Risks to Private Wells

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NC PFAS Testing (PFAST) Network, a research program funded by the NC Policy Collaboratory

High Variation in GenX and PFAS in Private Wells Has Been Observed

1,054 private wells tested

- 18% > GenX health advisory

Map Key

- Red = > 140 ng/L
- Yellow = 0- 140 ng/L
- Green = nondetect

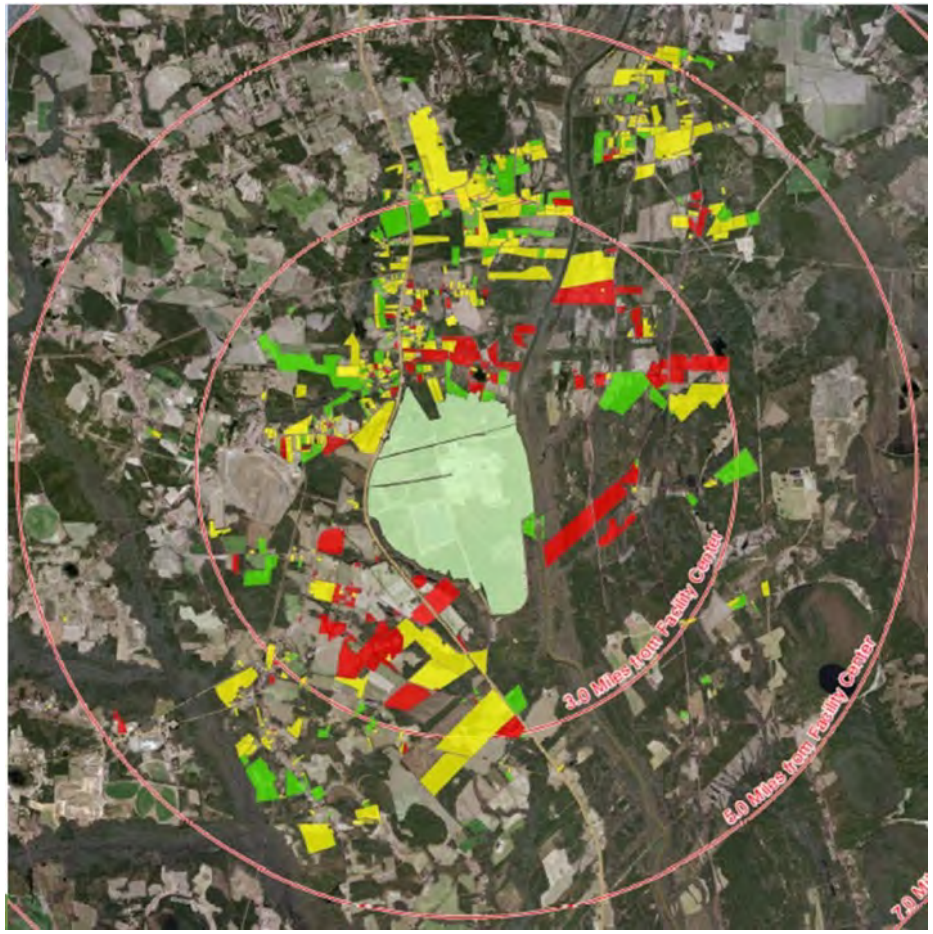


Figure courtesy of DEQ

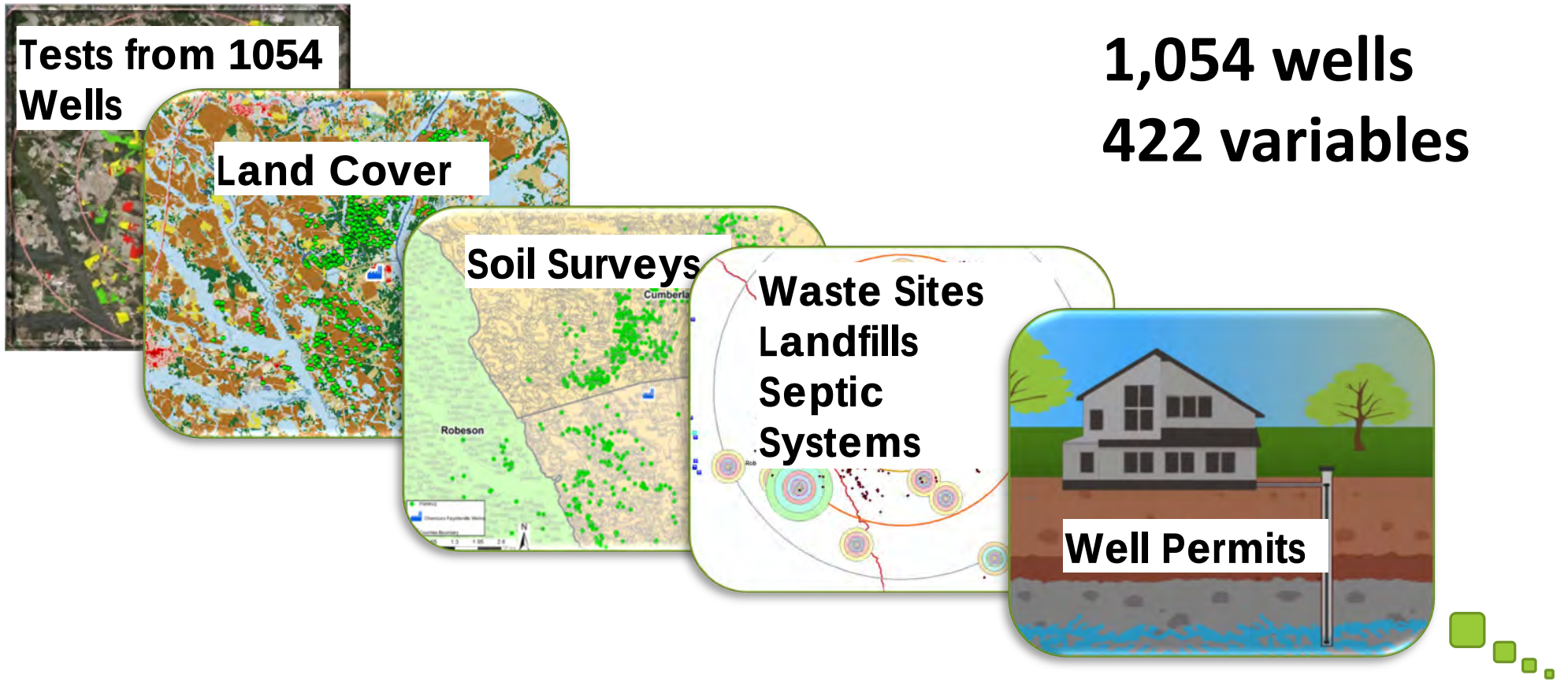
Research Objectives

1. Determine why some wells are contaminated and others are not.
   - What features of the wells, landscape, geology, weather, and geographic location influence risks to wells?

2. Develop a method for predicting risks in untested wells.

METHODS

We Built a Database of Multiple Factors That Might Influence GenX in Well Water



1,054 wells

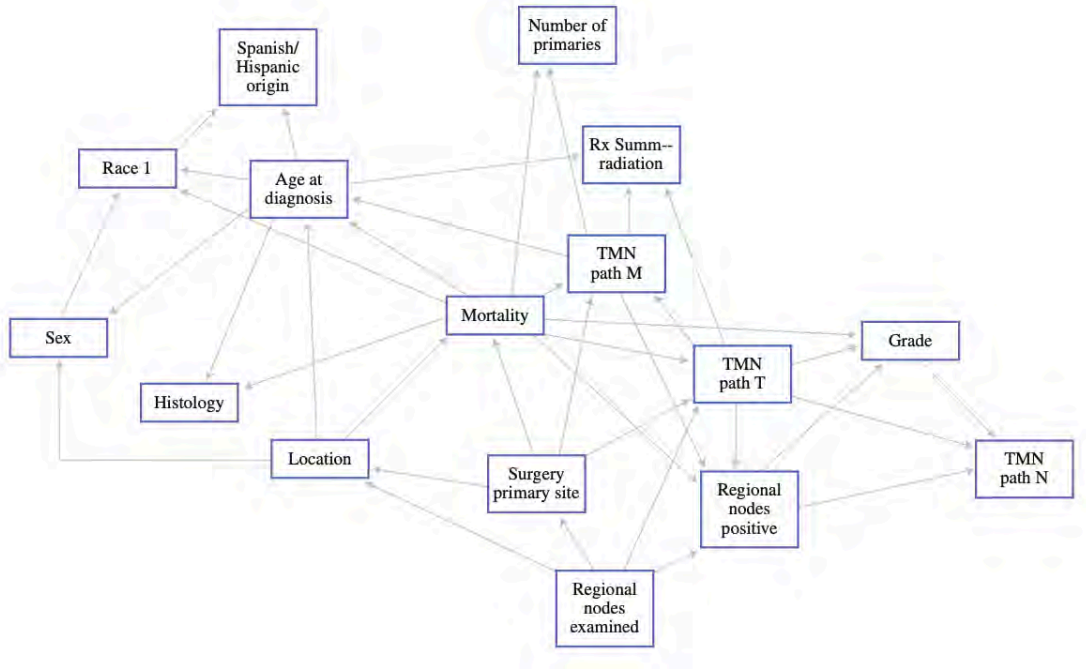
422 variables

We Used Artificial Intelligence to Build a Diagnostic Tool

Methods are similar to those used in medical diagnostics.

Search for patterns in data from previous patients.

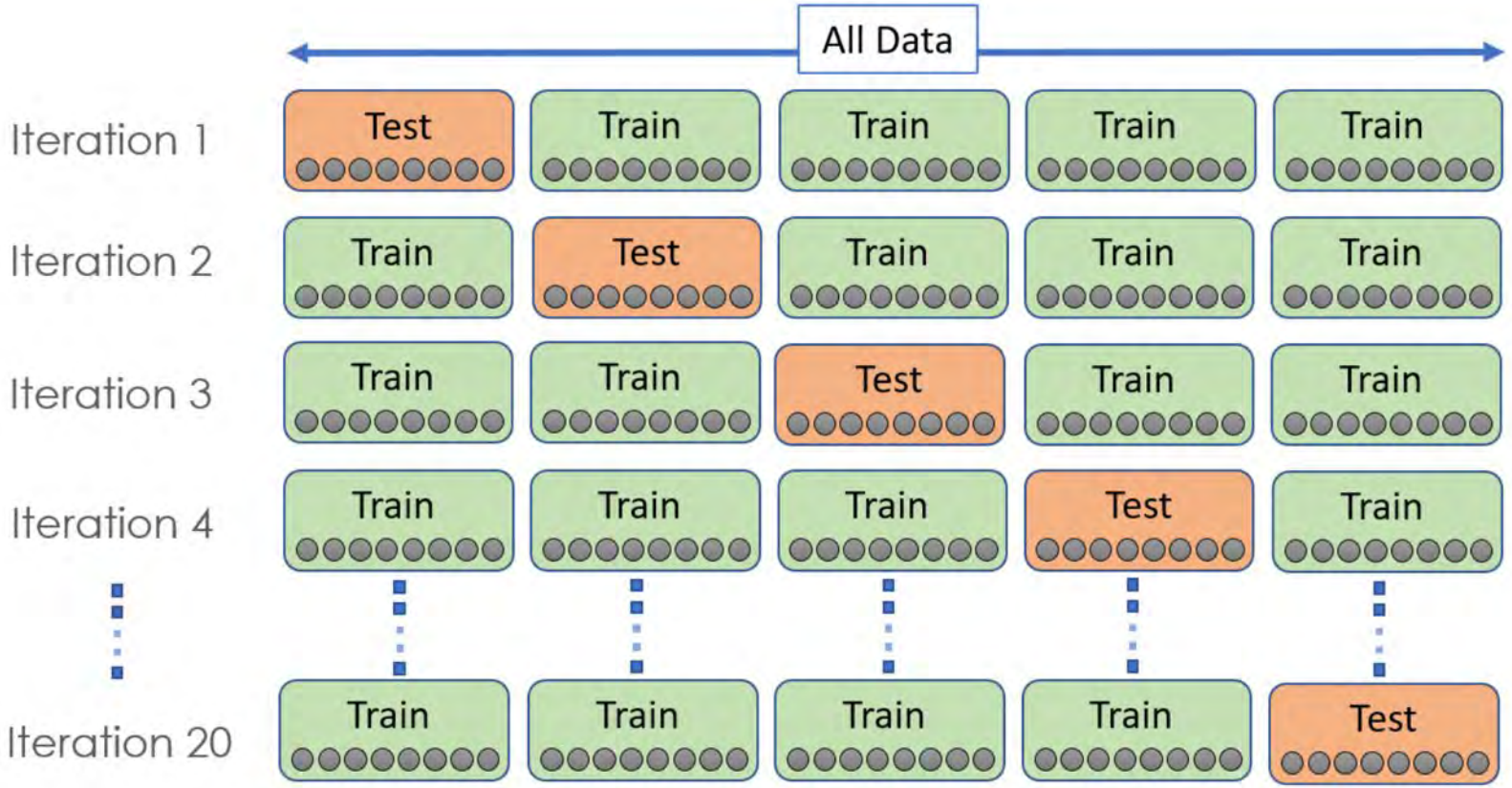
- Analogy: contaminated well=sick patient.



Example: Predicting most effective treatment for colon cancer.

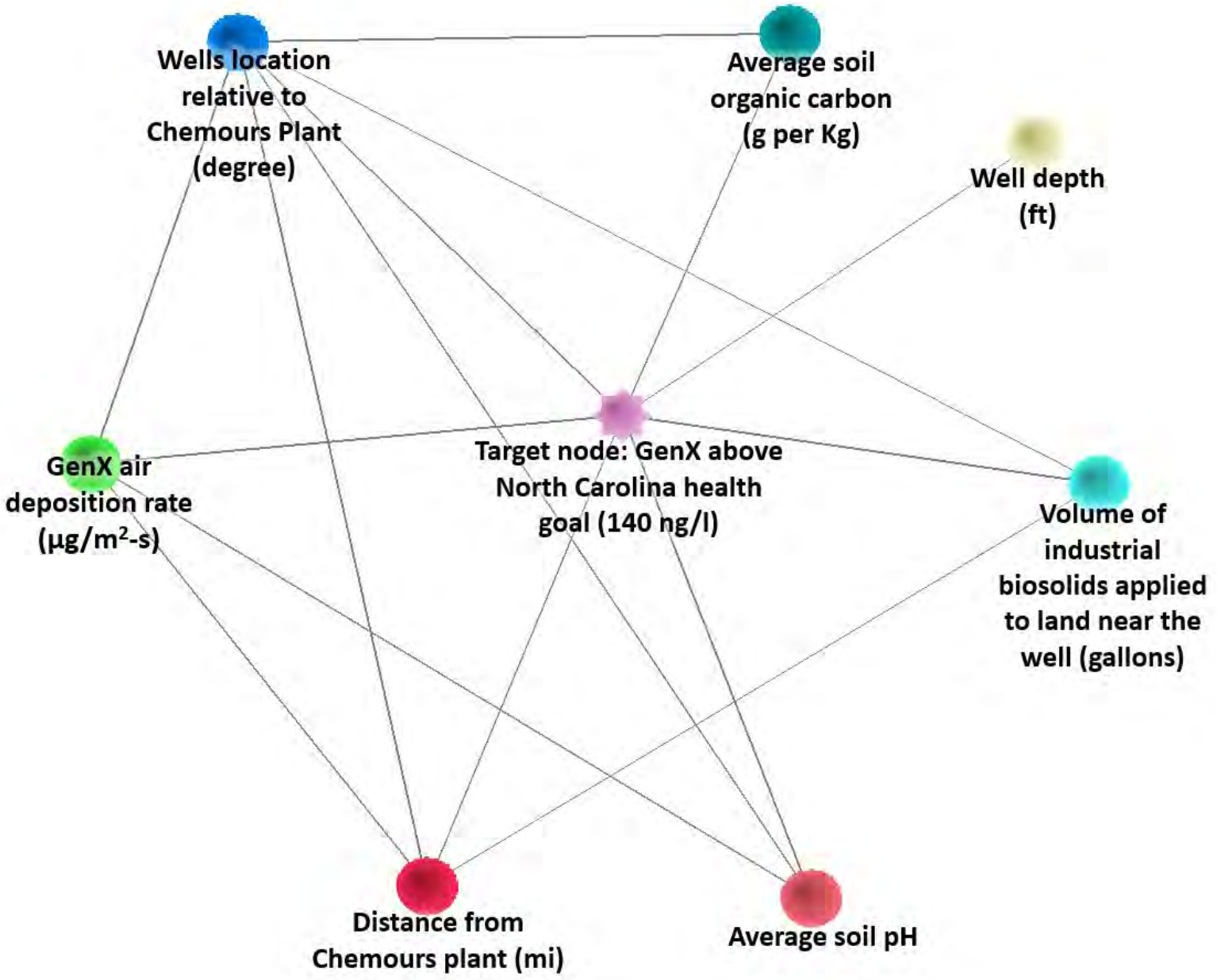
SOURCE: Stodjadinovic et al., 2013

We “Train” the Model on Part of the Data and Test Its Accuracy on the Rest



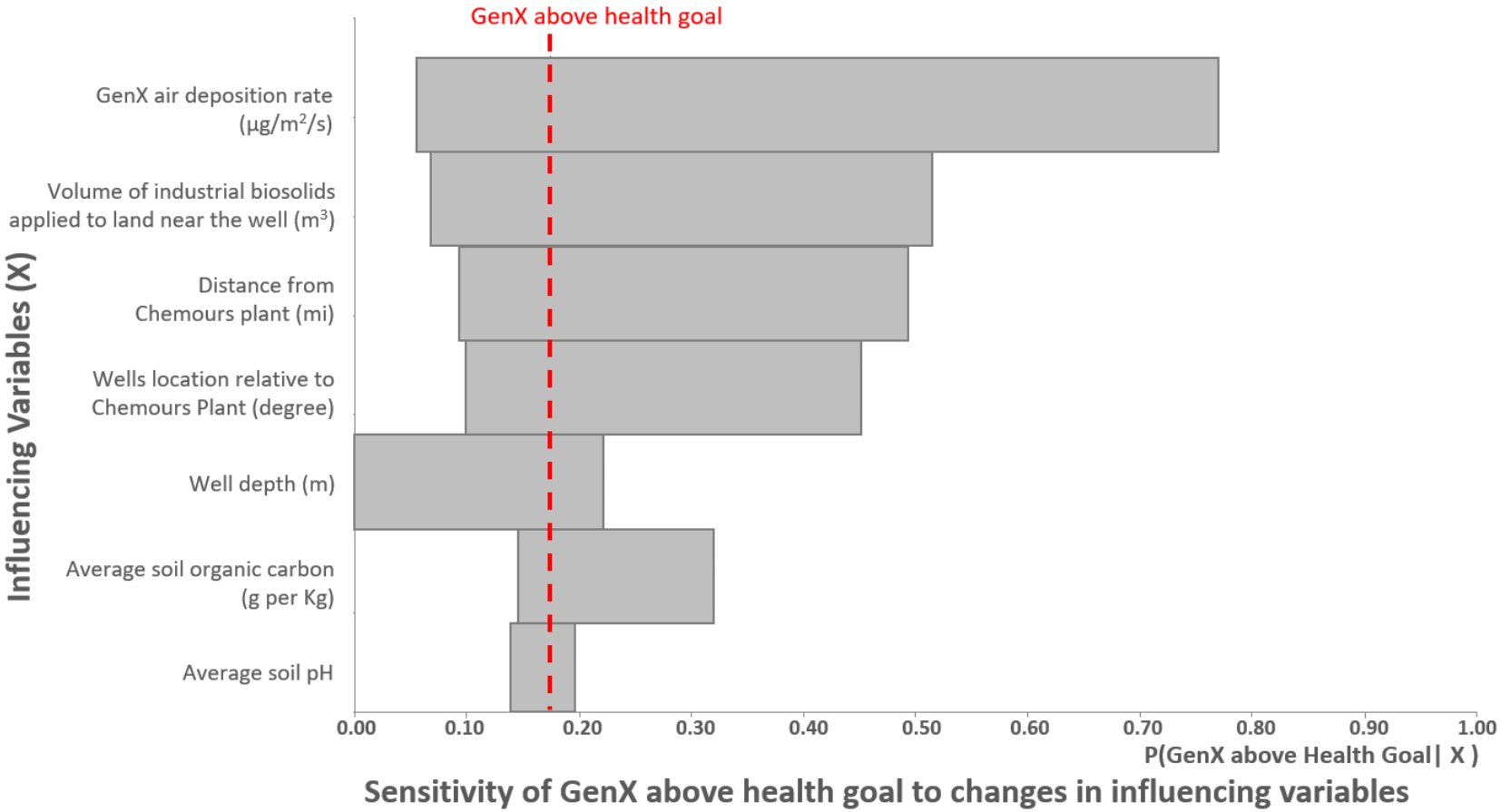
Results

Only a Few Variables Are Important Predictors



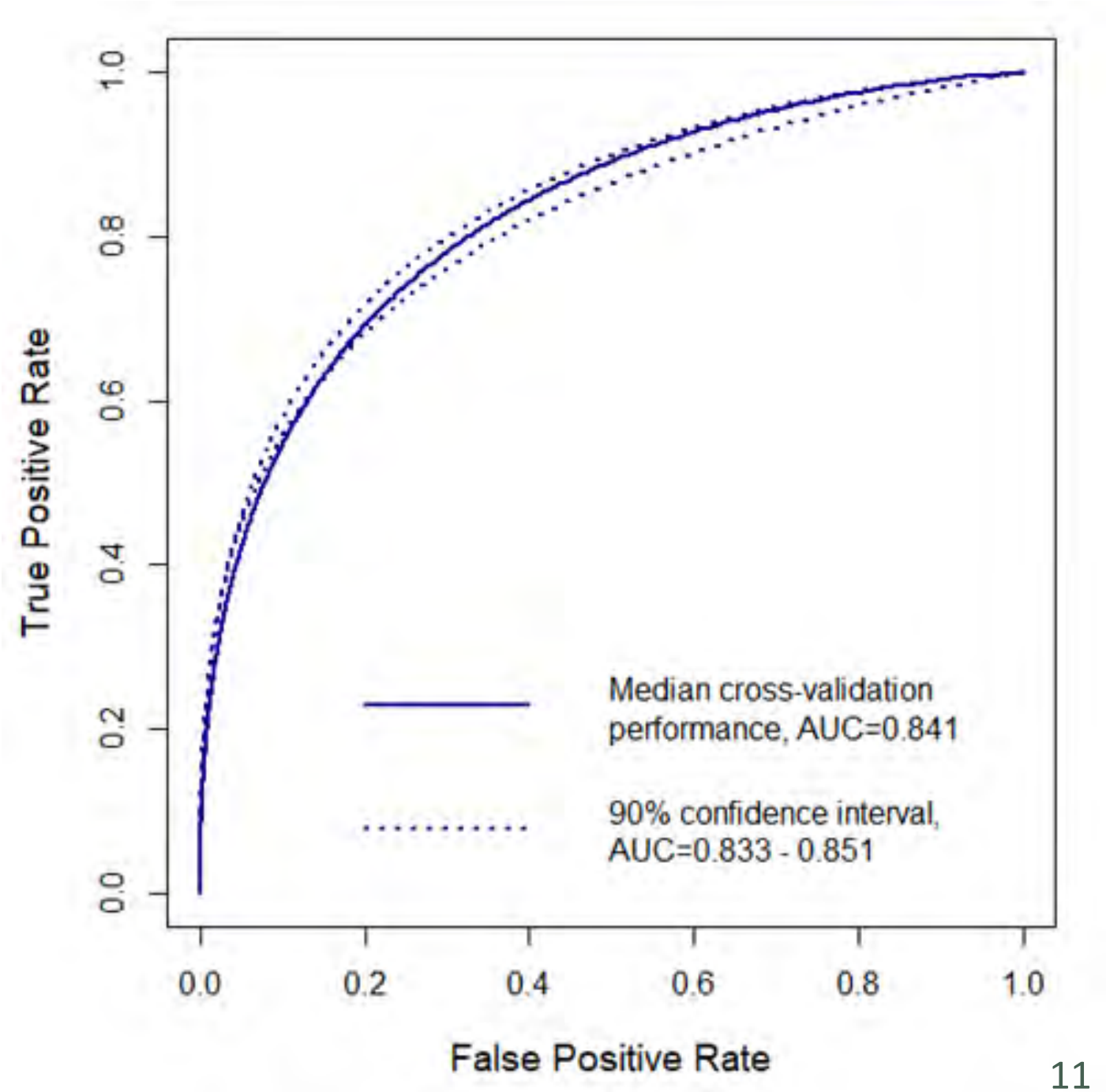
Even Fewer Variables Have Strong Effect

- Air deposition
- Industrial biosolids
- Distance from Chemours

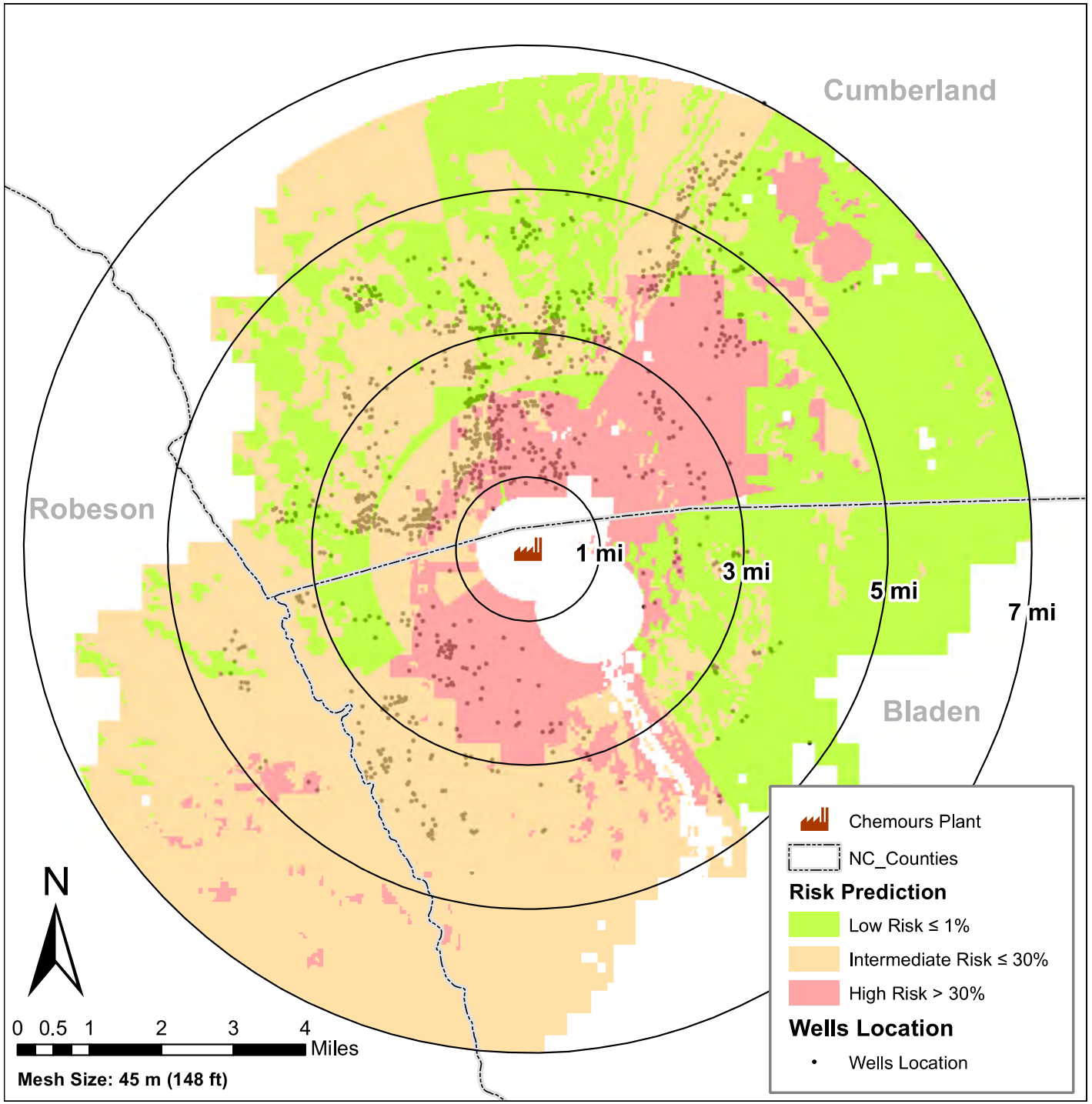


The Model Has Very Good Accuracy

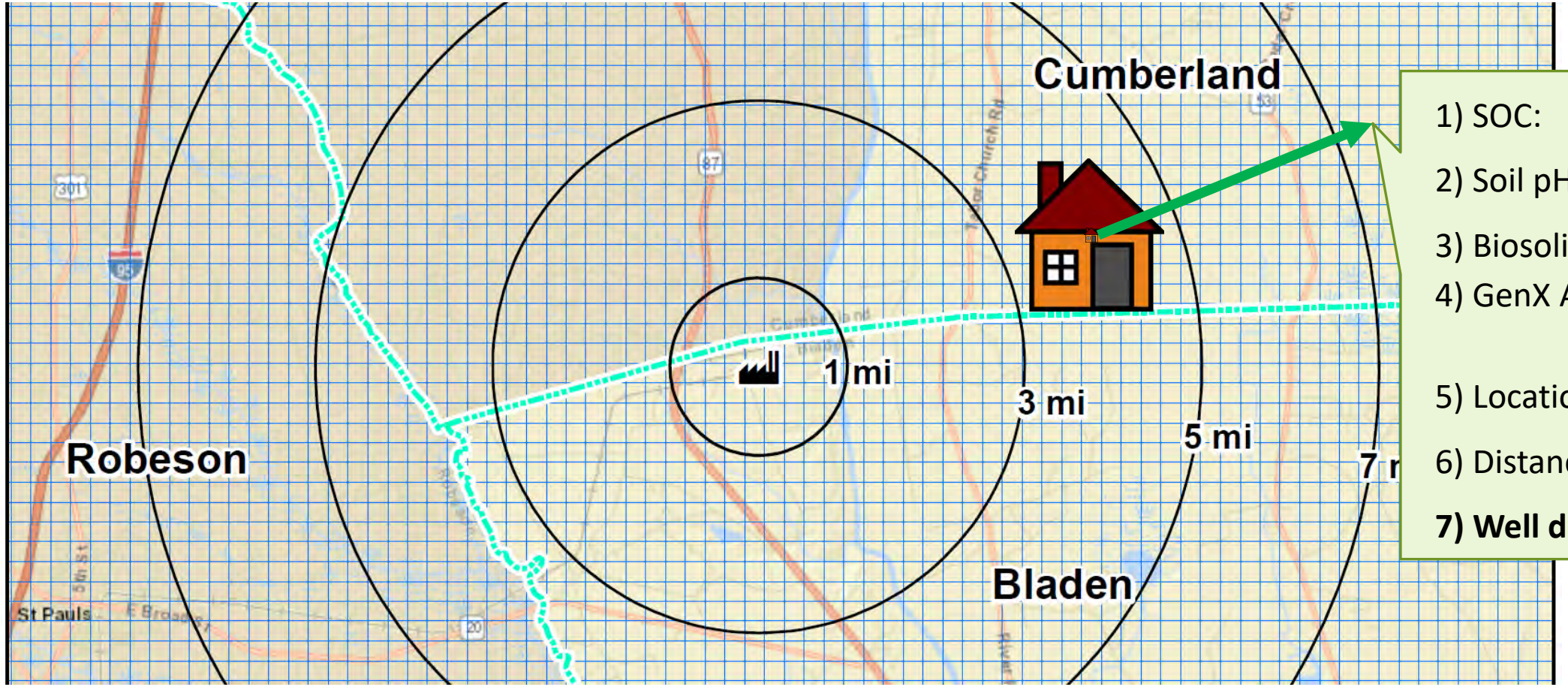
- Performance metric for "classifiers:" area under receiver-operating characteristic curve (AUC)
- Typical metrics:
  - >0.8="good"
  - >0.65=fair"
  - ≤0.5 = "poor"



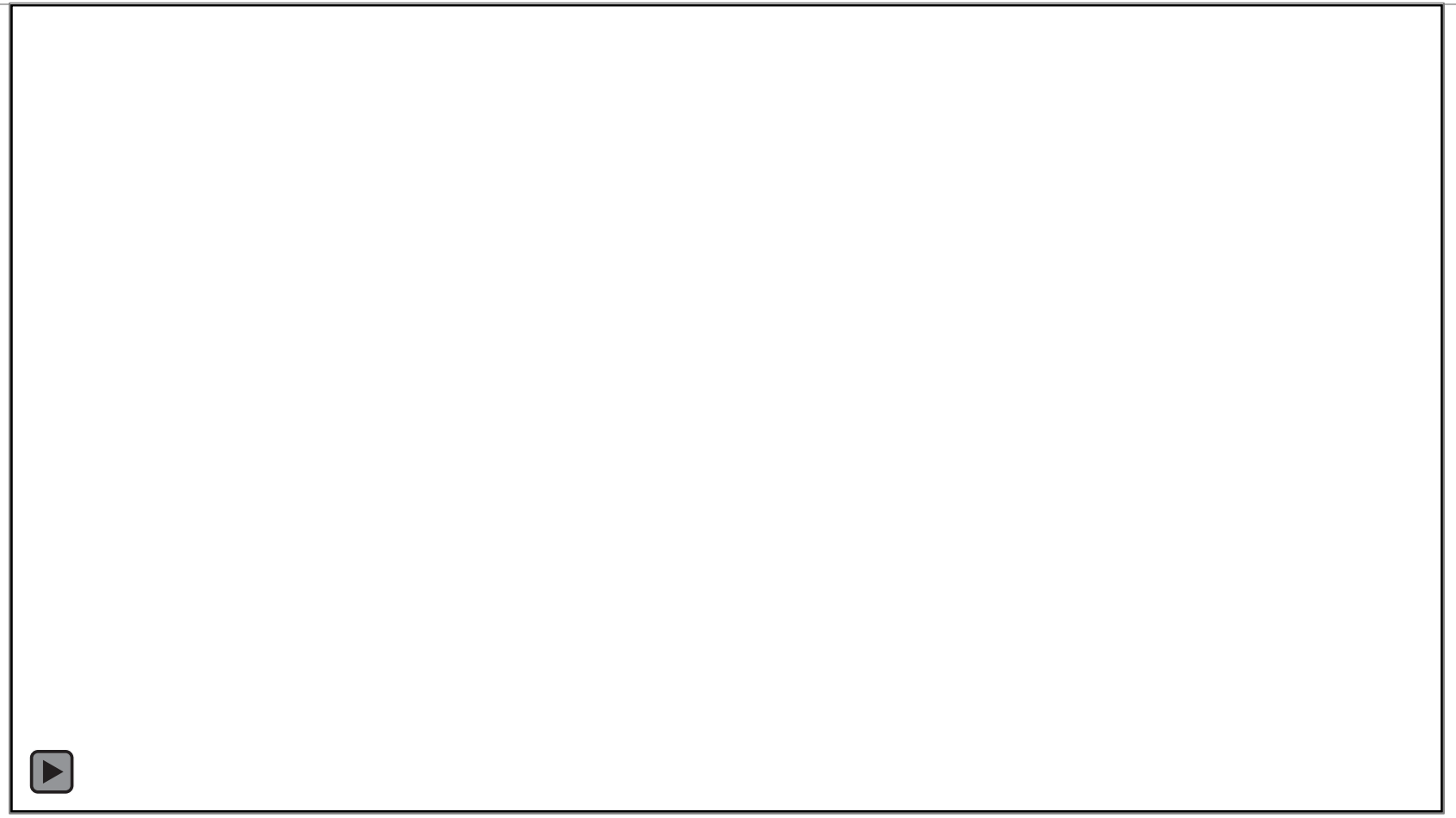
Model Can Be Used to Map Risks at Unsampled Wells



With Well Depth the Model Can Calculate the Risk



Prototype Web Version Allows Users to Predict Risks at Untested Wells



http://bit.ly/GenXSI