EEB313 Project Figures and Tables

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Table 1: Description of EAB Data Variables

Variable_Name	Variable_Description	Units	Type
Latitude	Latitudinal position of observational site	degrees (°)	Numeric
Longitude	Latitudinal position of observational site	degrees (°)	Numeric
Year	Year of sampling	N/A	Numeric
Community	Communities of Ontario that were surveilled for EAB presence (n=92)	N/A	Categorical
Community Type	Characterized each Ontario community as either rural or urban	N/A	Categorical
Avg Temp	Average annual temperature for each Ontario community	degree Celsius (°C)	Numeric
Result	EAB presence denoted in the dataset as detected or not detected	N/A	Categorical

Table 2. Results from the summaries of the GLM models constructed.

Model_Description	GLM	Statistical_Significance	P_Value	Model_AIC
1: The effect of time on EAB detection.	glm(as.factor(result)~ year, family = binomial, data = ont_eab_data)	Yes	0.8*10−7	8152.5
2: The effect of time, community, and their interaction on EAB detection.	glm(as.factor(result)~ year*community, family = binomial, data = ont_eab_data)	No	0.997−1.00	6391
3: The effect of community type on EAB detection.	glm(as.factor(result)~ community_type, family = binomial, data = ont_eab_data)	Yes	<2*10−16	7656.8
4: The effect of temperature on EAB detection.	glm(as.factor(result)~ avg_temp, family = binomial, data = ont_eab_data)	Yes	<2*10−16	8048.4
5: The effect of temperature and community on EAB detection.	glm(as.factor(result)~ avg_temp + community, family = binomial, data = ont_eab_data)	2 out of 92 communities were statistically significant. Average temperature was not.	<2*10−16	6806.3
6: The effect of temperature, community type and their interaction on EAB detection.	glm(as.factor(result)~ avg_temp * community_type, family = binomial, data = ont_eab_data)	Community type was statistically significant. The interaction between temperature and community type was statistically significant. Temperature alone was not.	0.000183 (community type) 7.74*10−16 (interaction) 0.171271 (temperature)	7343.5

Table 3. Results from post hoc ANOVAs (test = "Chi") on GLM models that included individual communities.

Model_Description	Variables_Assessed	Associated_P_Values
2: The effect of time, community, and their interaction on EAB detection.	Time Community Interaction	8.3*10−8 <2*10−16 <2*10−16
5: The effect of temperature and community on EAB detection.	Average temperature Community	<2.2*10−16 <2.2*10−16

Figure 1: EAB Data Visualizations

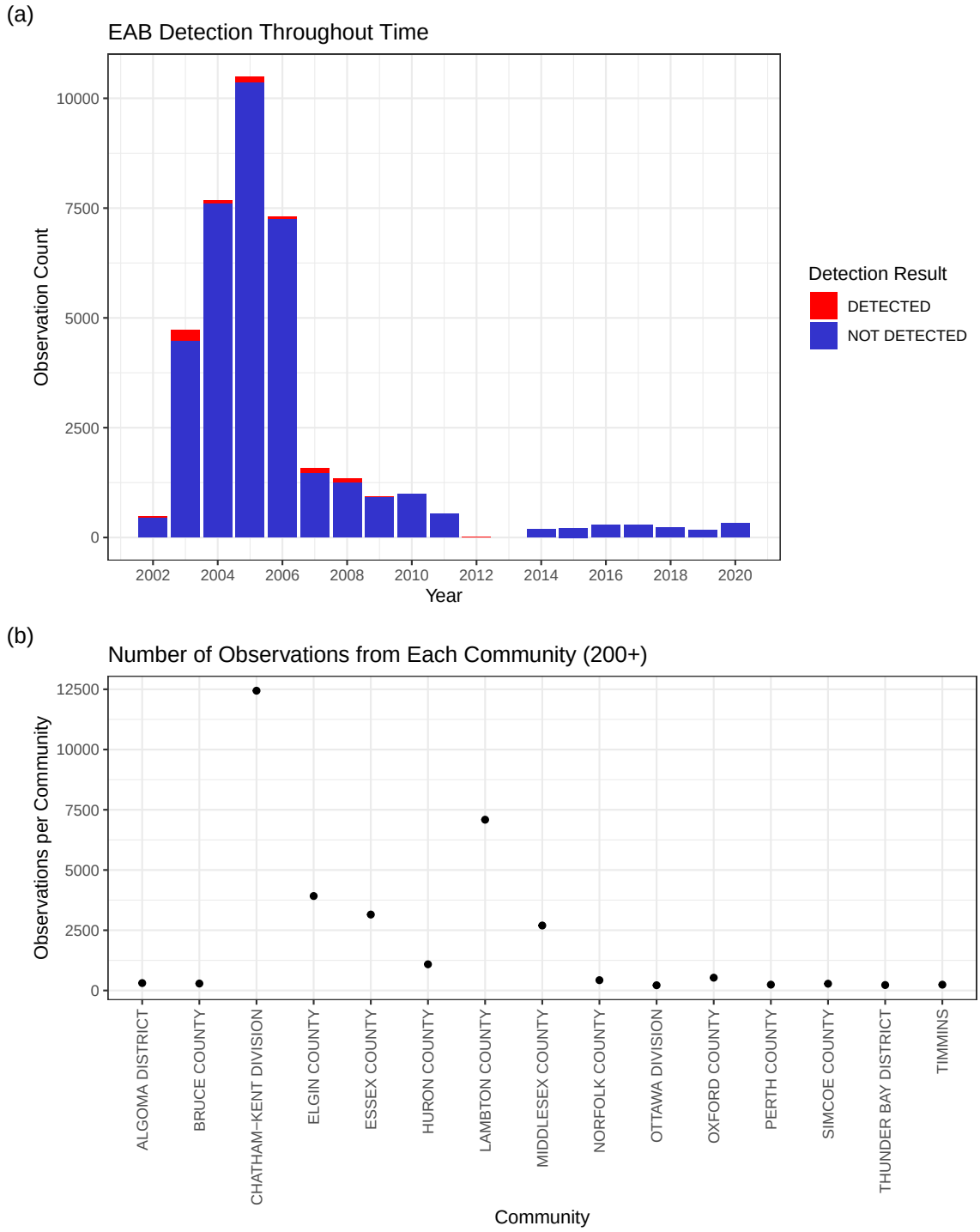


Fig. 1. Visualizing the EAB Data (a) Graph of EAB detection over the years, colour−coded by whether EAB were detected or not for each observation. Note how the number of total observations decreases sharply after 2006 and the number of EAB detections are barely visible given the high number of undetected observations, and (b) Number of observations plotted for communities with 200 or more observations to observe which communities carry the data. Note Chatham−Kent Division has more observations then the rest of the communities, with approximately 12,500 observations out of the total 37,801 observations in our data.

Figure 2: Longitude and Latitude

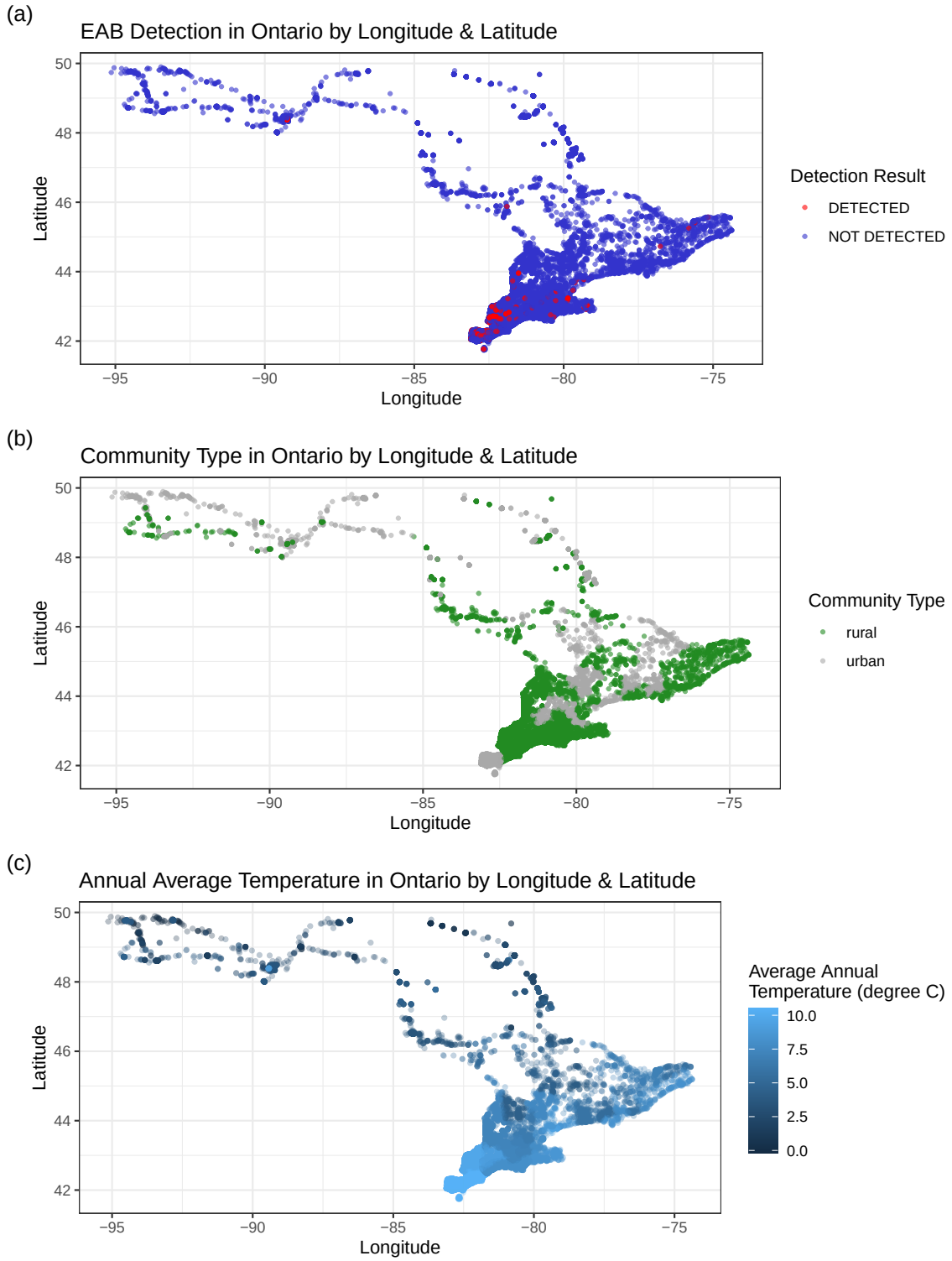
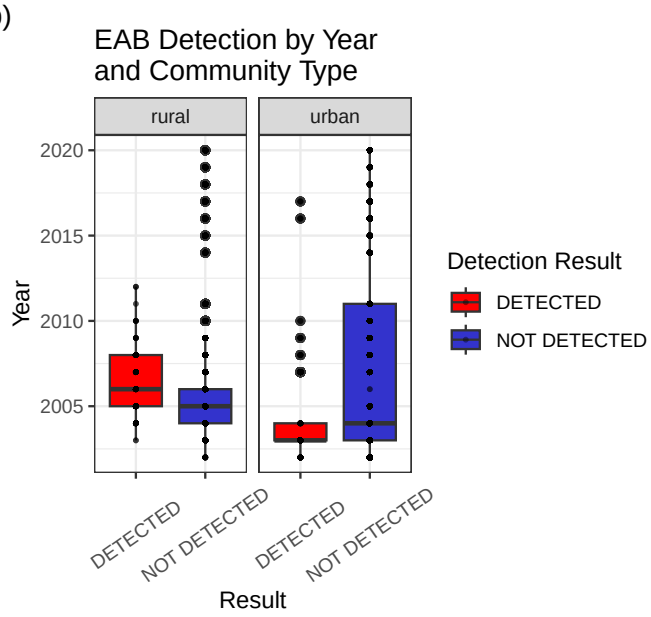


Fig. 2. Visualizing influence of geographical coordinates of observations on (a) EAB detection, (b) community type, and (c) average annual temperature. The longitude and latitude of EAB detections were found to be statistically significant to community type (GLM $P < 0.001$) and average annual temperature (GLM $P < 0.001$) of the communities. Note how EAB detections are clustered in southern Ontario, where we can observe more rural communities and higher average annual temperatures.

Figure 3: Community Type and EAB Detections

	DETECTED	NOT DETECTED
rural	430	31175
urban	426	5770

(b)



(c)

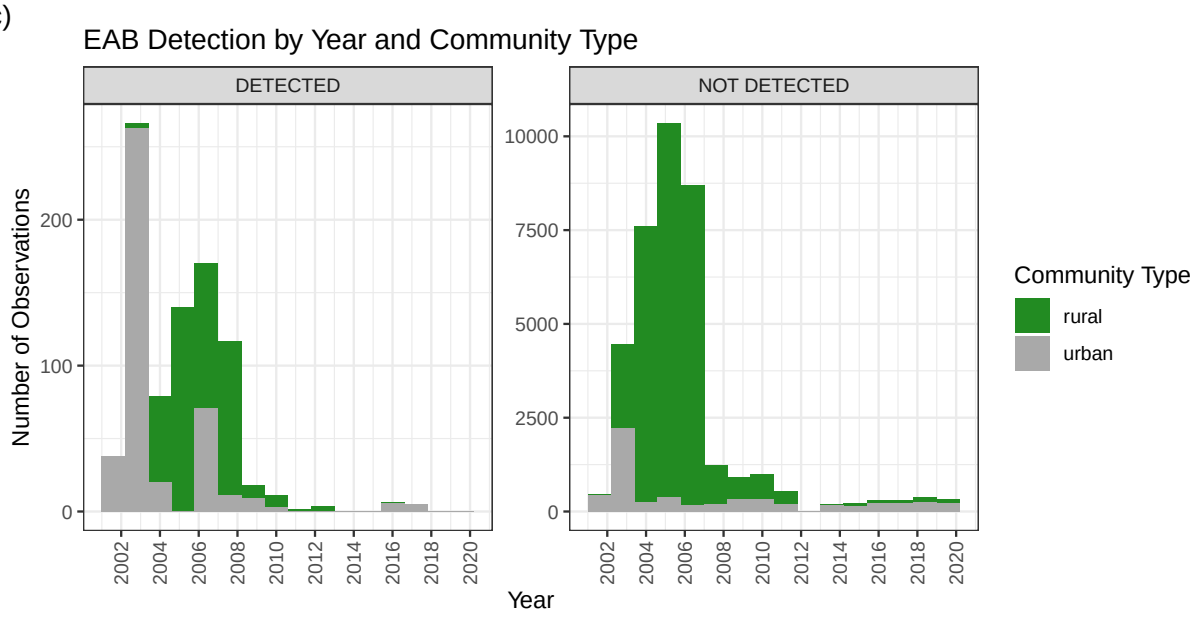


Fig. 3. (a) Number of EAB detected vs not detected for urban and rural community types, (b) boxplot showing EAB detection over the years for each community type, and (c) histogram of observations over the years sorted by community type and whether EAB were detected or not. Note how in the boxplot, the number of EAB detections in rural communities lasts for several years whereas EAB detections in urban communities last a shorter time.

Figure 4: Temperature and EAB Detections

(a)

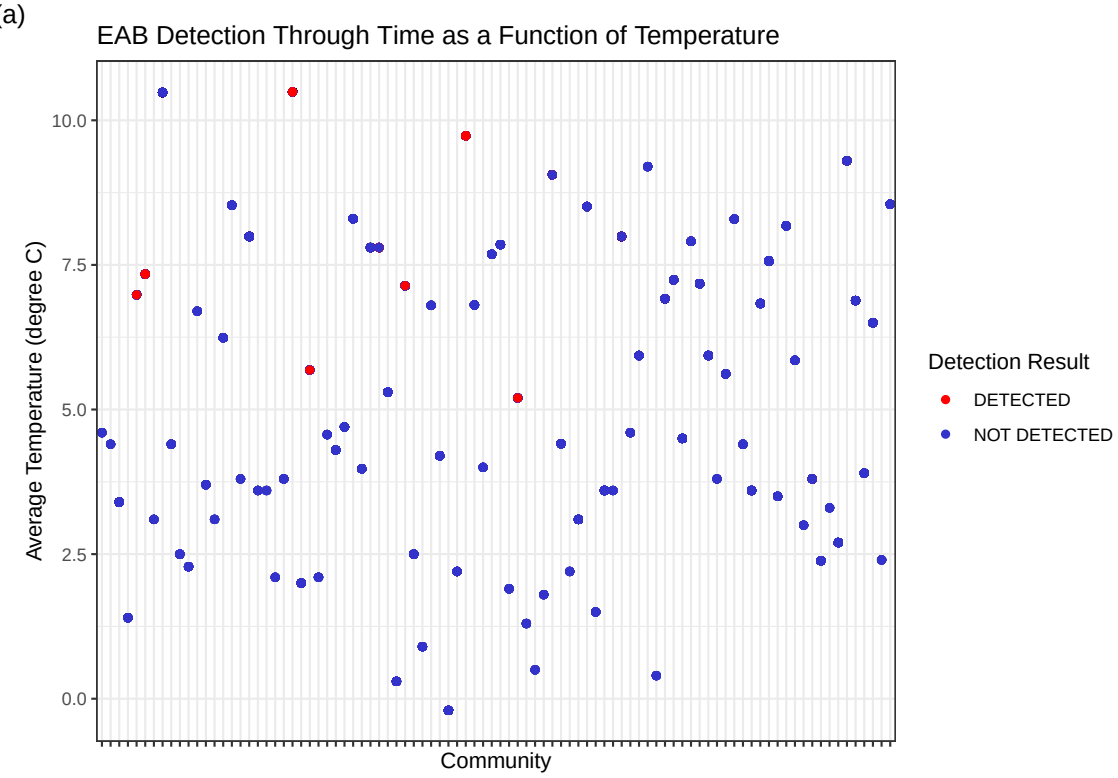


Fig. 4. (a) Comparison of average annual temperatures for the Ontario communities with EAB detections coloured in red. Communities with higher average annual temperatures were more likely to have EAB detections, and as the average temperature decreases, EAB detections become sparser.