West Nile Virus: Data and Modeling

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Roadmap

- Background
- Introductory data exploration
- Model building and methodology
- Findings
- Recommendations

<u>Objectives</u>

Analysis of provided data

Model building for predictions

Recommendations for pesticide deployment

- 1. Chicago DPH mosquito data
 - Trap location, date, species, WNV present

- 2. NOAA weather
 - 2 stations
 - Times, temperature, precipitation, atmospheric pressure, observations

- 3. Pesticide spray data
 - Date and location

- Data 3 sources:
 - 1. Chicago DPH mosquito data
 - 2. NOAA weather data
 - 3. Pesticide spray data

Modeling Approach

Associate each trap test with weather and spray data

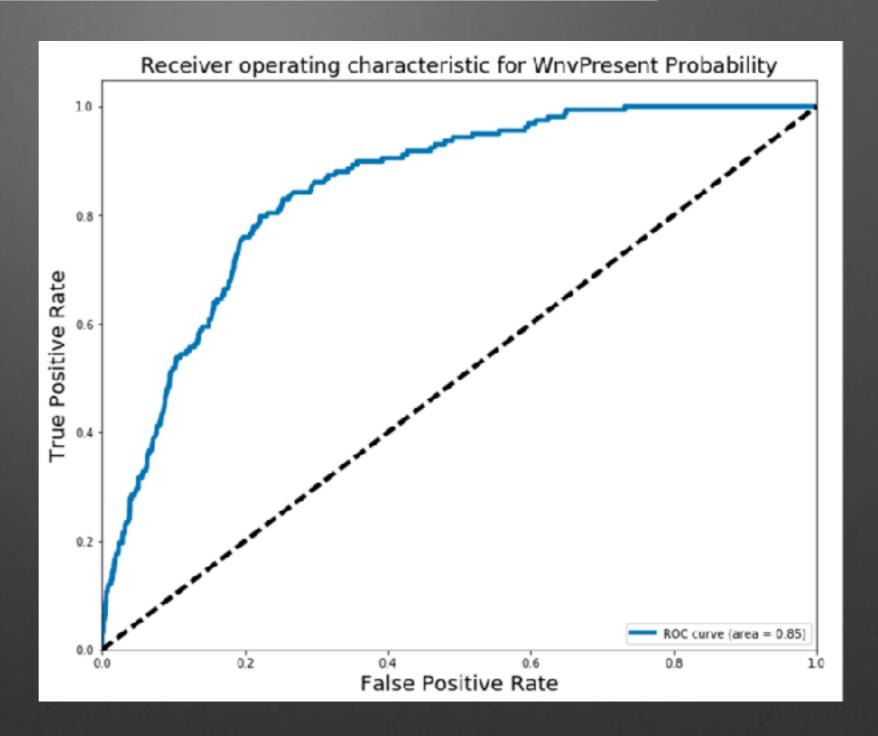
Determine factors that made for an effective predictive model

Measure model effectiveness

Model Effectiveness

ROC-AUC

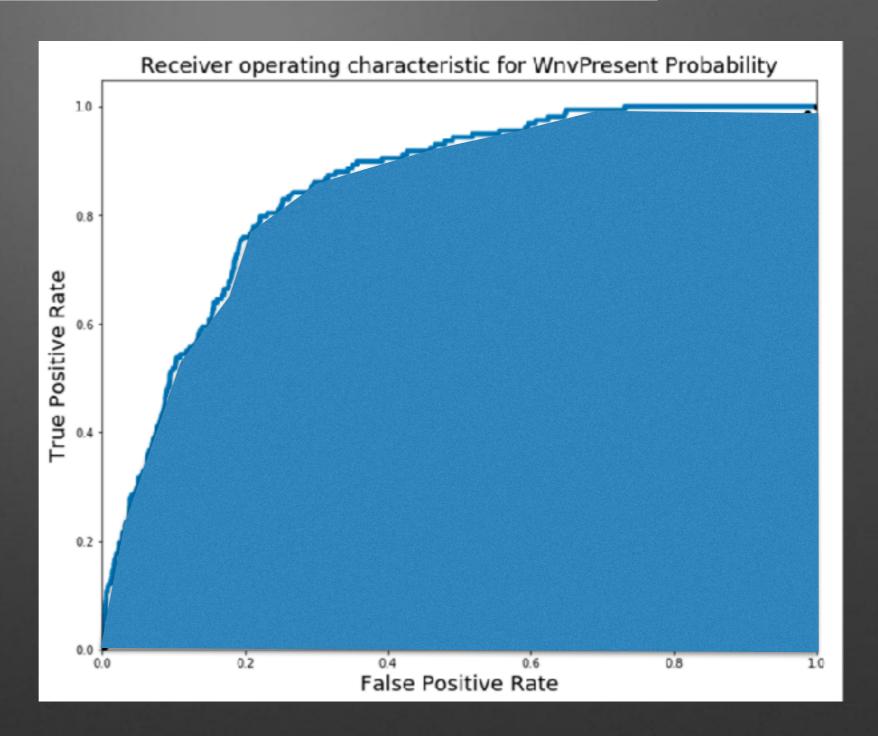
"Area under the curve"



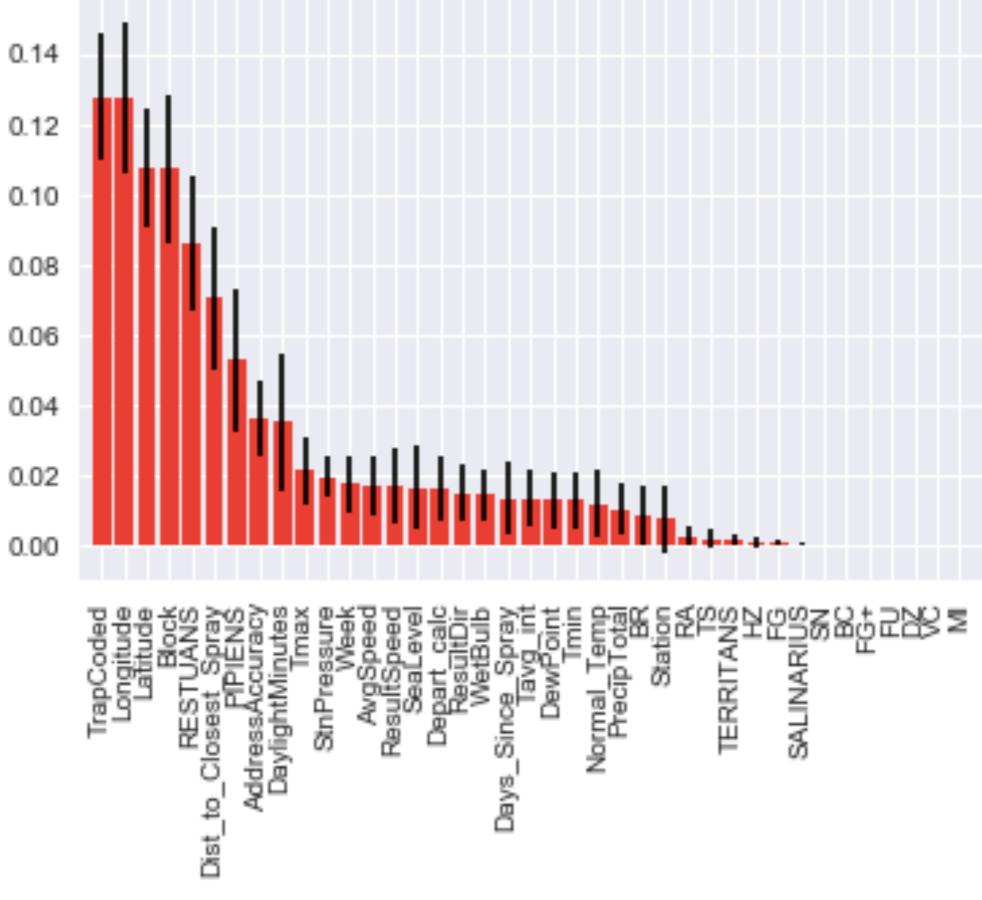
Model Effectiveness

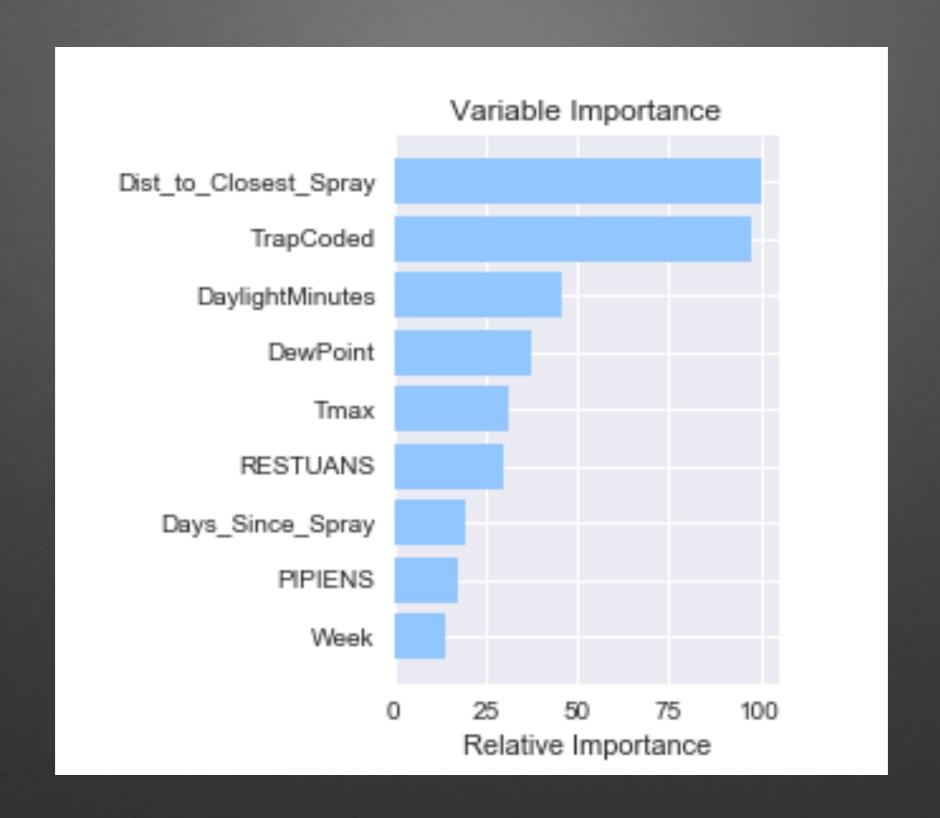
ROC-AUC

"Area under the curve"



Feature importances





To Tableau



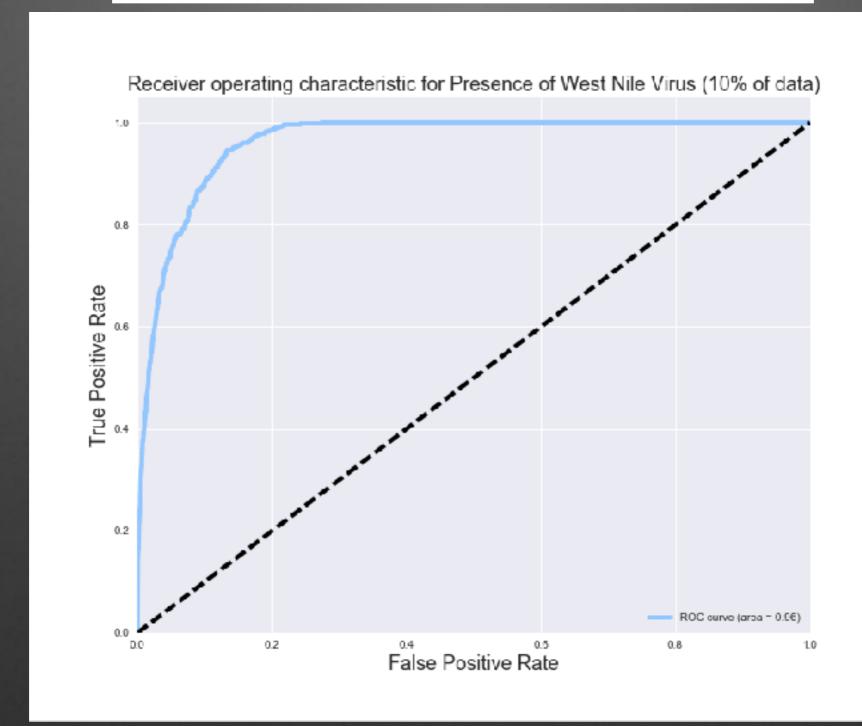
Unfortunately, # mosquitoes is the strongest predictor

TrapCoded	1	-0.002	-0.03	0.00067	-0.036	-0.032	0.0043	-0.058	-0.063	0.0092		c
MESTLANIS	-0.002	1	-0.24	0.23	-0.082	-0.069	-0.25	-0.096	-0.011	-0.08		
PIPIENIS	-0.03	-0.24	1	-0.25	0.058	0.038	0.27	0.048	-0.036	0.11		
Dayligh Hinutes	0.00067	0.23	-0.25	1	0.15	0.17	-0.95	0.092	0.29	-0.08		6
De∡Peier	-0.038	-0.082	0.058	0.15	1	0.75	-0.014	0.18	0.16	0.085		c
Innax	-0.032	-0.069	0.038	0.17	0.75	1	-0.024	0.098	0.092	0.051		
West	0.0043	-0.25	0.27	-0.95	-0 014	-0 024	1	-0.078	-0.3	0.1		
Disk to Glosest Spray	-0.058	-0.096	0.046	0.092	0.18	0.098	-0.078	1	0.84	-0.11		
Days_Sinor_Spray	-0.083	-0.011	-0.036	0.29	0.18	0.092	-0.3	0.84	1	-0.15		4
Versitreased	0.0092	-0.08	0.11	-0.08	0.085	0.051	0.1	-0.11	-0.15	1		
	Topological	IALSTOANS	HFIRM	Contribition no	Inc. Ivad	carri	Yer.	Series Character Spring	Daya_Sinu_Spruy	WhiteFrence		

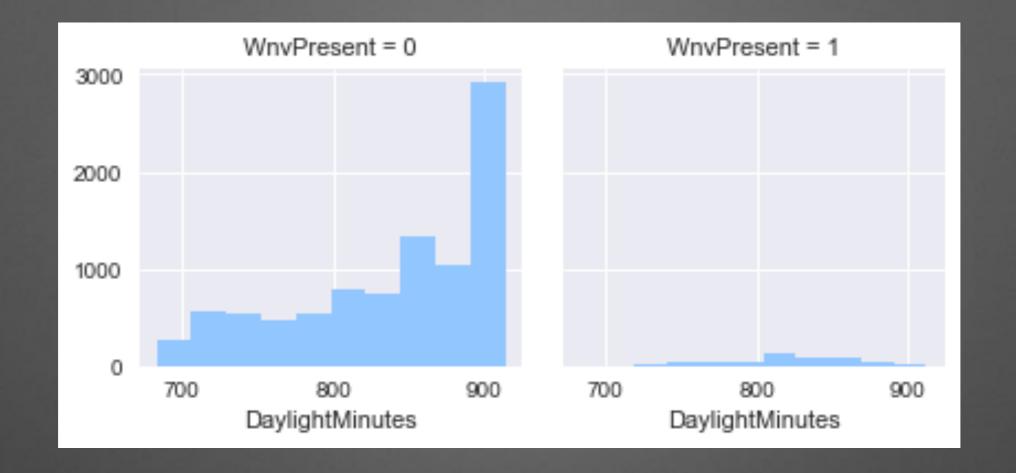
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InspCoded	1	0.008	0.0076	-0.001	8.20-05	0.0005	0.0012	0.03	0.00048	0.066		D.U
RESTLIANS.	0.008	1	0.34	0.0048	0.0047	0.0044	-0.0027	-0.0088	-0.0071	0.15		
PERLING	0.0076	0.34	1	0.00095	0.0046	0.0033	0.0013	0.0073	0.0055	0.3		04
Doylight Minutes	-0.001	0.0048	0.00095	1	0.24	0.42	-0.95	0.015	-0.058	-0.1		11-1
DiscFei-4	8.2e-05	0.0047	0.0046	0.24	1	0.59	-0.15	0.099	0.091	0.12		na
Irrax	0.0005	0.0044	0.0033	0.42	0.59	1	-0.38	0.053	0.029	0.097		
Wash	0.0012	-0.0027	0.0013	-0.95	-0.15	-0.38	1	-0.0074	0.068	0.13		0.4
Unit to Closest Spray	0.03	0.0086	0.0073	0.015	0.099	0.053	0.0074	1	0.98	-0.086		3.4
Days Since Spray	0.00048	0.0071	-0.0055	-0.056	0.091	0.029	0.068	89.0	1	-0.058		
Várs/Prosent.	0.068	0.15	0.3	-0.1	0.12	0.097	0.13	-0.086	-0.058	1		0.0
	TrapCoded	ROSTI, AABS	SELECTION	Dojudkinko	Describe	Irrax	Mass	ره برقی امتحد کی بال دا	Days Stony Spory	Vary health		

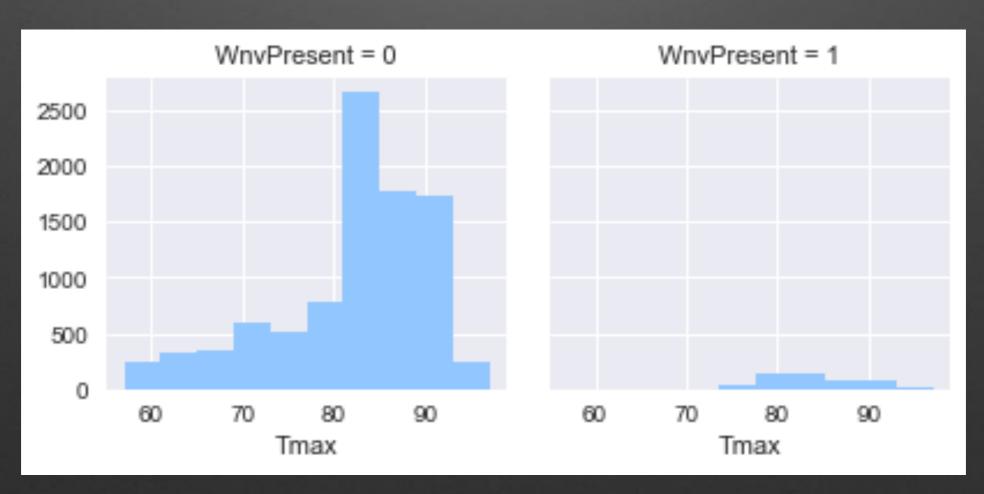
Findings

Model Evaluation

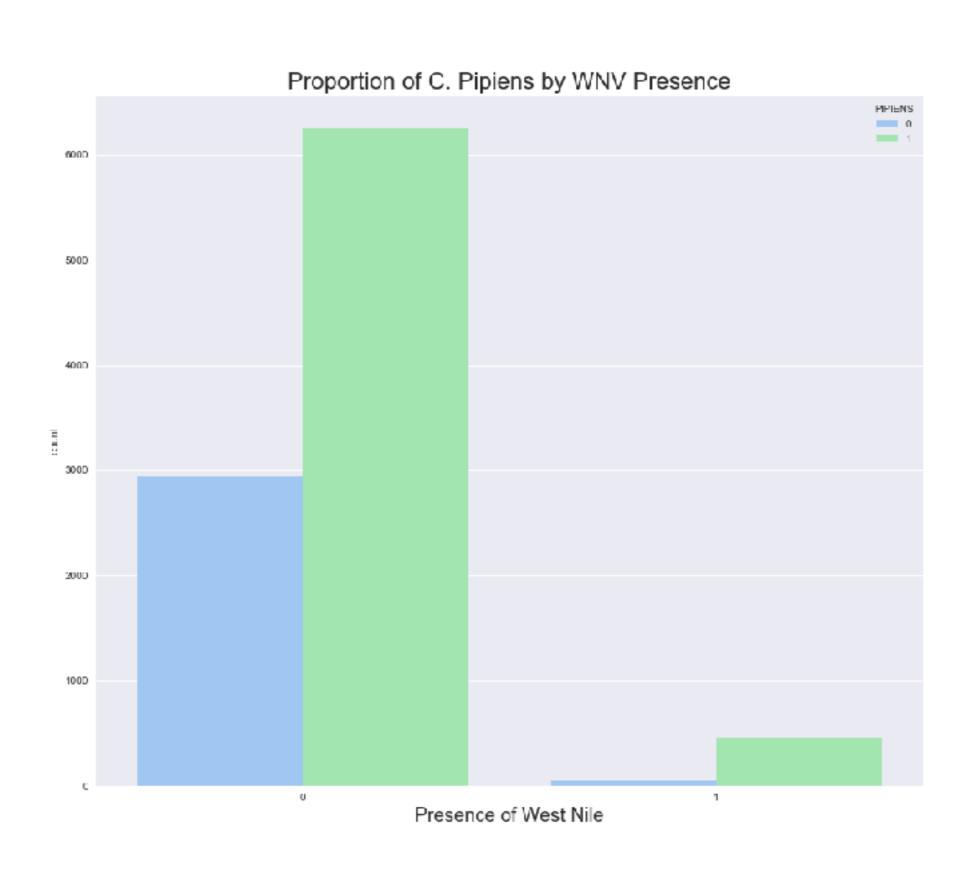


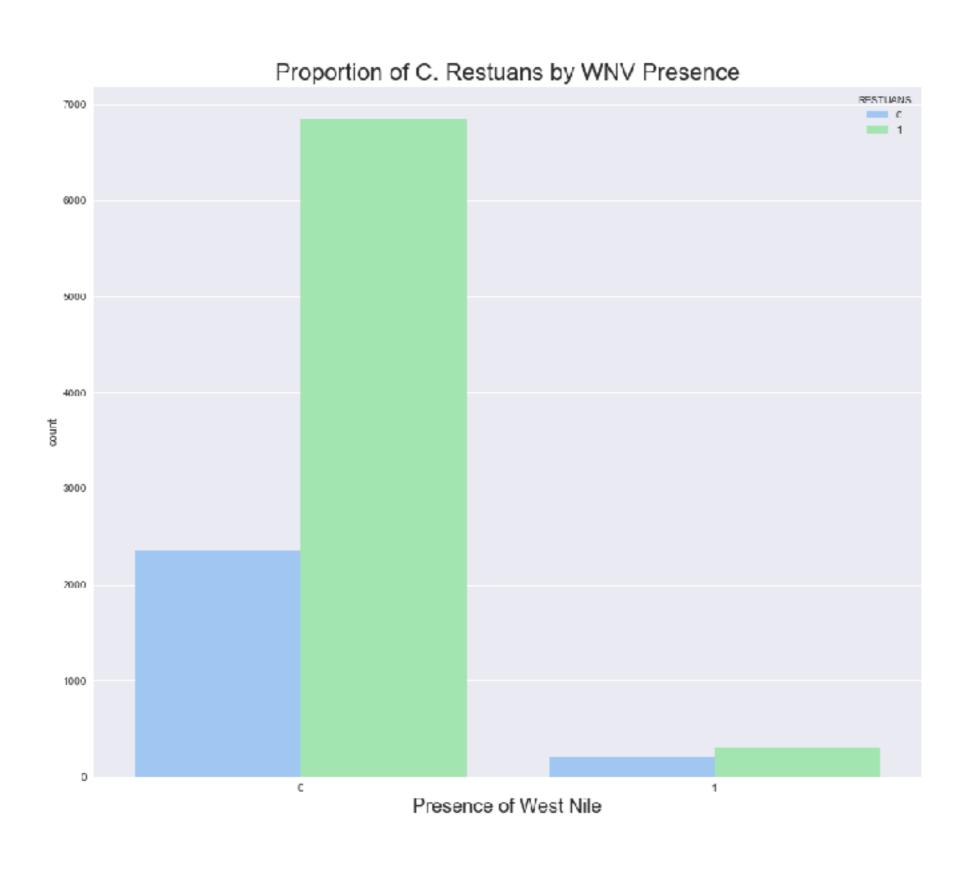
ROC-AUC Score: 0.745 / 0.748





Background • Exploration • Modeling • Findings • Recommendations





Preventative vs. Reactionary?

Difficult to recommend with this spray data

Enhanced risk:

1 moisture & 1 temperature

- Focus areas:
 - + trap, C. restuans and C. pipiens
 - Population centers, ORD, MDW

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Future Directions

Model runs with more complete data

(Test group missing # of mosquitoes)

Incorporate updated data

Questions?