SWE & Snow Depth

This rmarkdown shows some of the relationships between SWE and snow depth at each location. Analyses conducted include:

- Correlation between SWE and Snow Depth with the colors grouped by months
- linear relationship between Swe and snow depth for each month
- graph of the slopes of the monthly linear relationship

General Patterns

Correlation between SWE and Snow Depth (November - April Water Year)

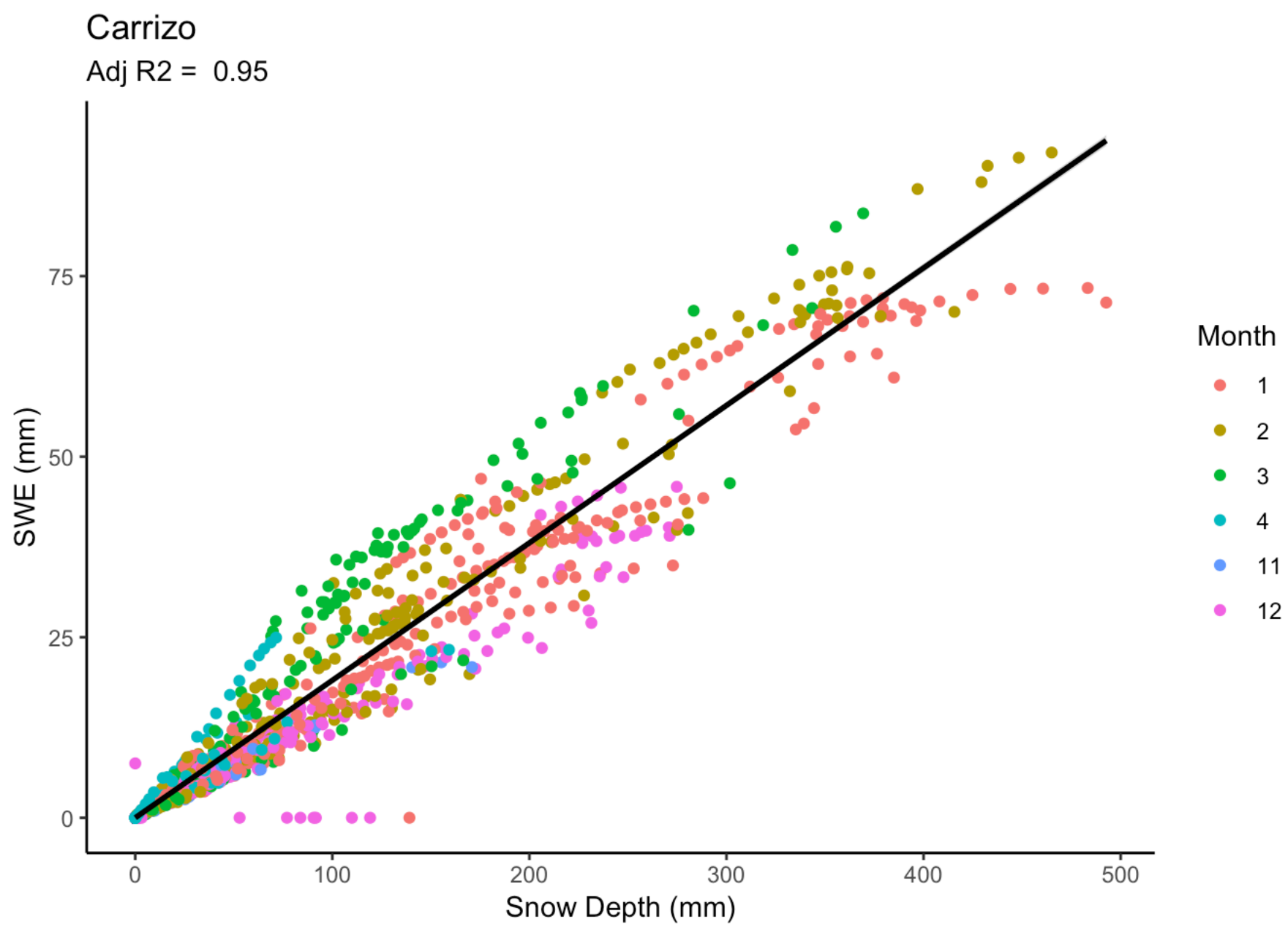
- SWE and snow depth are highly correlated across regions (>0.9)
- Generally, as snow depth and swe values get larger, they become less closely correlated

Monthly linear relationships between SWE and Snow Depth

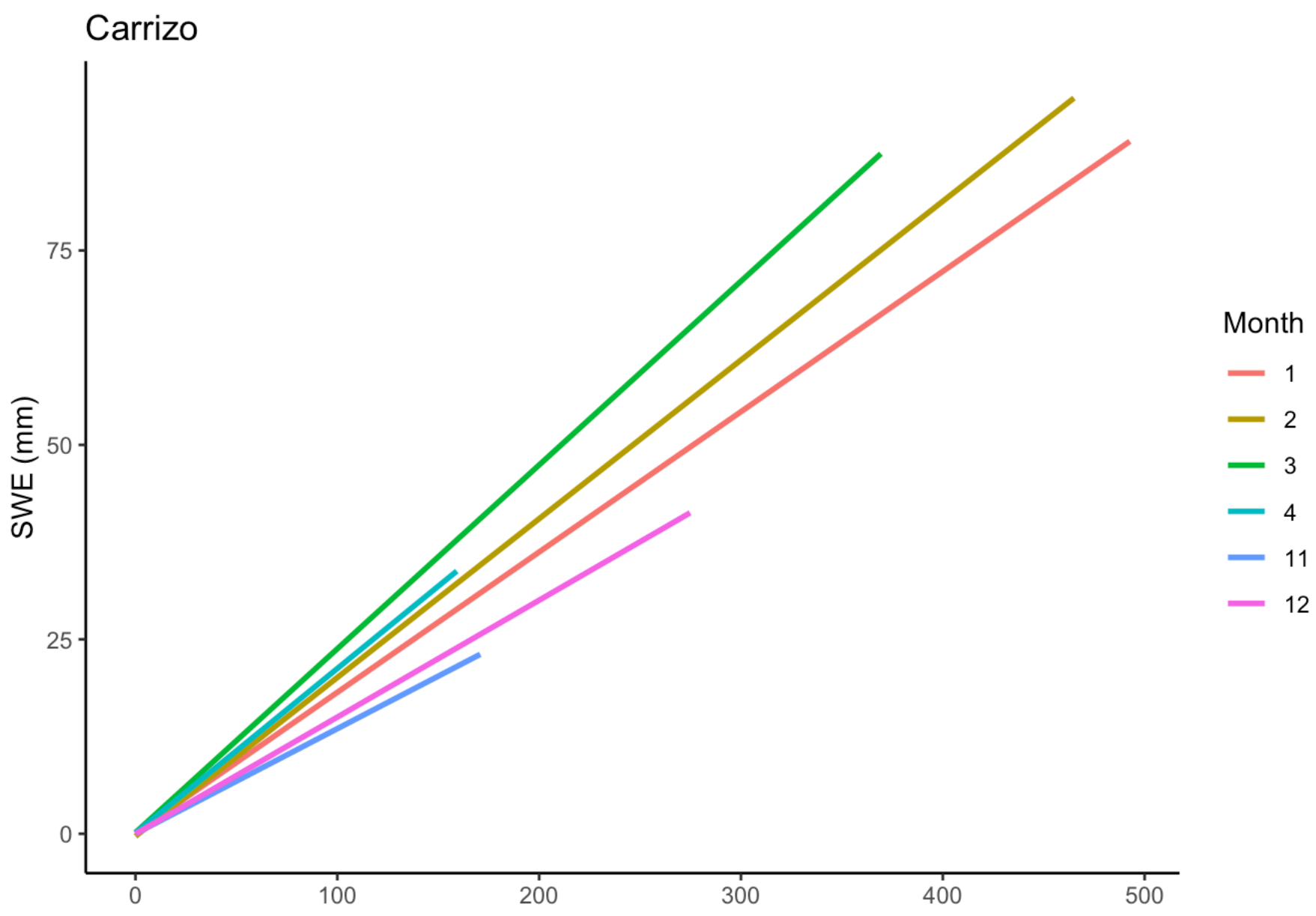
- SWE is a function of depth and density, so SWE/depth = bulk density
- So through the water year, we see generally increasing density at all locations November to March.
- However, in April, there is sometimes a drop in density depending on location - this may simply be because most of the snow has melted

Carrizo

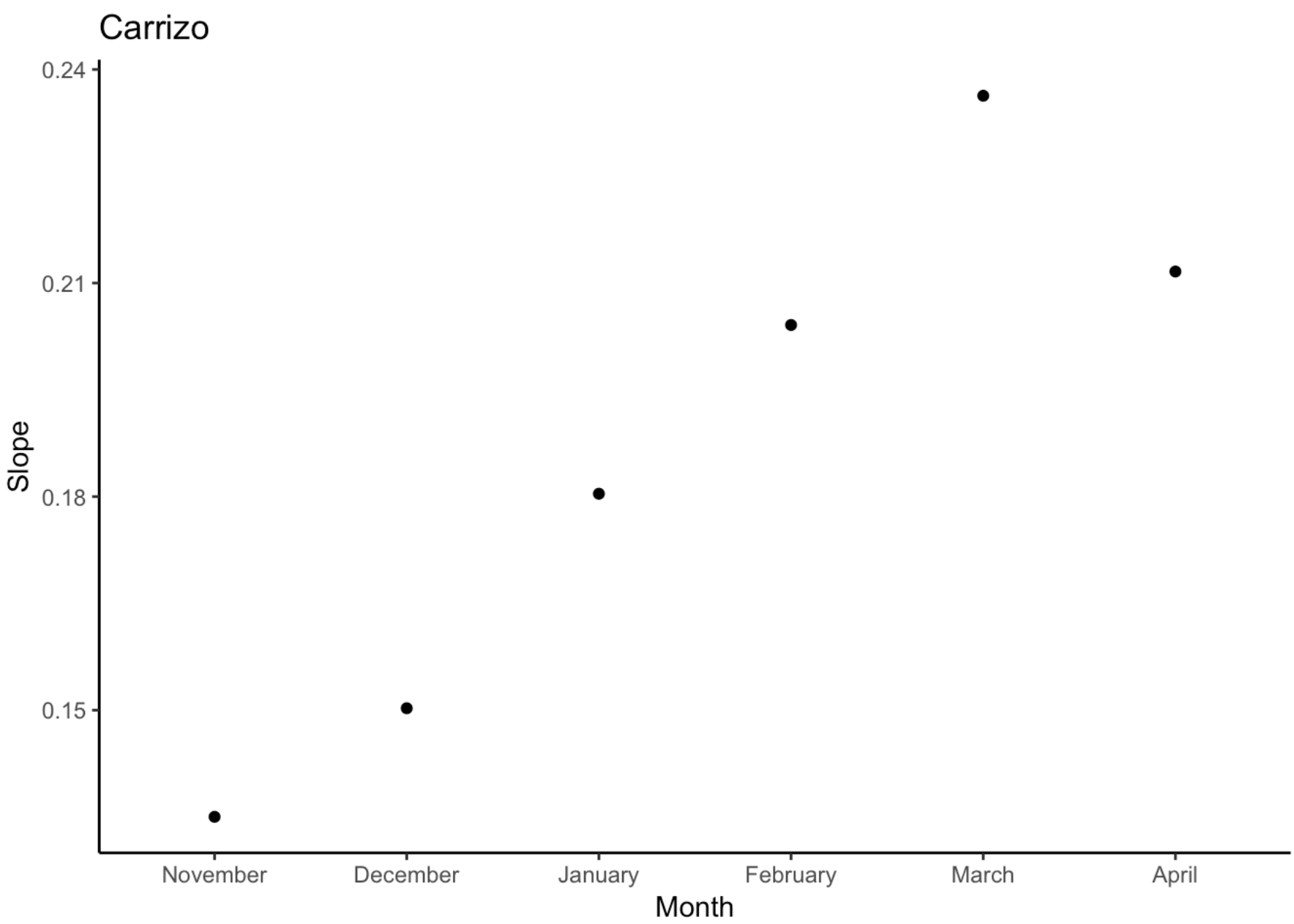
- Generally, January, February, and March swe and depth values are less correlated than other months



Each month has it’s own line:



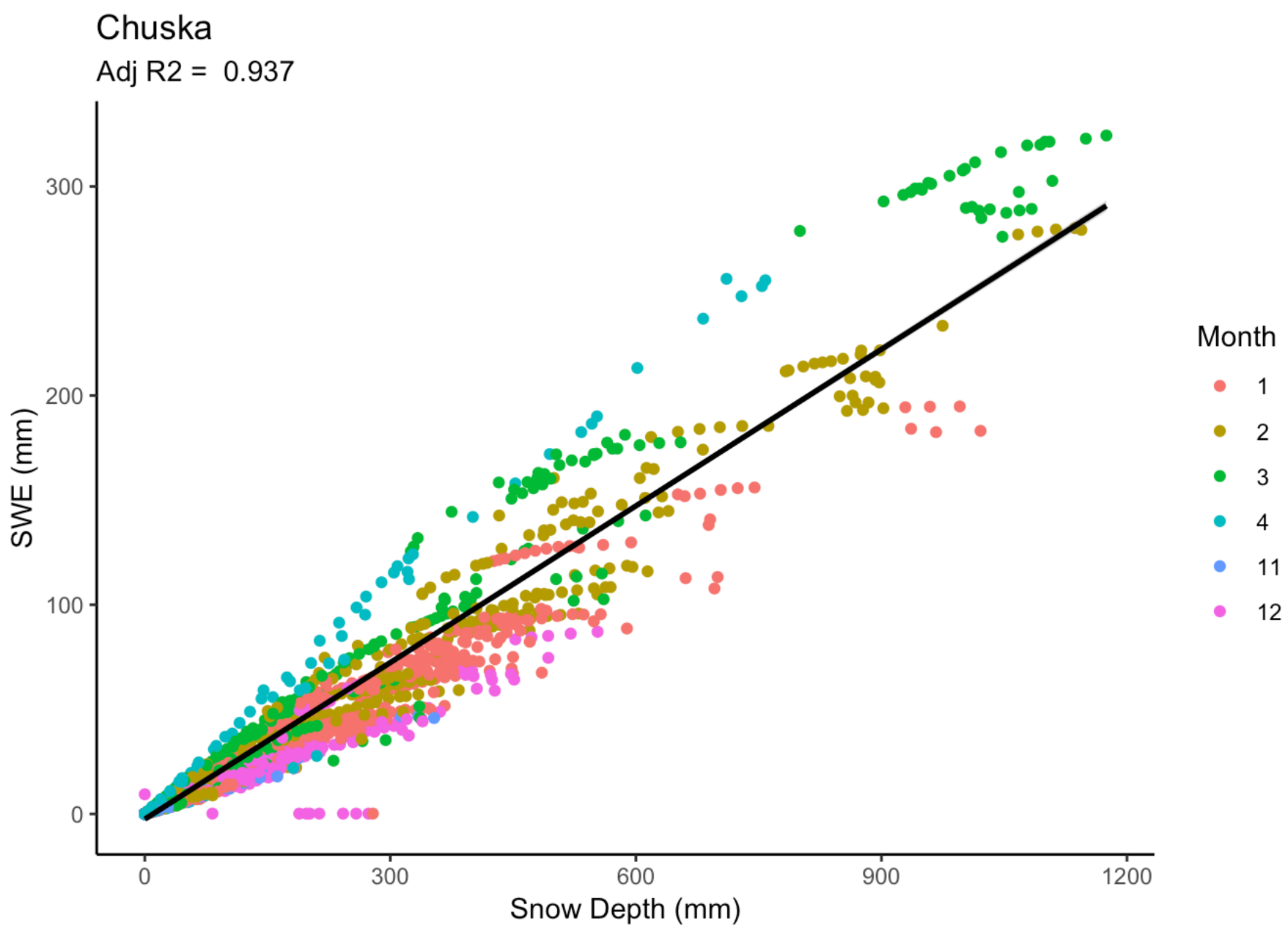
Slope of the line of the linear relationship of each month’s swe and snow depth - almost linearly increasing slop through the water year until April, where the slope decreases back down to almost the February slope



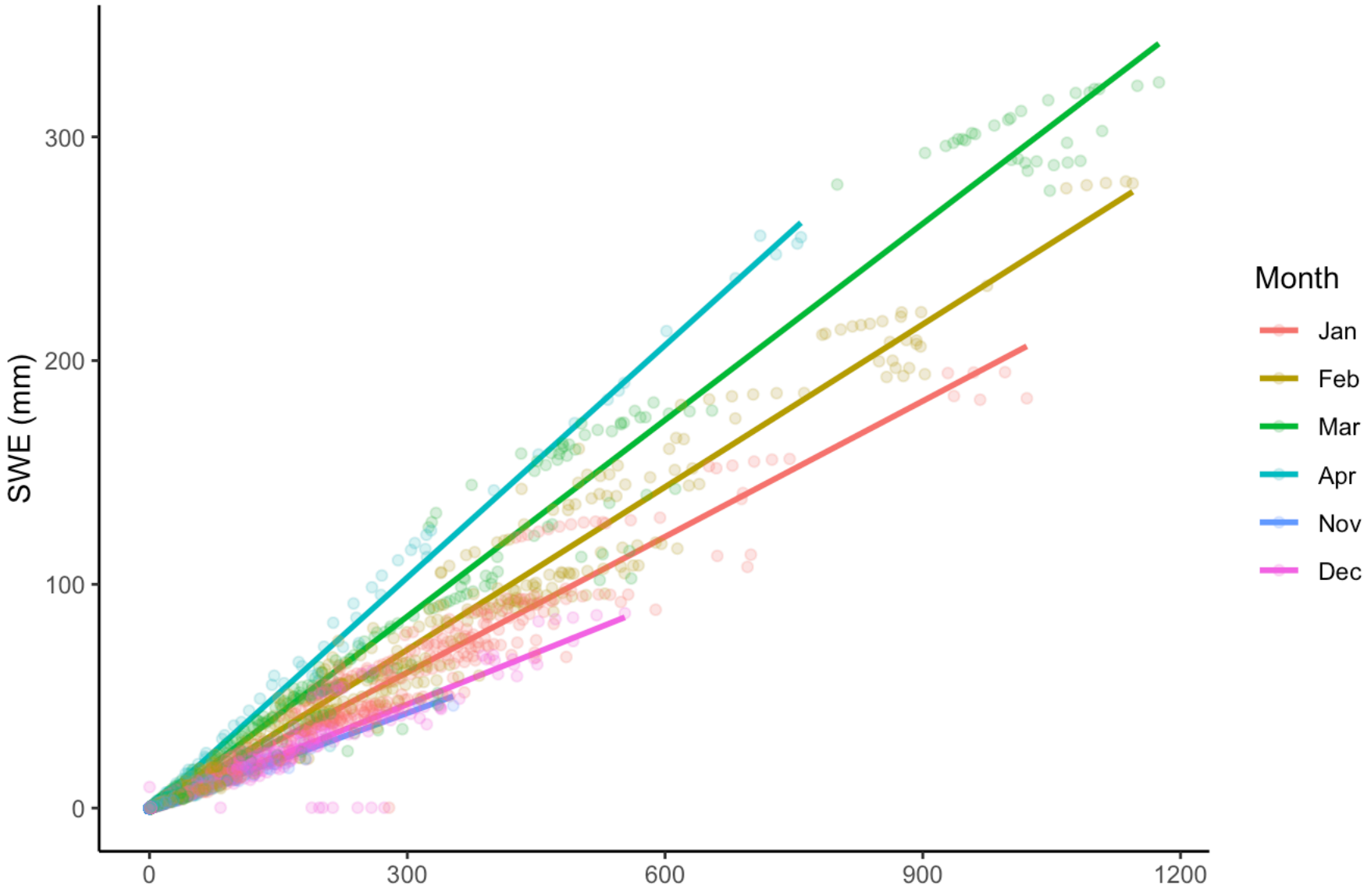
Chuska

undefined

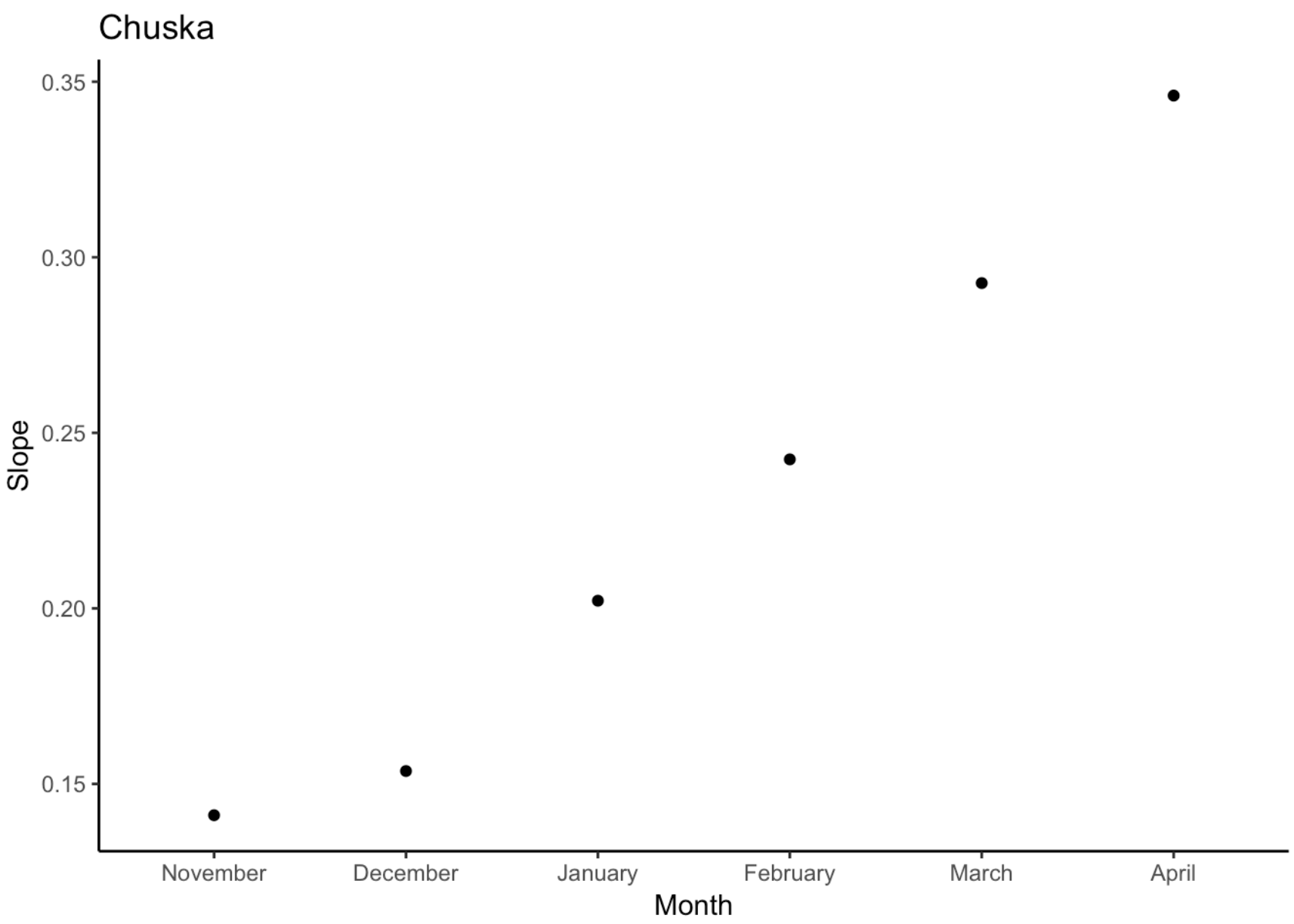
- Generally, January, February, March, amd some April swe and depth values are less correlated than other months



Each month has it’s own line:



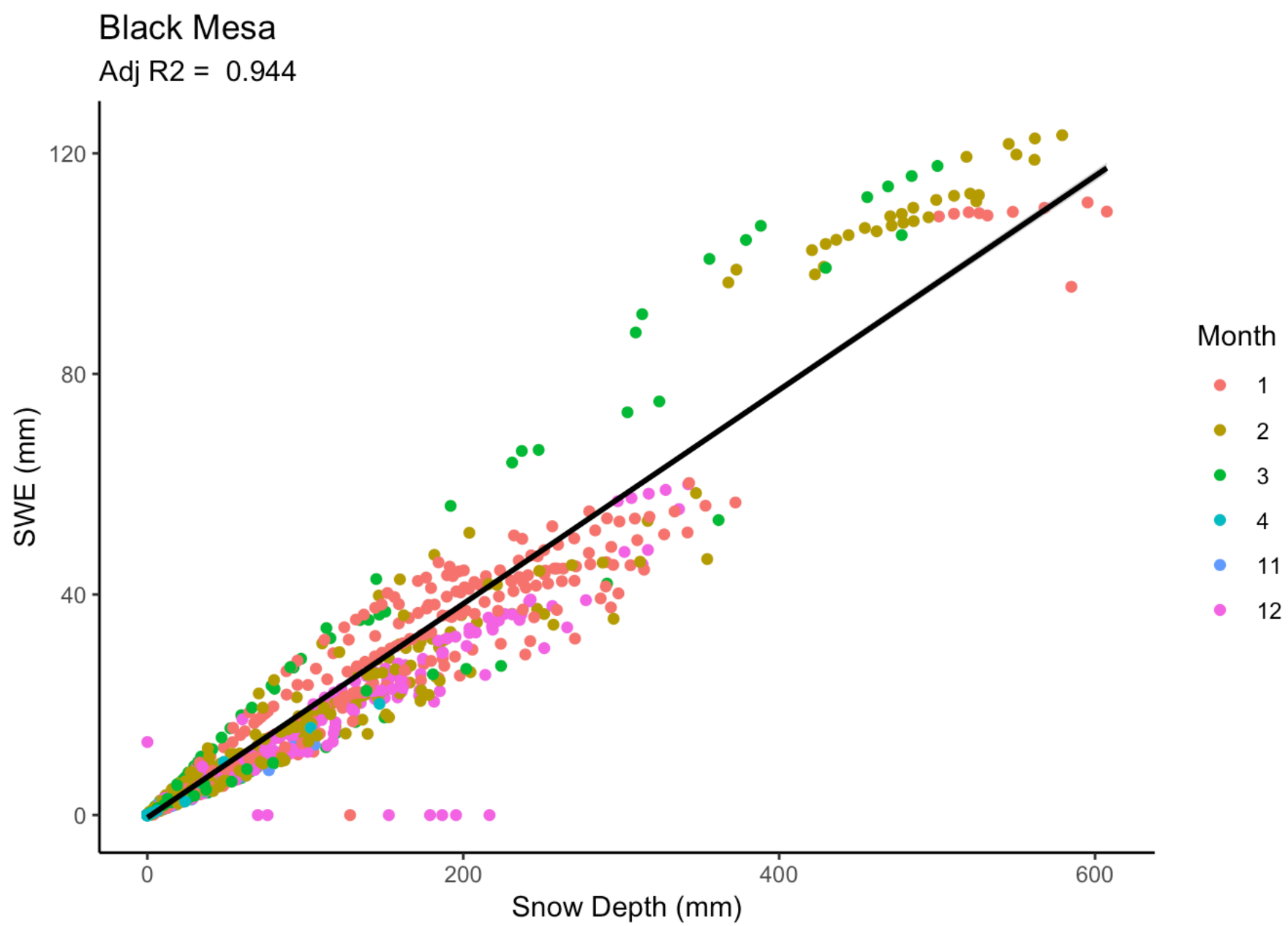
- almost perfect linear increase in the slope of the relationship between swe and depth through time
- adjusted r squared values for all lines > 0.9



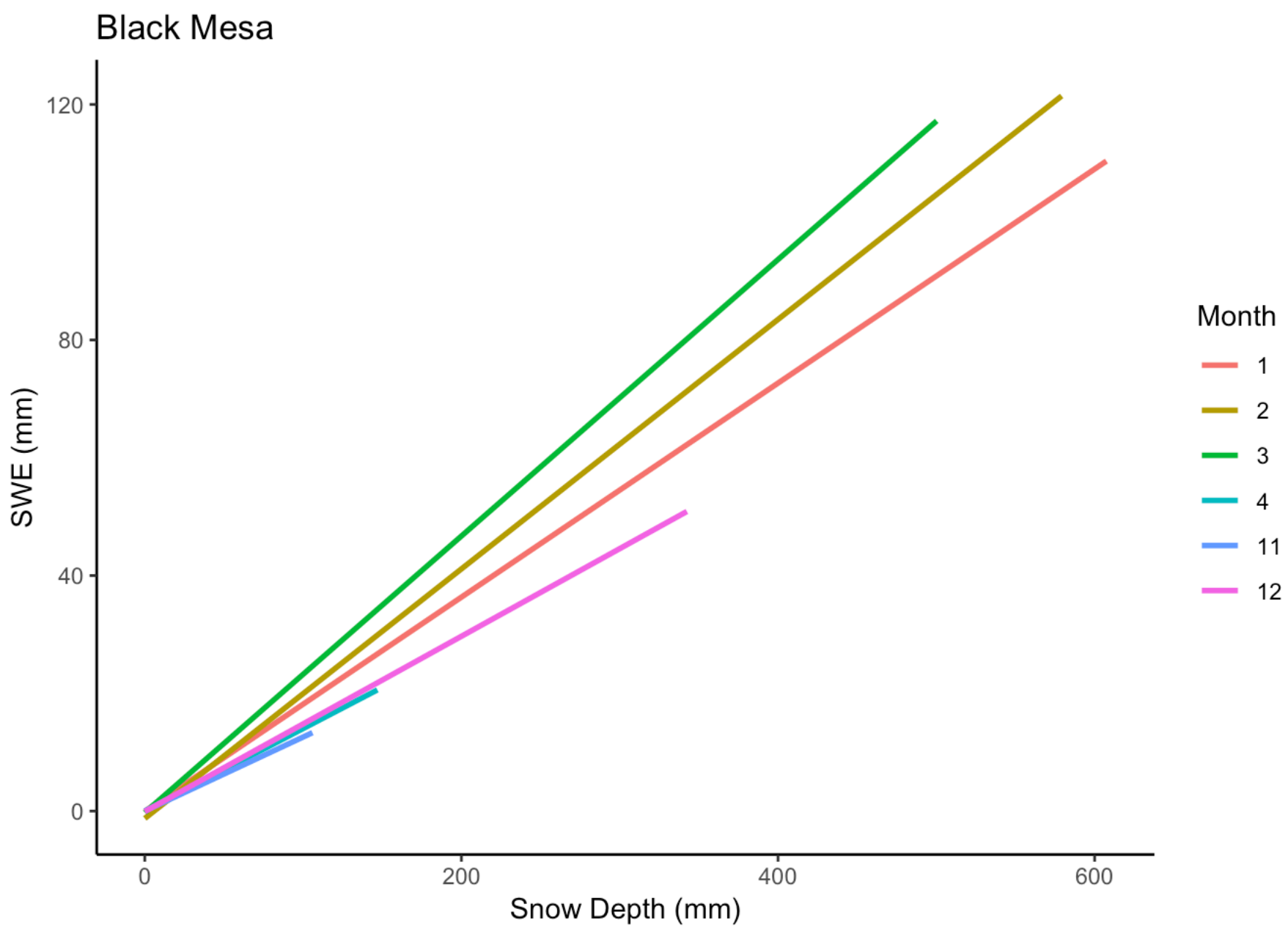
Black Mesa

undefined

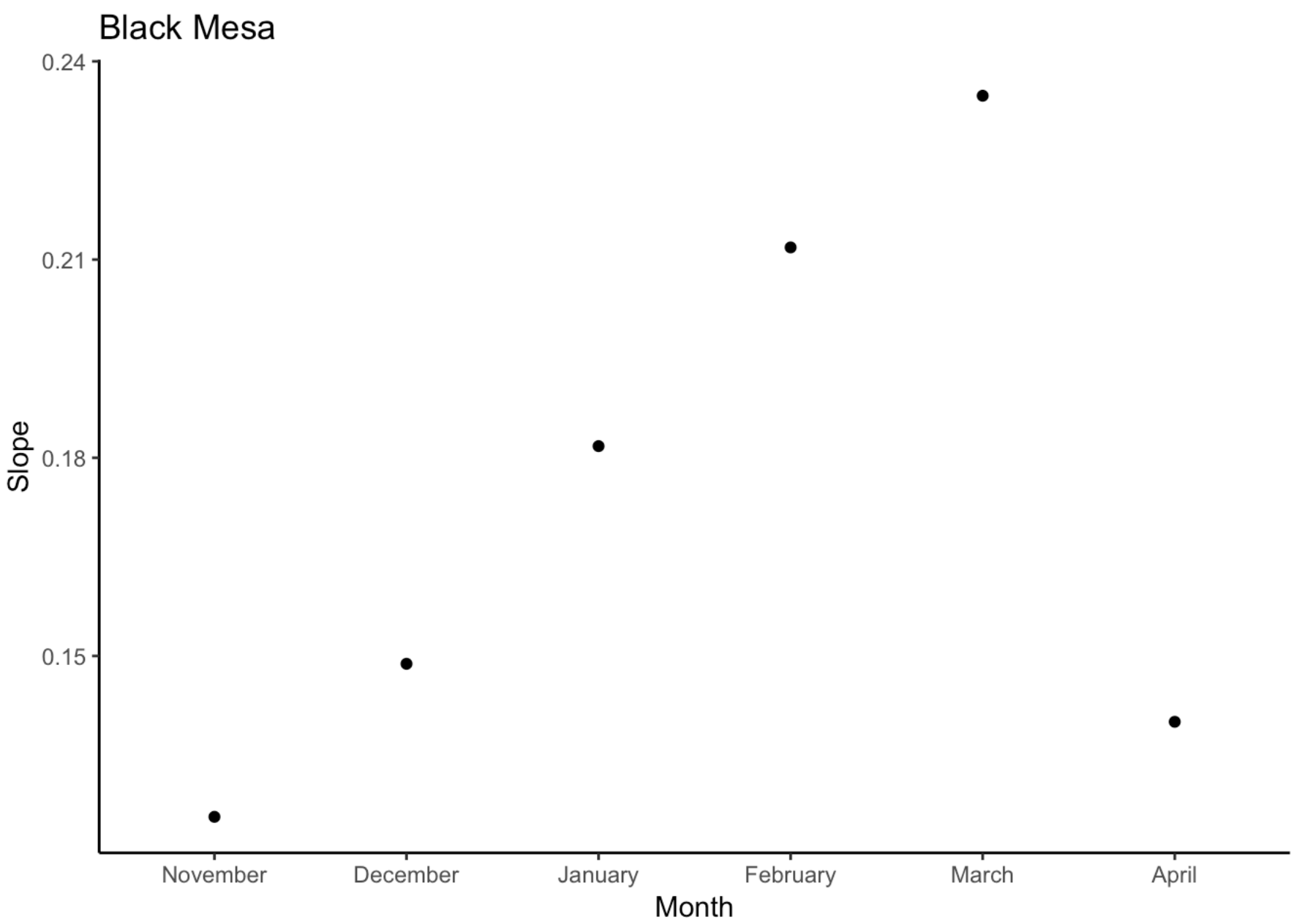
- Generally, January, February, and March swe and depth values are less correlated than other months



Each month has it’s own line:



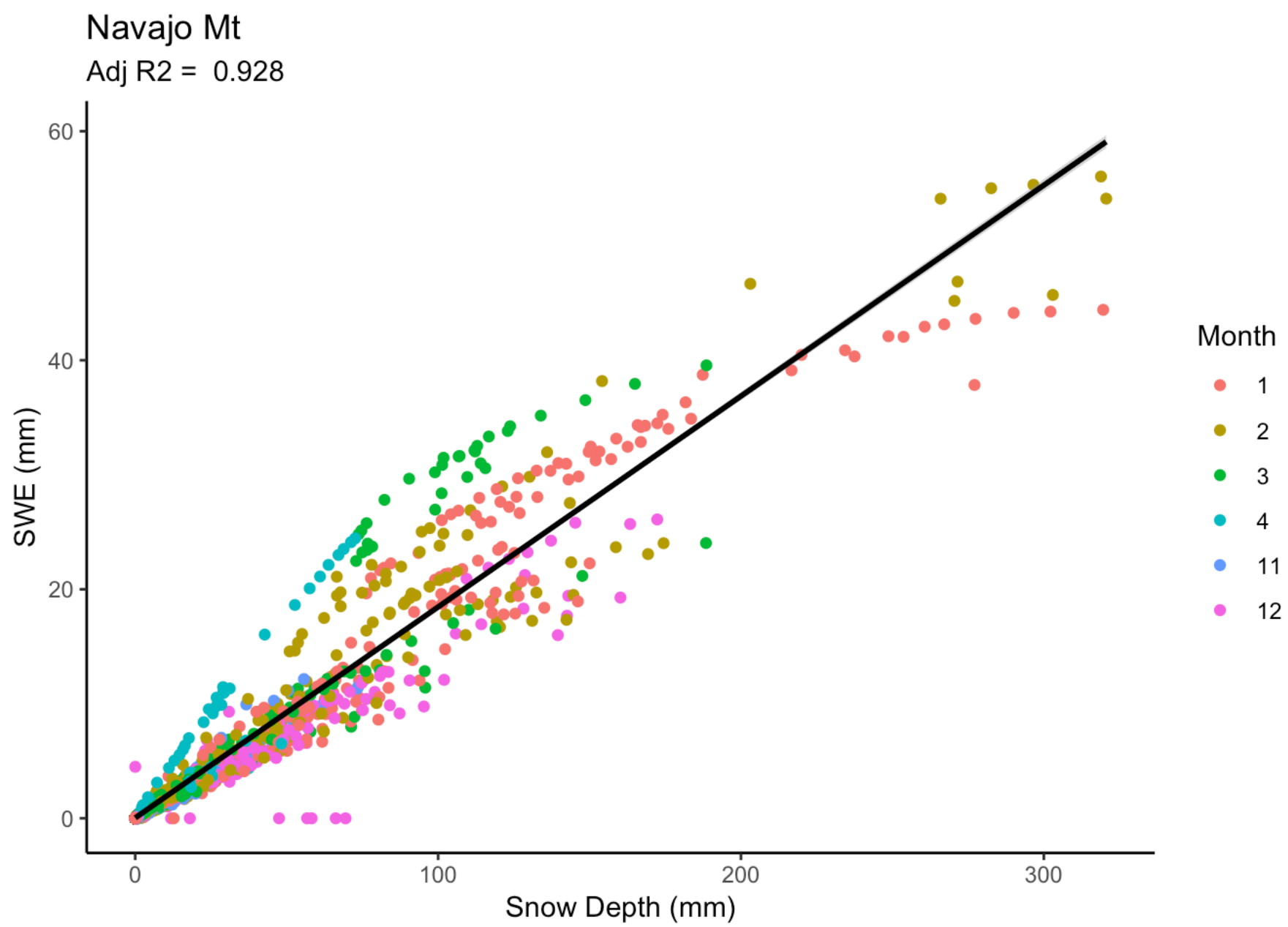
- almost linearly increasing slop through the water year until April, where the slope decreases back down to almost the November slope



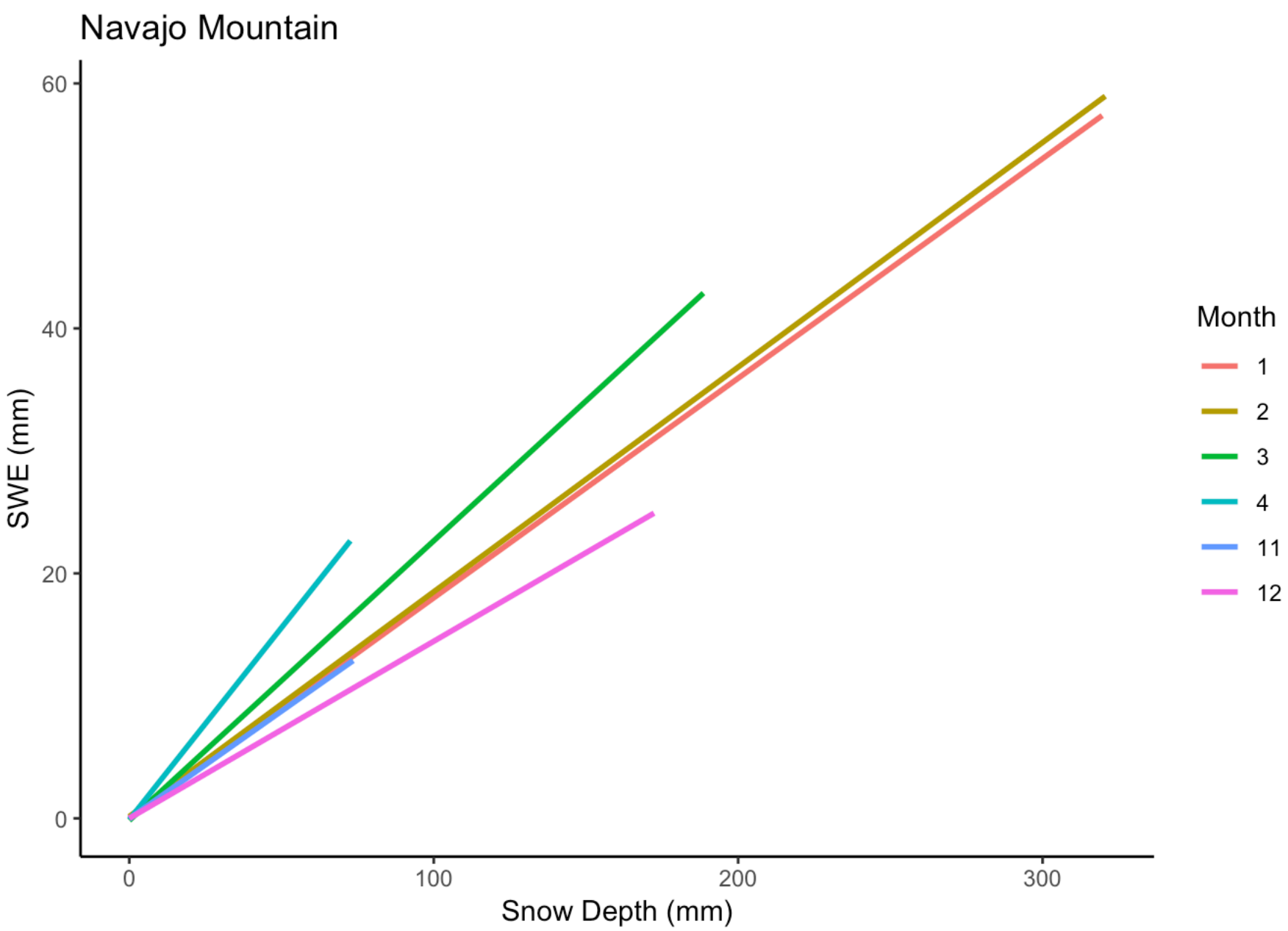
Navajo Mt

undefined

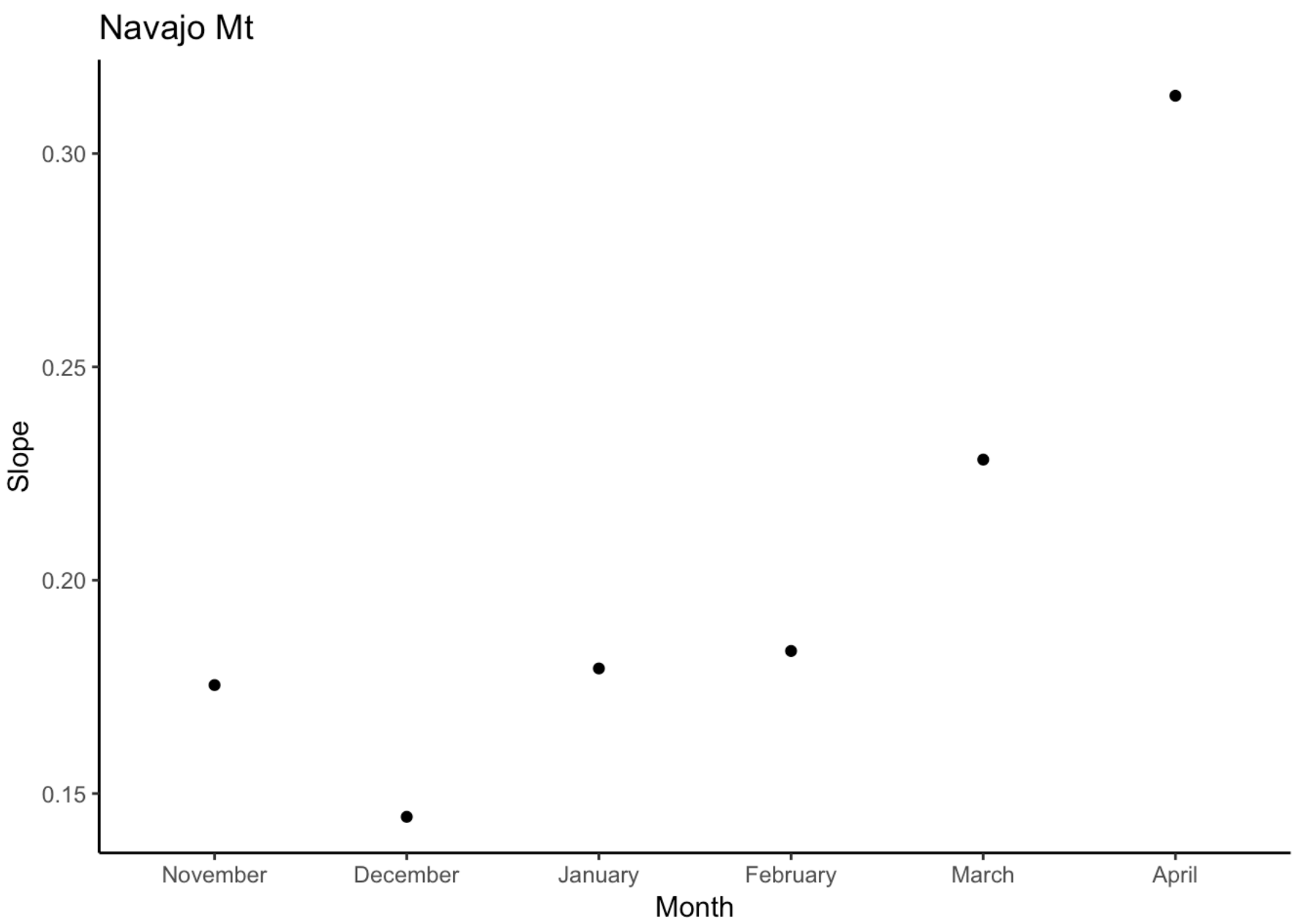
- March, January, and some december most often less correlated



Each month has it’s own line:



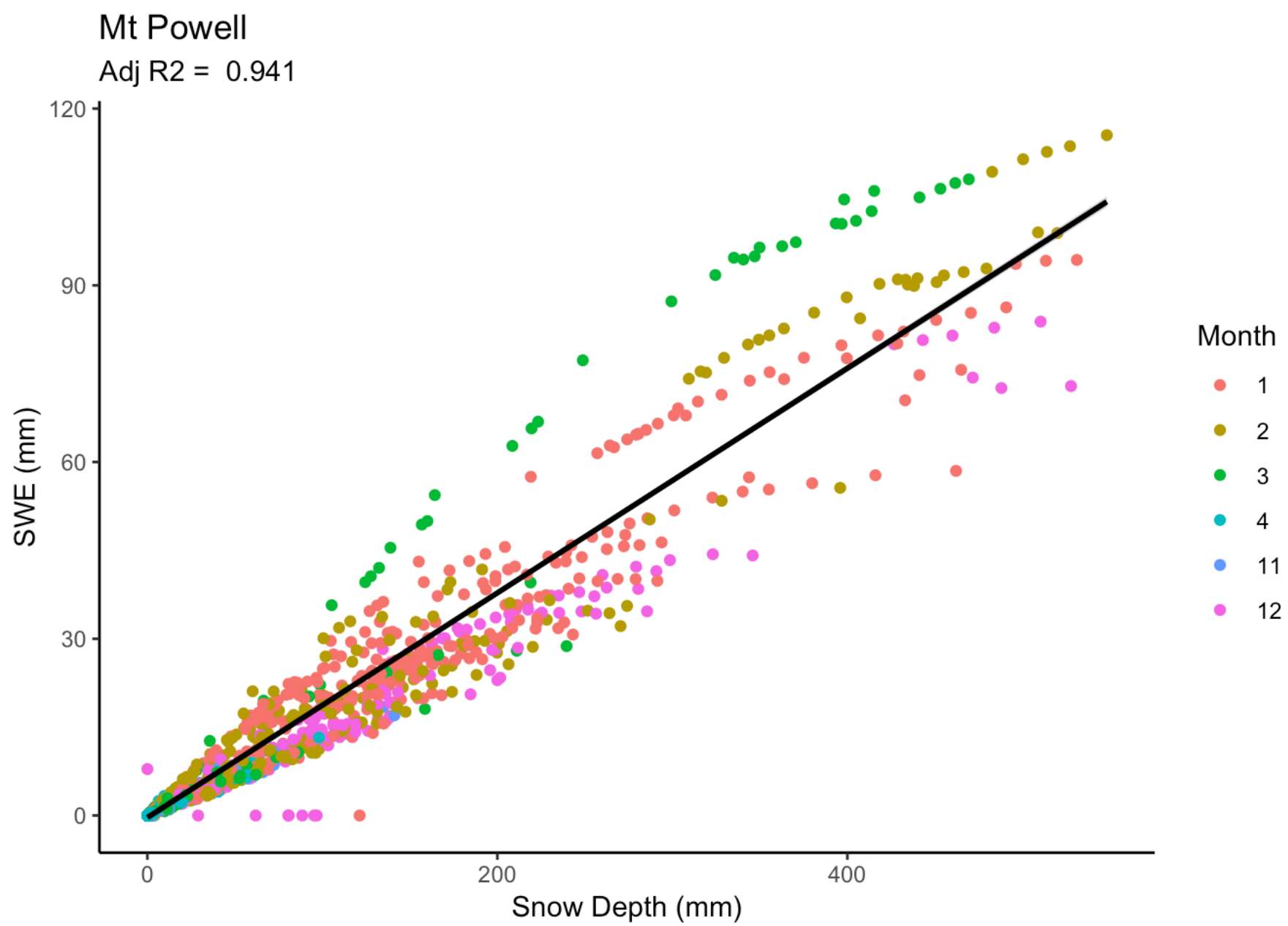
- Seems to be the only location where there is not really a clear linear increase in the slope of the relationship between swe and snow depth



Mt Powell

undefined

- Jn, Feb and March seem to be outliers



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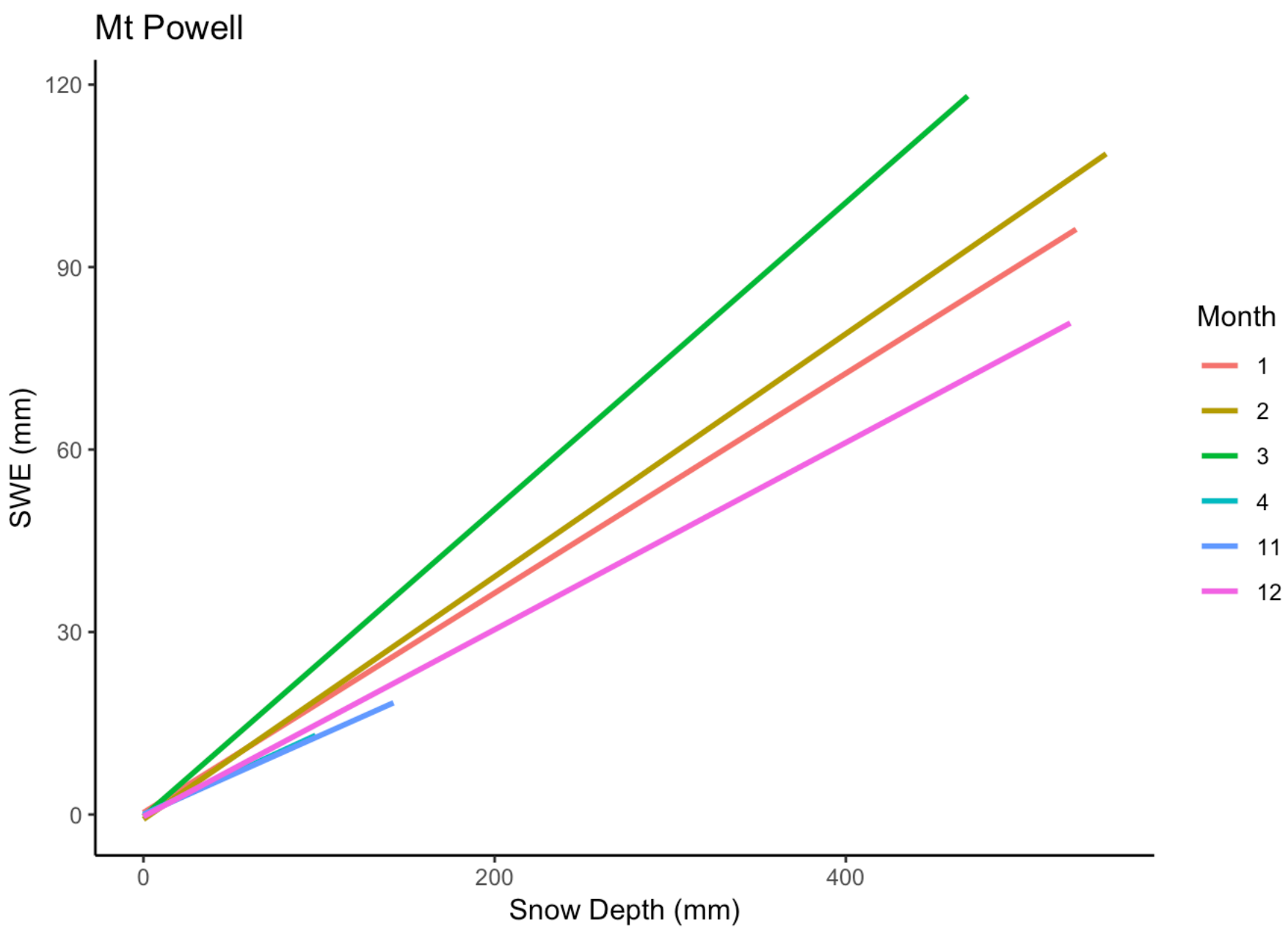
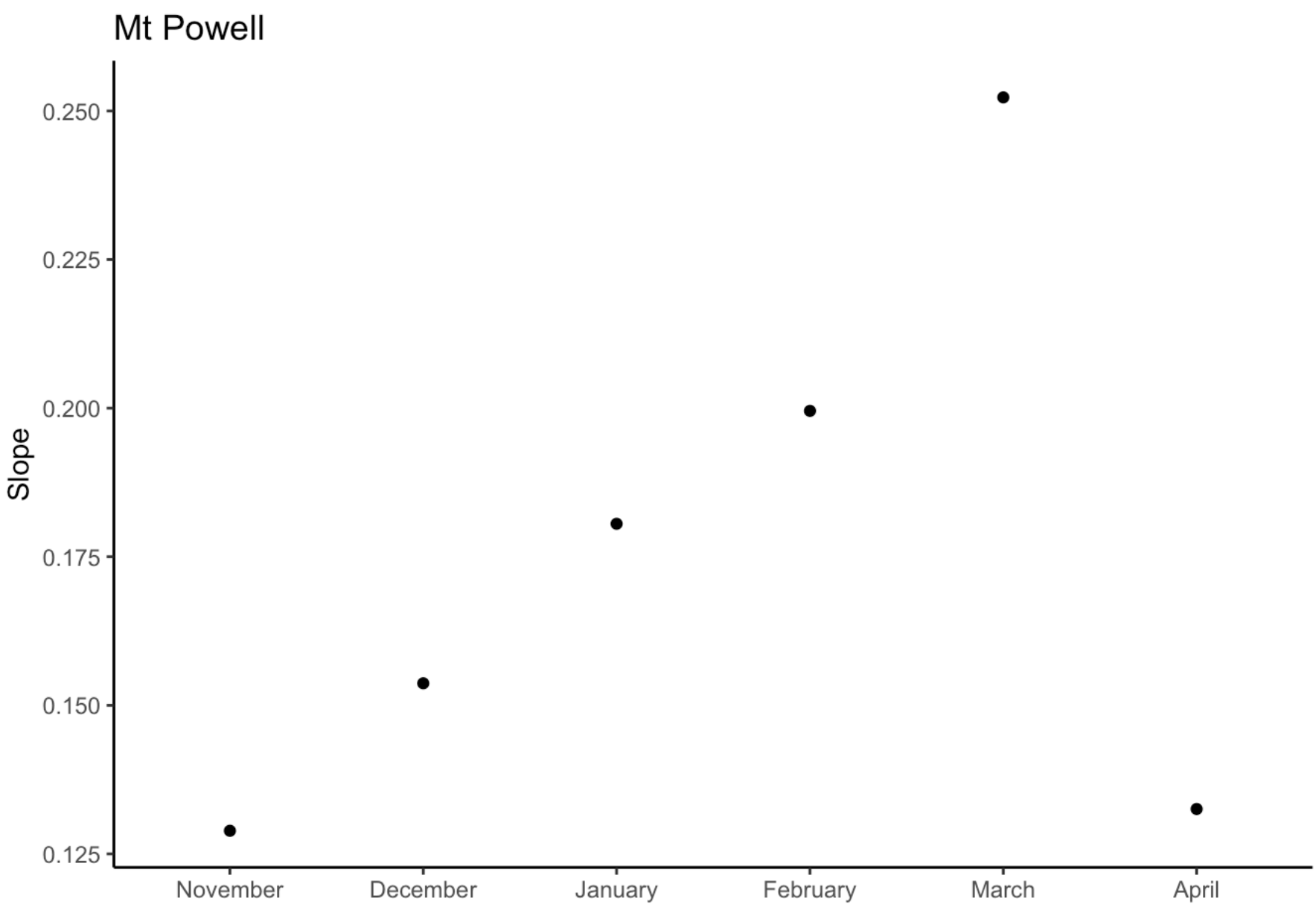


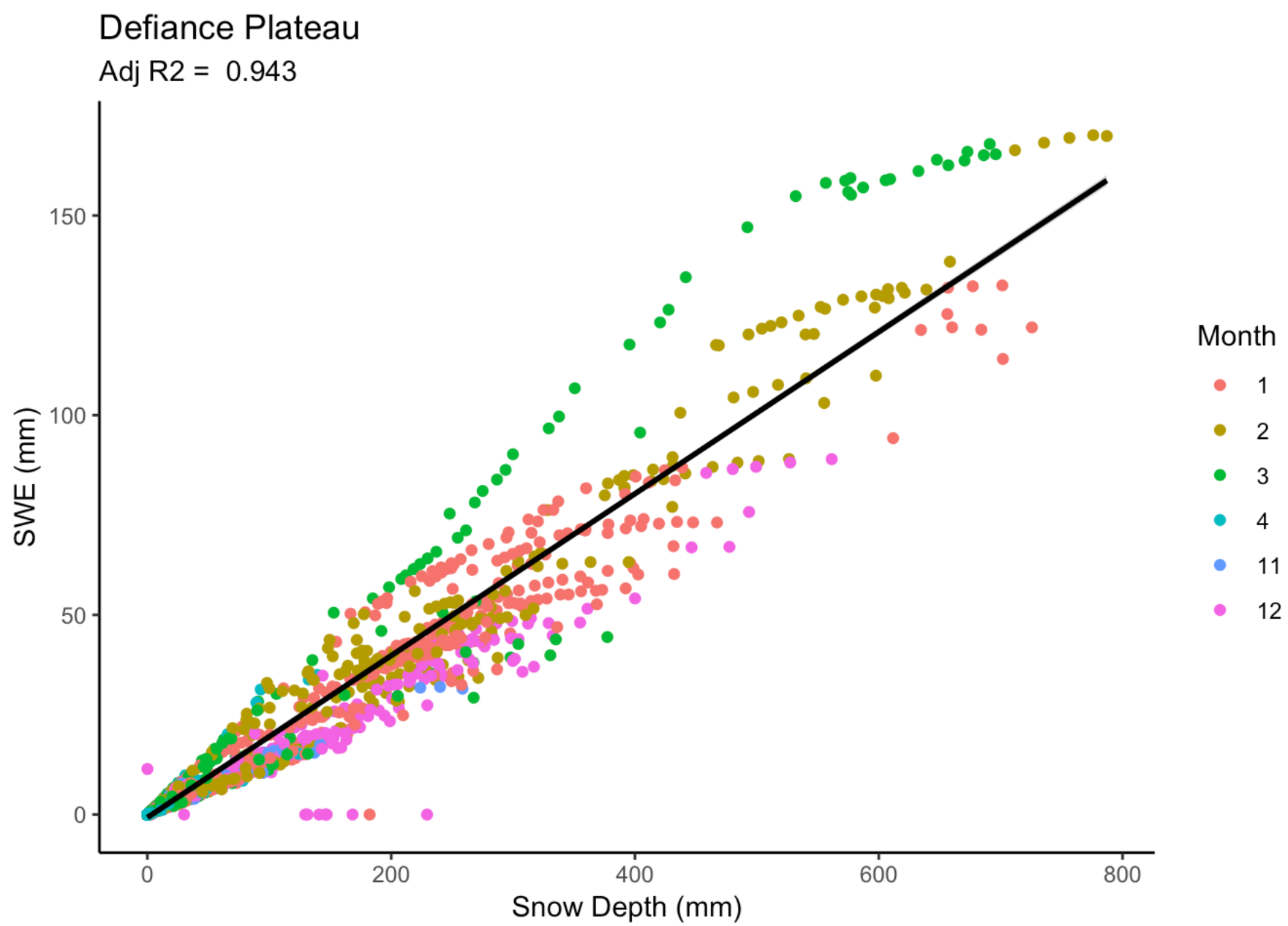
- almost linearly increasing slop through the water year until April, where the slope decreases back down to almost the November slope



Defiance Plateau

undefined

- March seems to be least correlated



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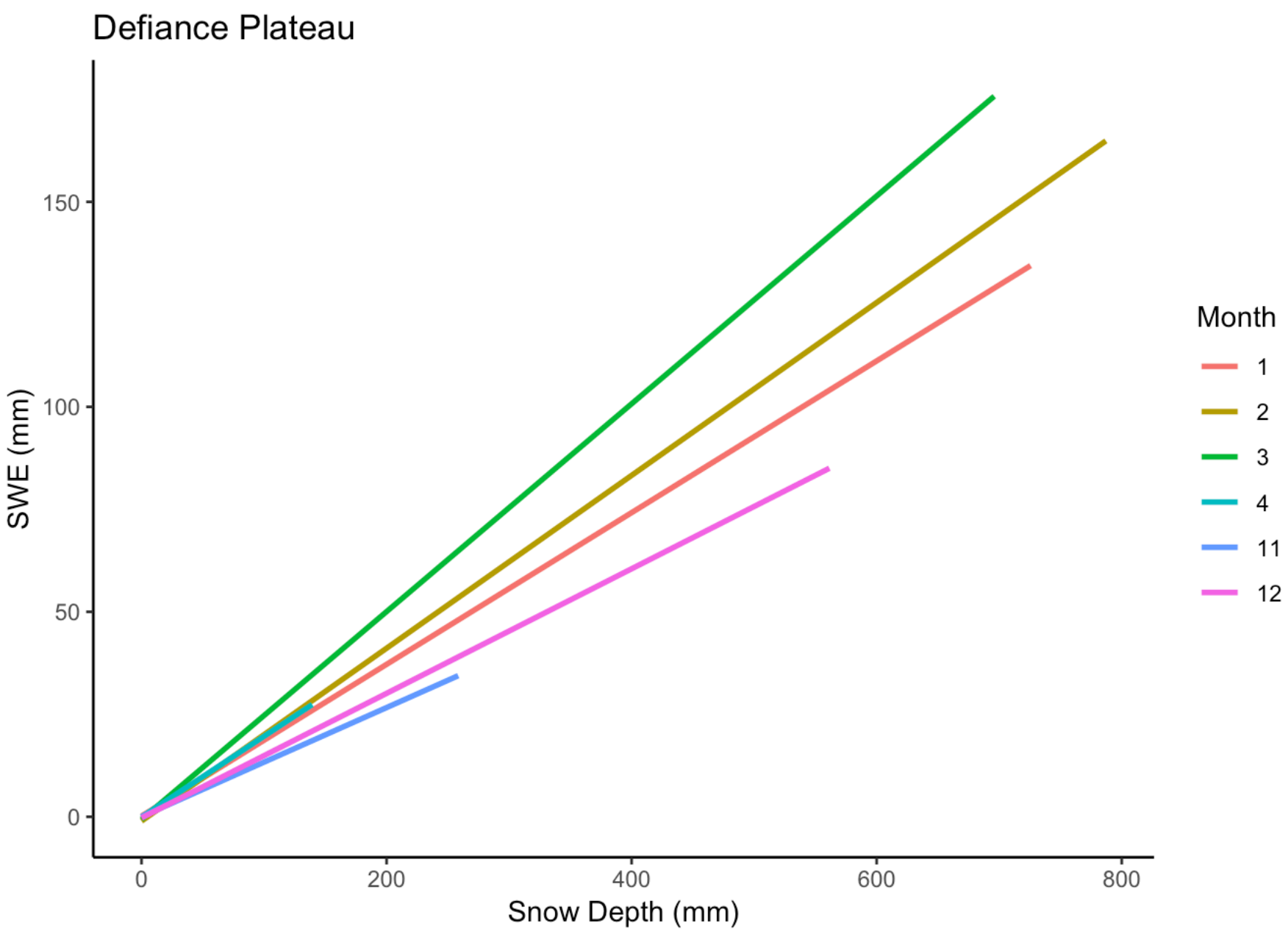
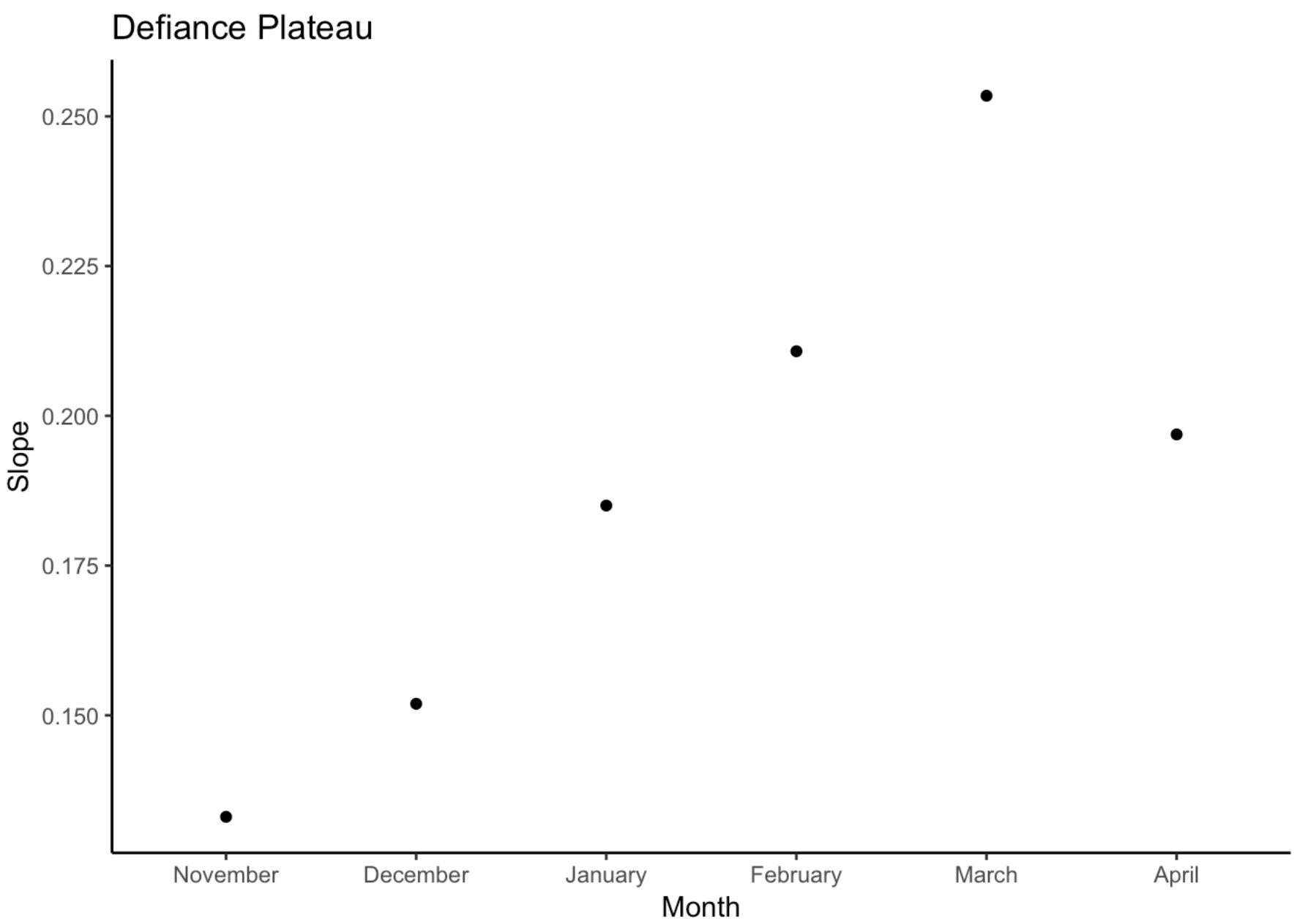


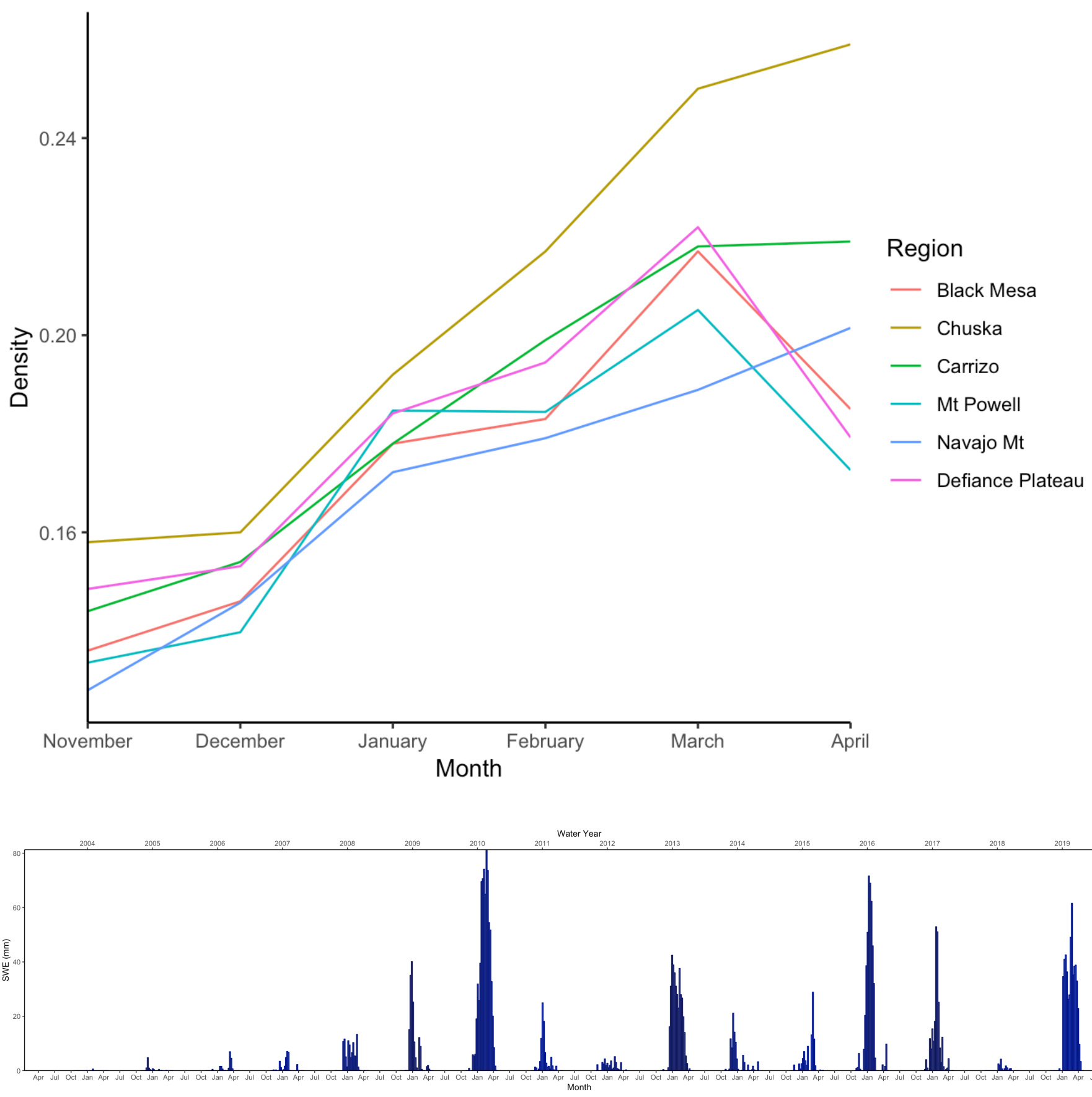
- almost linearly increasing slop through the water year until April, where the slope decreases back down to almost the January slope



SWE-depth ratio

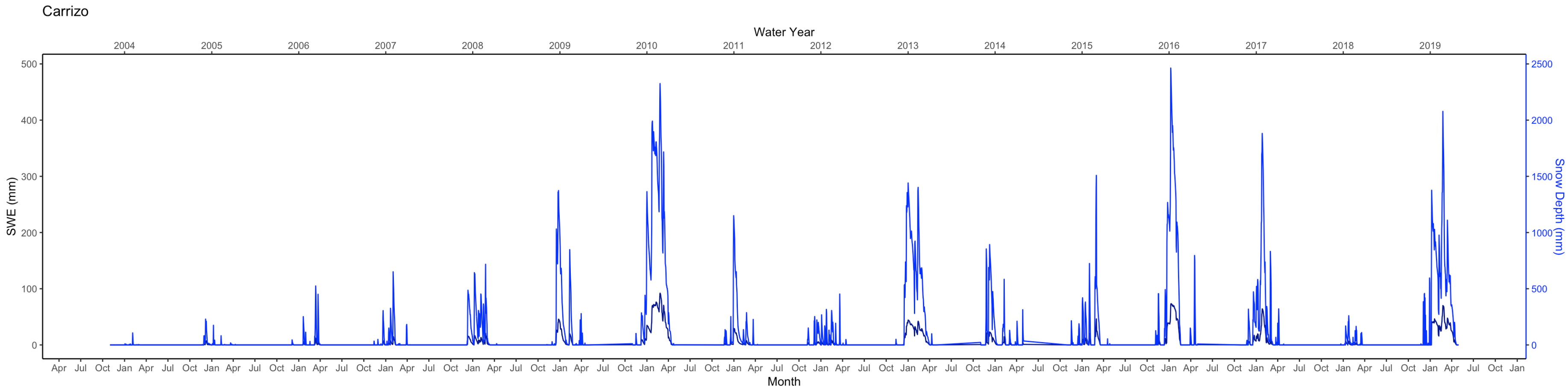
undefined

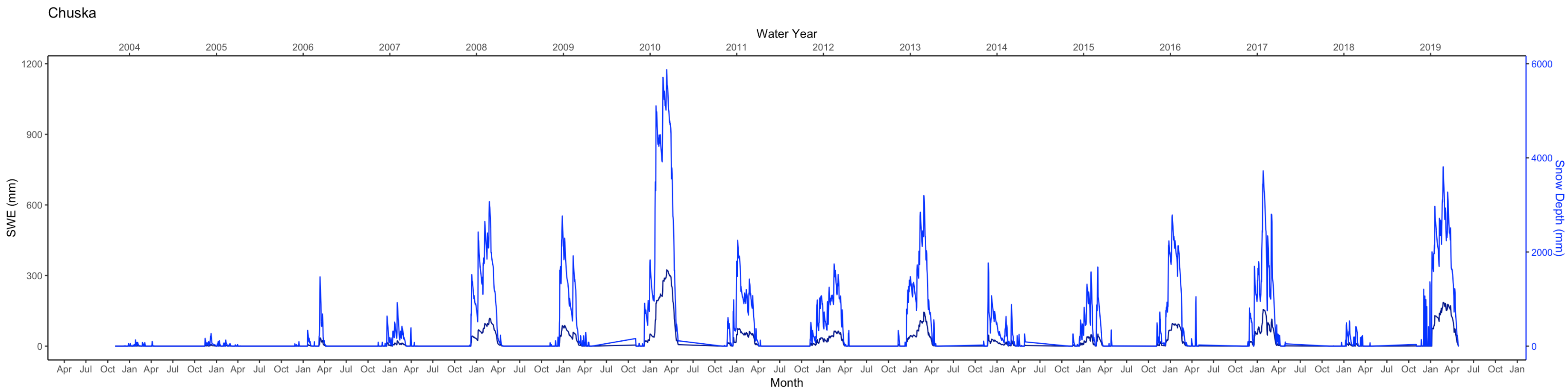
- annual averaged metric
- **Carrizo**: 0.185
- **Chuska**: 0.206
- **Black Mesa**: 0.174 . ### SWE-depth ratio (= density) monthly average:
- Generally, density increases through the water year (starting at november). This corroborates the trend seen in the correlation graph where depth and swe becomes less correlated as the water year progresses

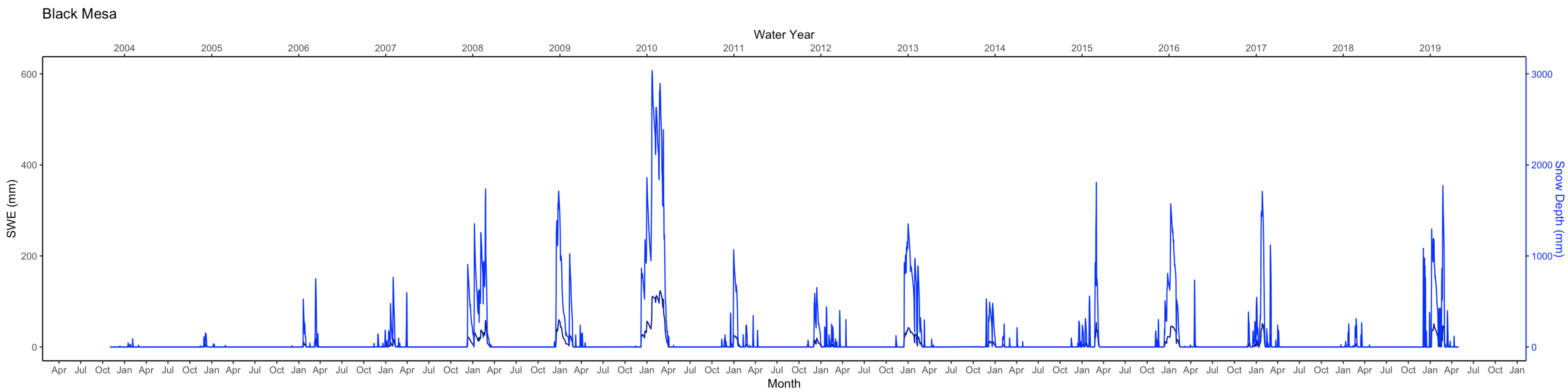


SWE and Snow depth (November - April Water Year)

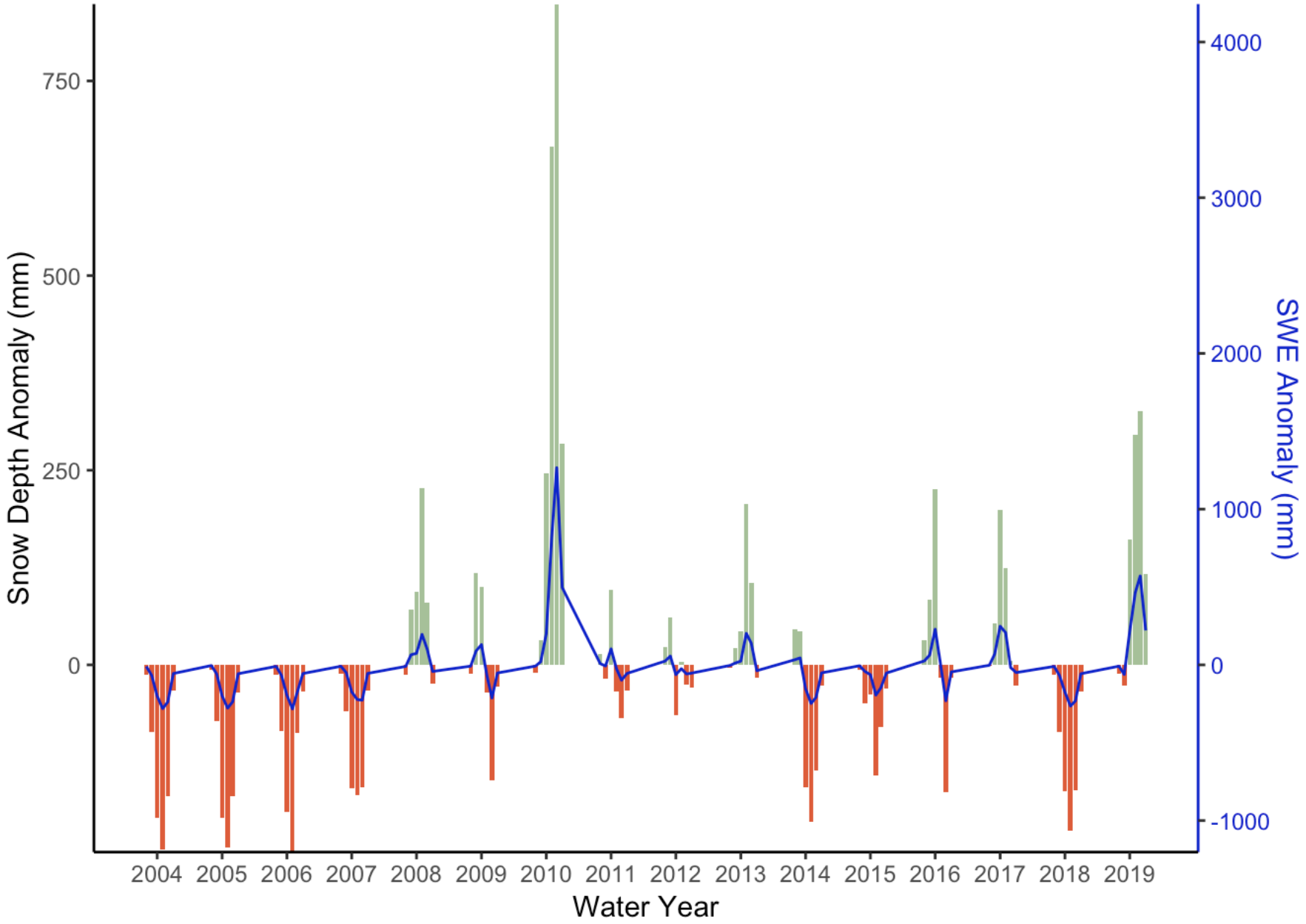
- Generally, snow depth is much greater than SWE, but follows the same general patter

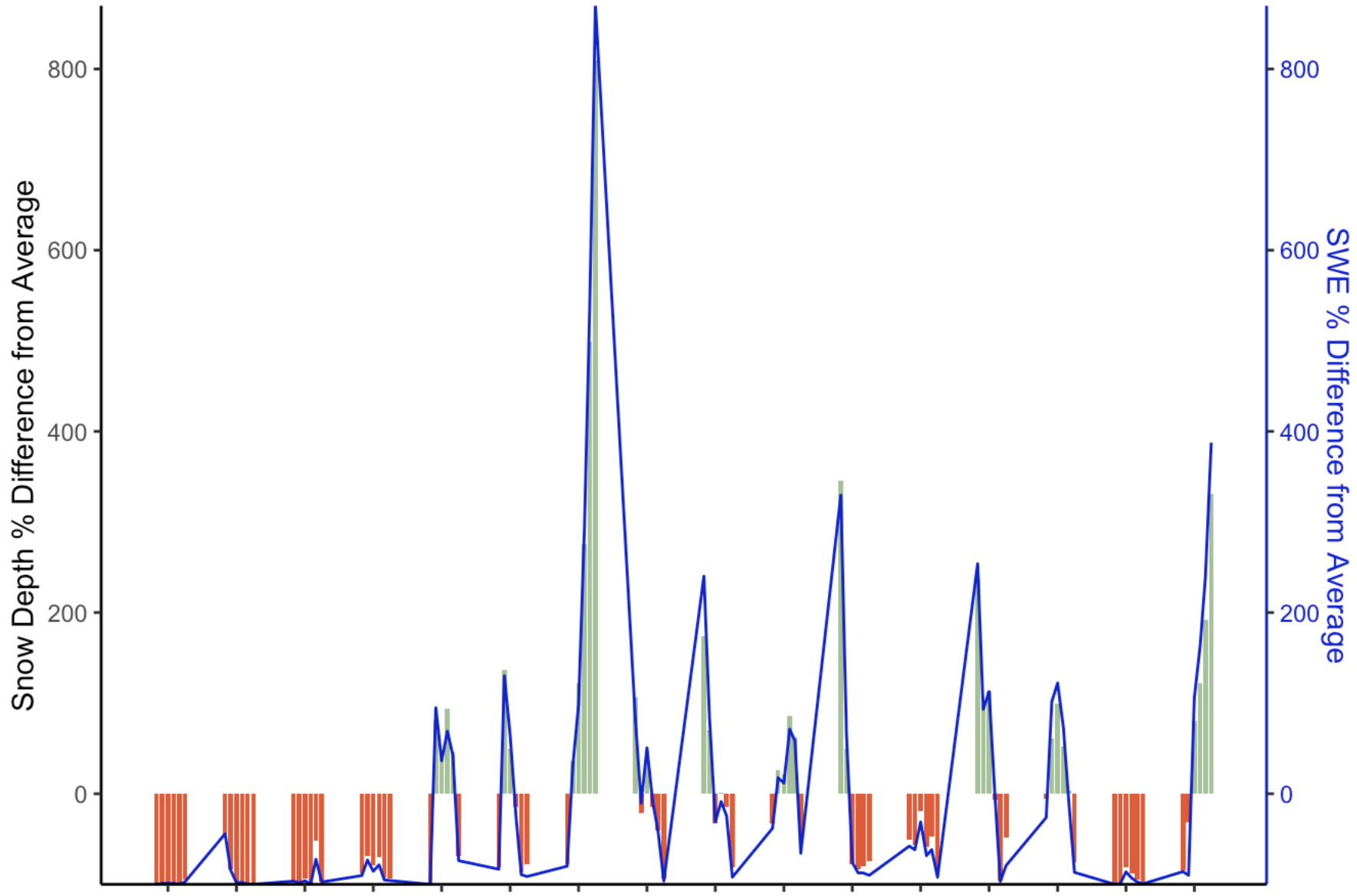


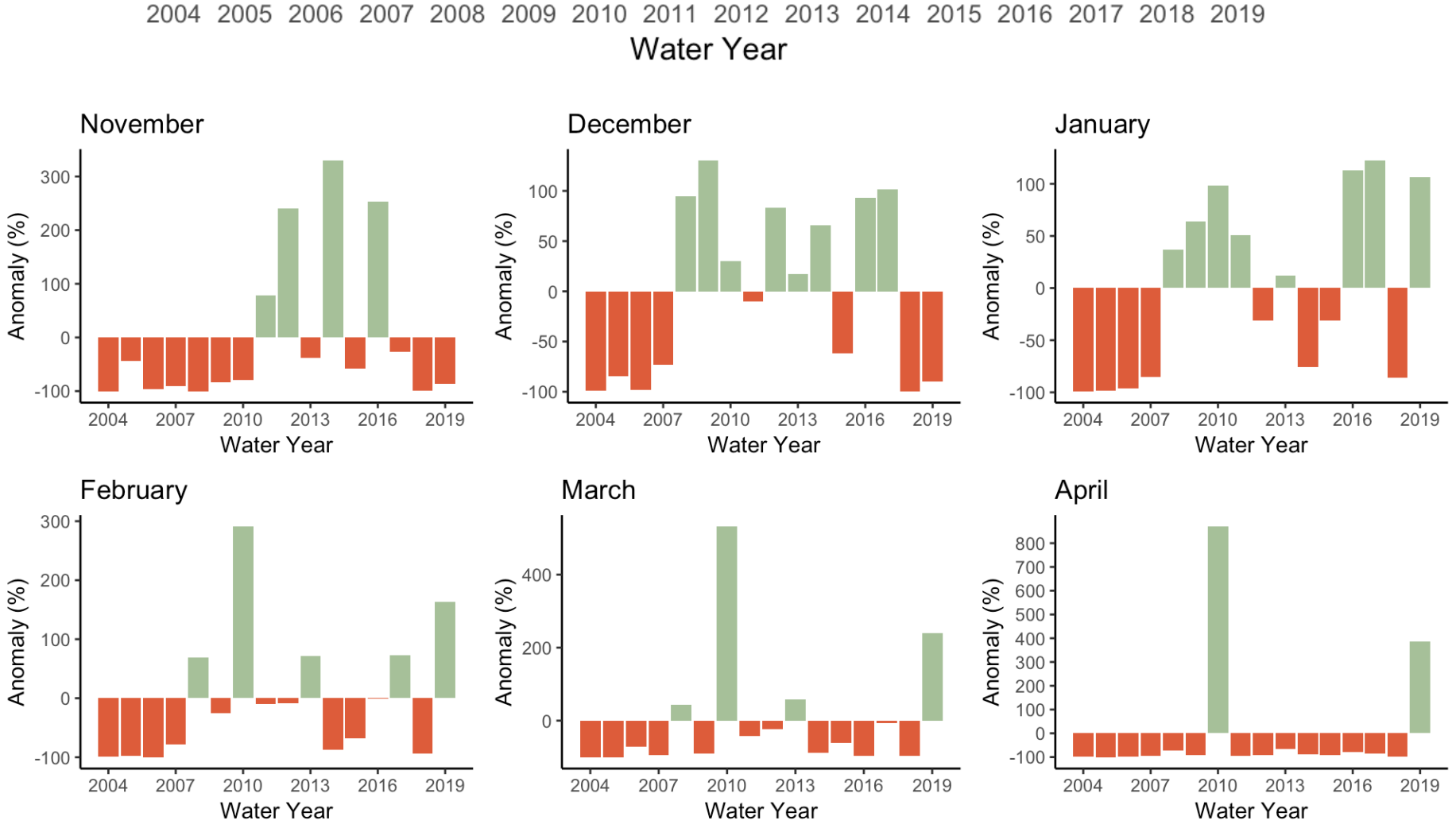




Chuska SWE vs depth monthly anomaly

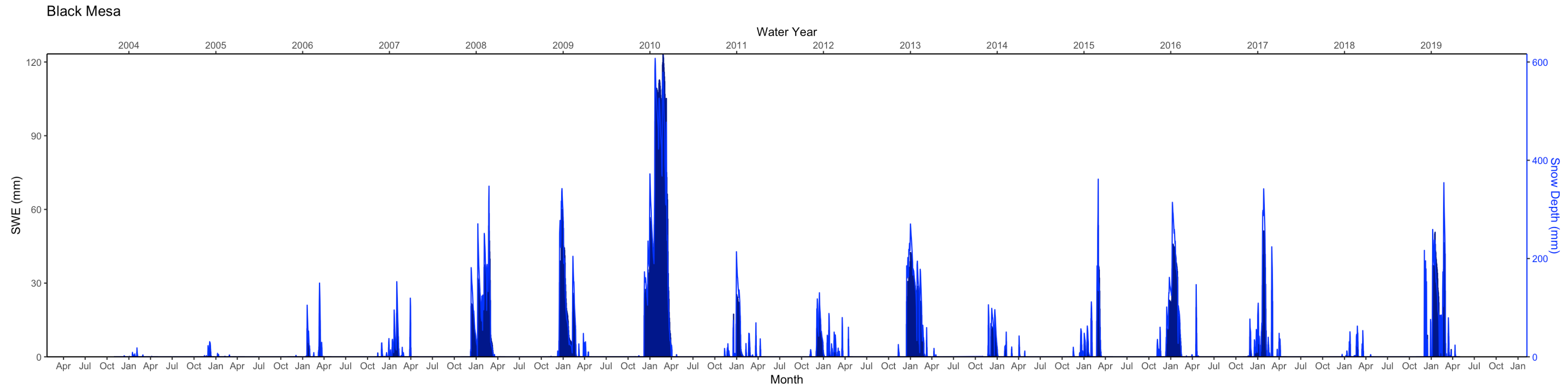

Snow Depth Anomaly (mm)
750
500
250
0
4000
3000
2000
1000
0
-1000
SWE Anomaly (mm)
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Water Year





Depth scaled (depth*0.2) by swe/depth metric

- shows how well correlated SWE and snow depth are


Black Mesa
Water Year
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
SWE (mm)
Snow Depth (mm)
Month