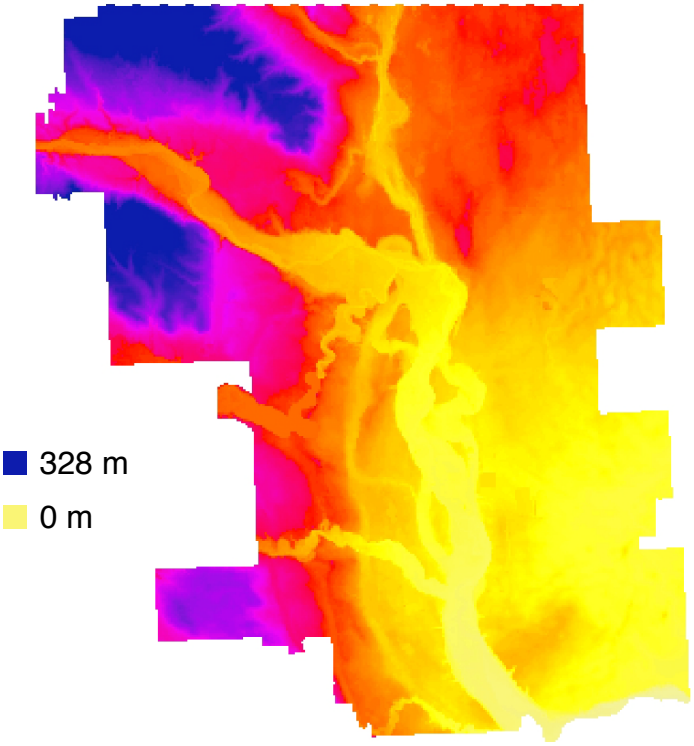
Flood Prediction in Calgary & Edmonton, Canada

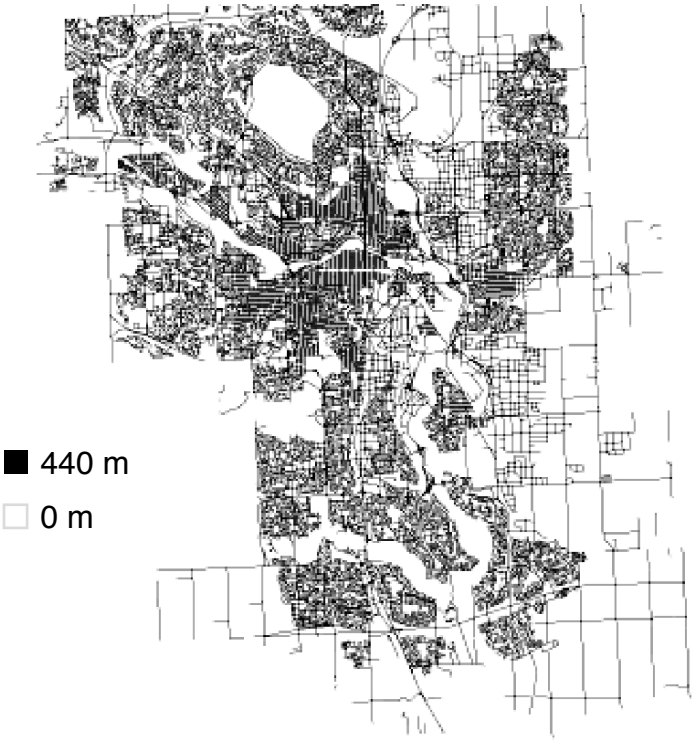
Allison Carr &
John Michael LaSalle

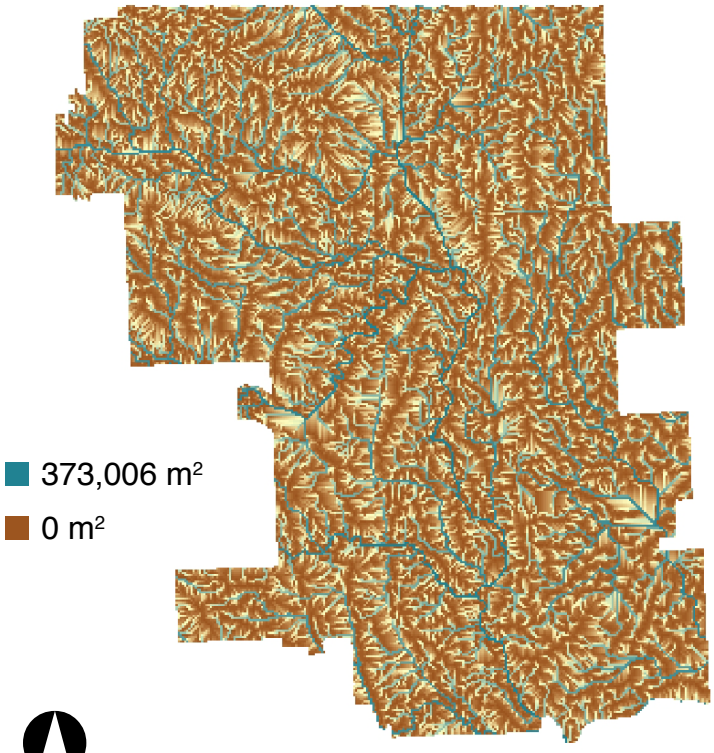
The Data

Normalized Elevation

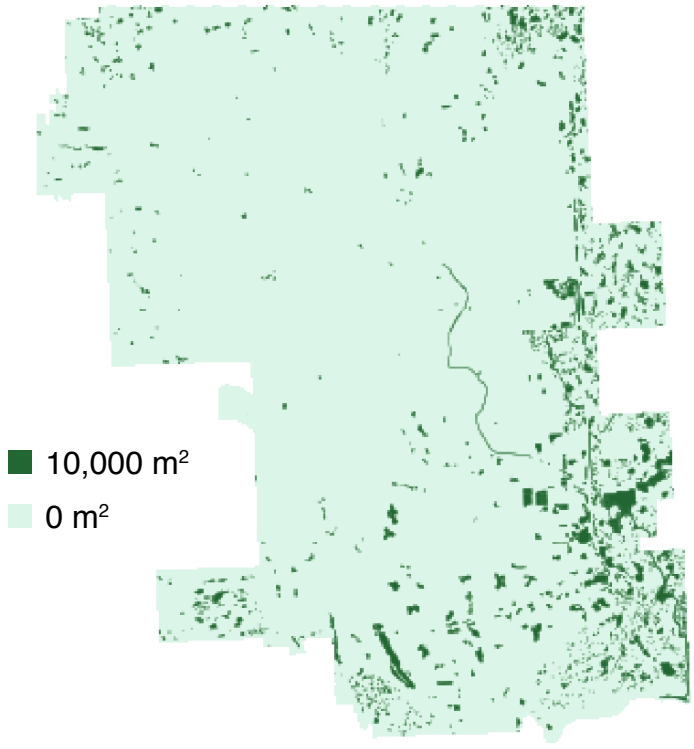


Road Length





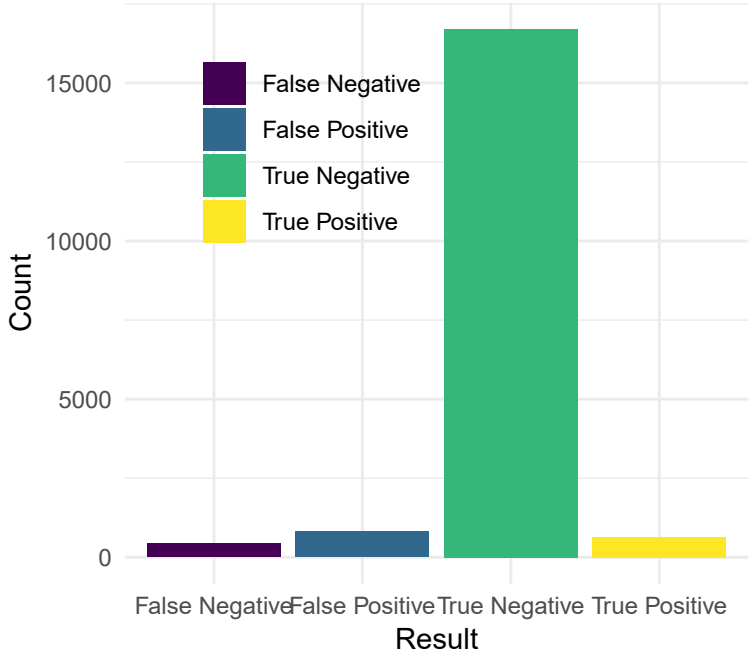
Flow Accumulation



Wetland Area

The Model

Prediction Results

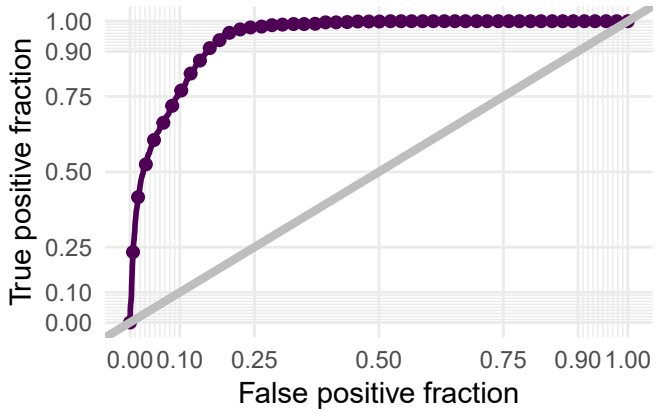


Model Features

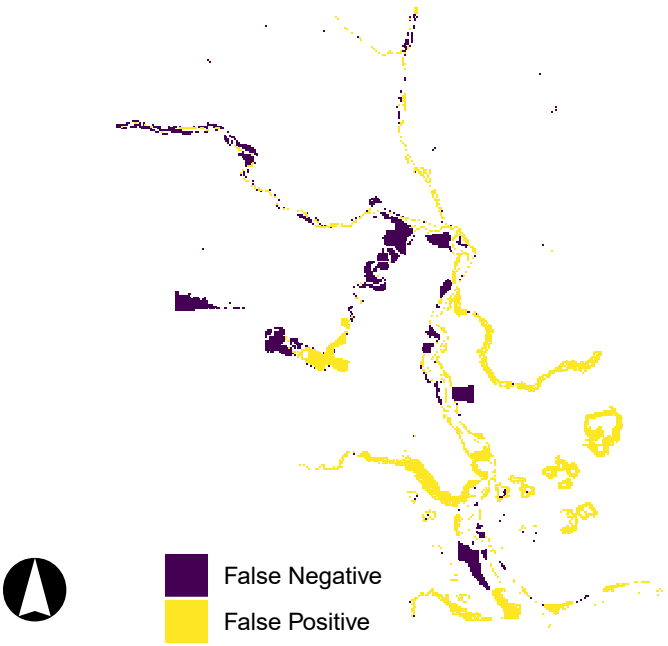
	Z Value	P Value
Flood ~		
(Intercept)	2.552	2.00^{-16}
Permeable Area +	3.803	1.43^{-03}
Water Area +	8.054	8.02^{-16}
Wetlands Area +	-13.876	2.00^{-16}
Normalized Elevation +	-39.871	2.00^{-16}
Road Length +	-2.575	1.00^{-02}
Distance to Stream +	-39.487	2.00^{-16}
Slope +	-8.153	3.54^{-16}
Stream Order +	6.648	2.97^{-11}
Flow Distance +	-3.125	1.78^{-03}
Flow Accumulation	-4.400	1.05^{-05}

The predictive model has an overall accuracy of 95%, but that is largely because most of the city does not flood. Within the areas that flood, the accuracy was only 59%.The low variation in accuracy on differnet subsets of the training data indicate the model is generalizeable, but the errors are highly clustered as shown in the map below, showing spatial bias.

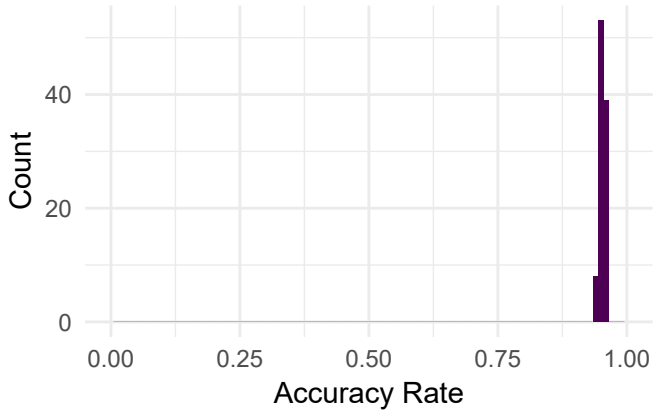
ROC Curve for Test Set



Clustered Errors

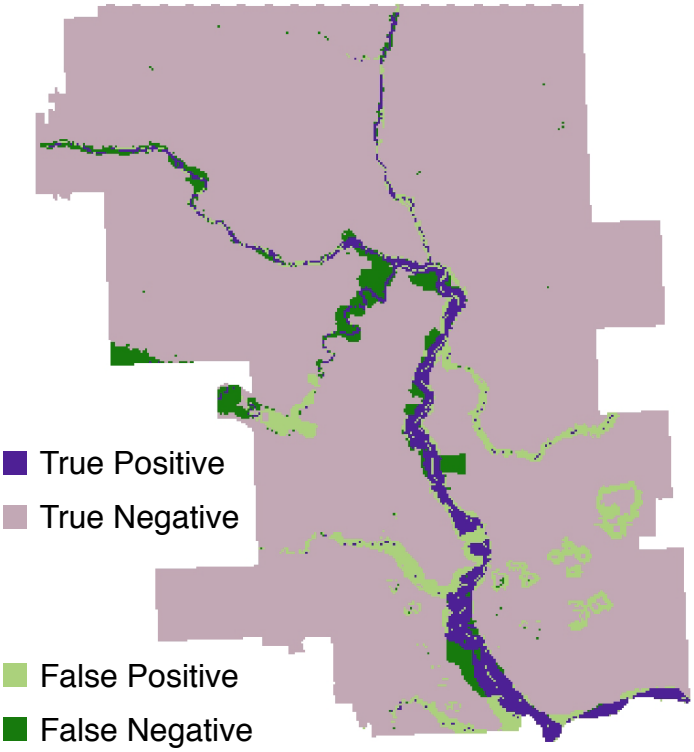


100 Subset Variation in Accuracy

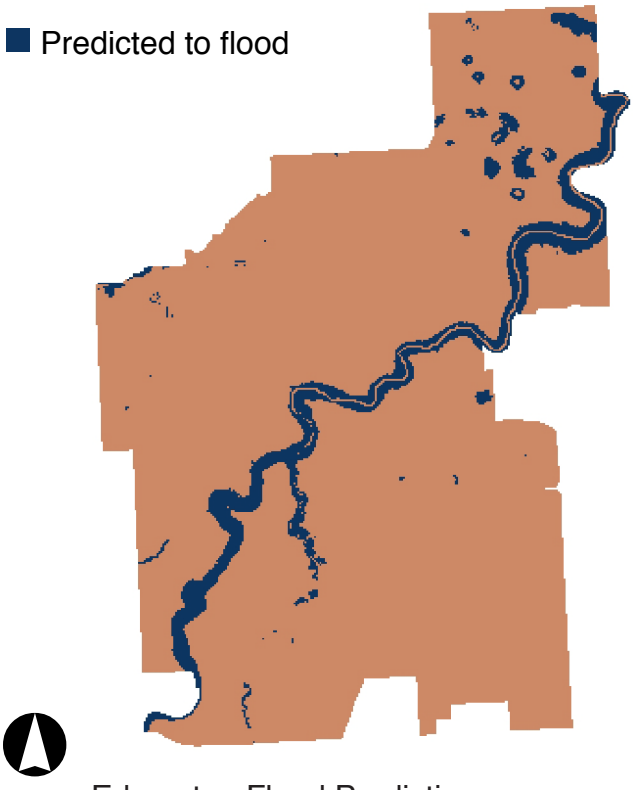


The Results

Calgary Prediction Outcomes



Calgary Flood Prediction



Edmonton Flood Prediction

Overall, this model would be useful for Edmonton if the city's physical conditions have changed since past flood events. Decreases in permeable area, elevation changes due to regrading, and changes in road length are a few factors that could change the potential extent of inundation. Pairing these results with local knowlege will help mitigate future flood impacts.