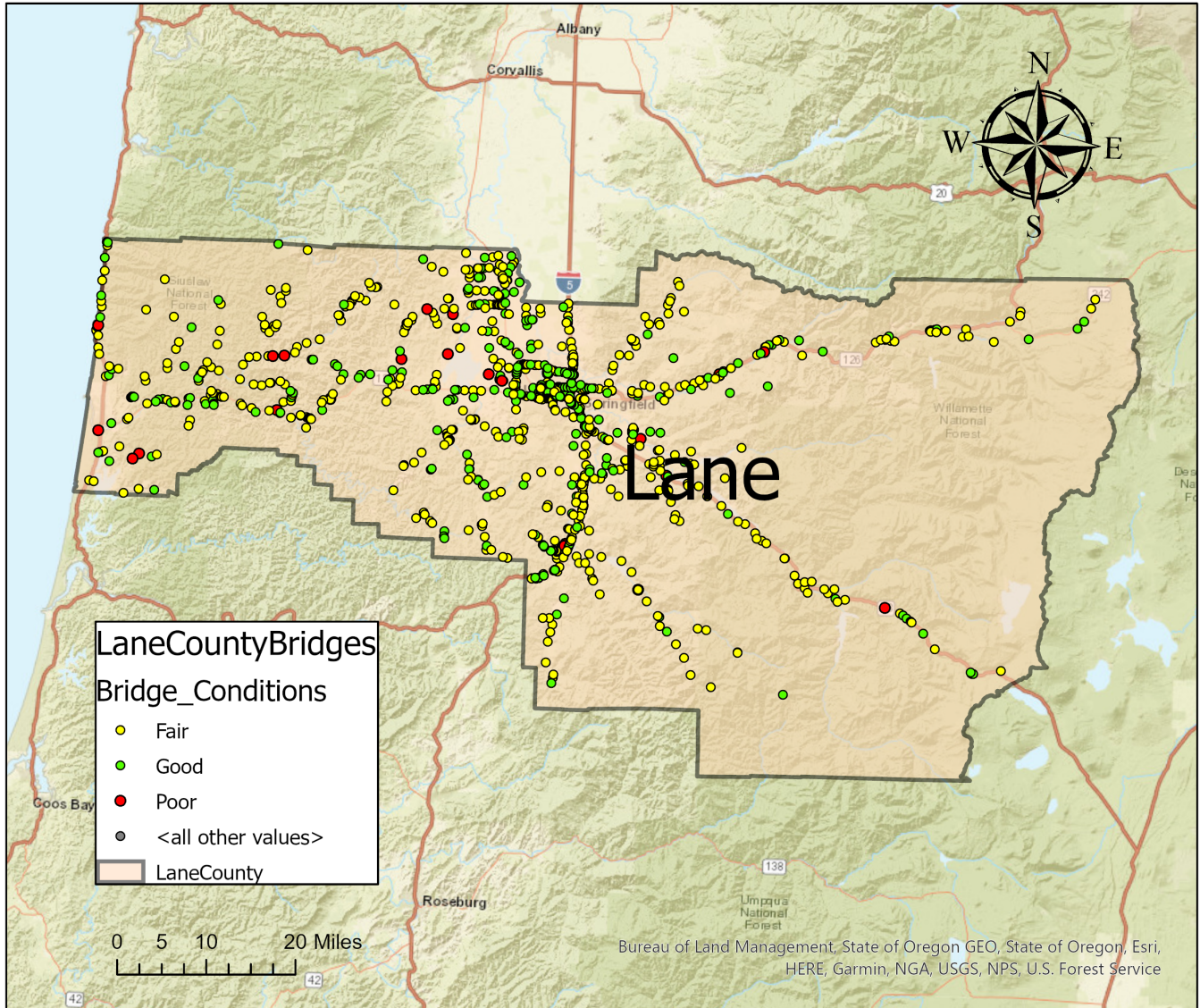
By: Kristian Hellberg



* This map displays all the current conditions of bridges located in the state of Oregon as of 2020.

Lane County current bridge conditions

By: Kristian Hellberg



Lane county bridge conditions

