

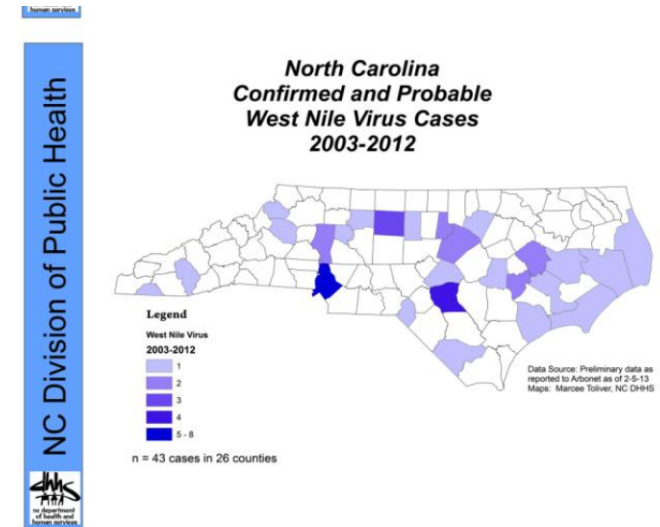
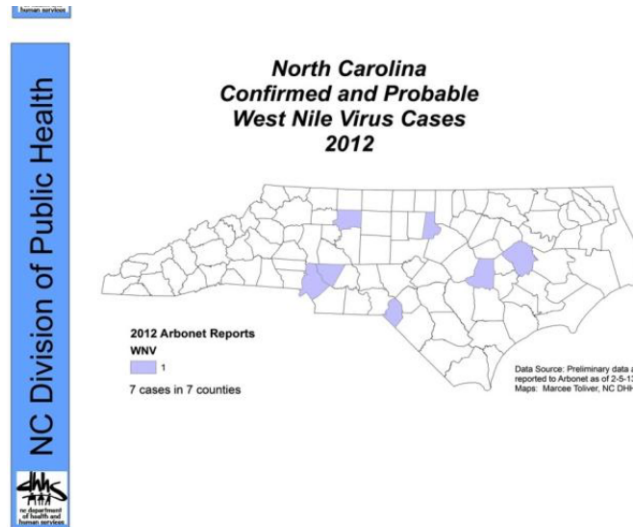
**Mosquito
Surveillance In
Wayne County
N.C**

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Introduction

Research Importance: Arbovirus vectors are prevalent in NC and have the potential to transmit emerging viruses to humans

- West Nile virus (WNV) is endemic in the Continental United States.
- *Culex sp.* mainly vector the virus and are found in Wayne Co. NC.
- Wayne County's mosquito surveillance program ended in ~2010
- A fatal WNV case was reported in the county in 2012



For more information about mosquito-borne illnesses and how to avoid them, see the N.C. DHHS Communicable Diseases website at <http://epi.ncpublichealth.info/cd/diseases/arbo.html>.

Study Goals

- Determine the abundance and diversity of *Culex sp.* Wayne Co. NC
- Assess the status of WNV in these mosquitoes
- Determine climate/mosquito associations
- Begin to build a historical record for Wayne Co. NC to help predict future human risk

Study Overview

- Study dates: May-December 2017
- Single trap location on the campus of UMO
- CDC Gravid trap baited with hay/yeast infusion
- Set up every Tuesday and Thursday, late afternoon
- Retrieved in the morning, mosquitoes knocked down, sorted based on sex, stored at -80 °C
- ID to genus and species level, sorted into pools (1-50 mosquitoes)
- Screened for WNV via qRT-PCR

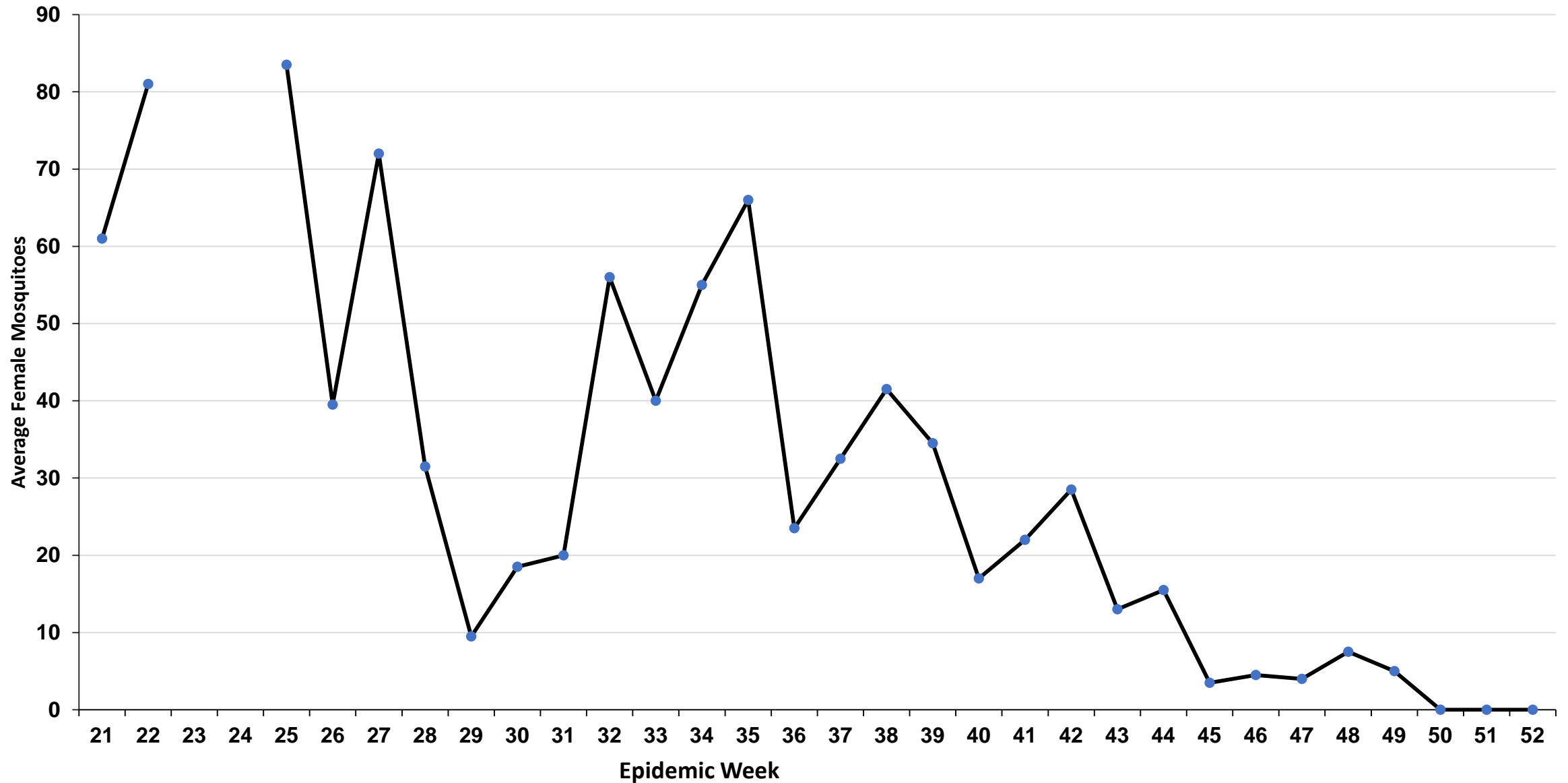
Trap Location



Pictures taken In December

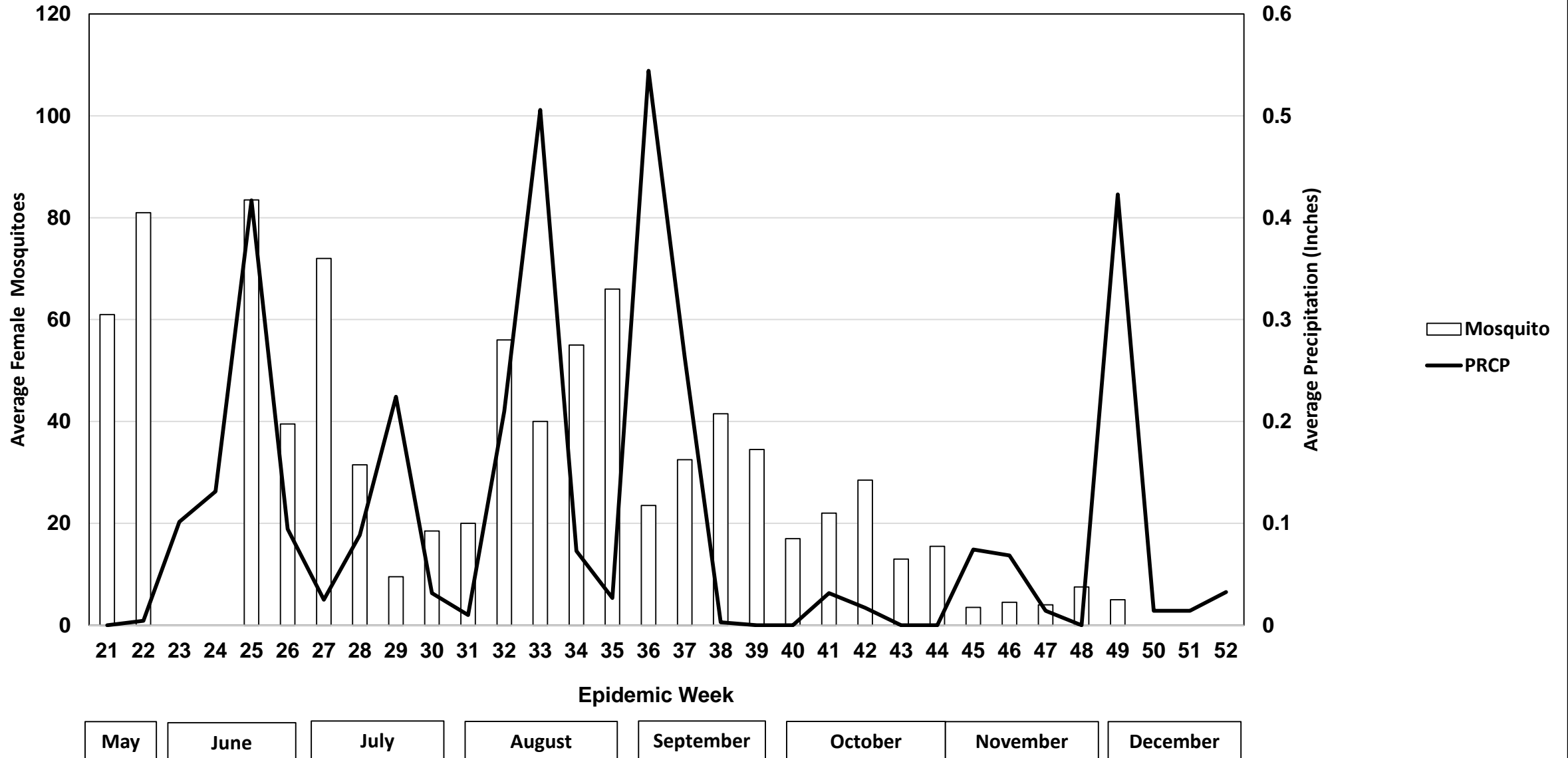
Isolated, on campus, parking lot runoff nearby, good habitat for birds

Weekly Abundance of Female *Culex* Mosquitoes

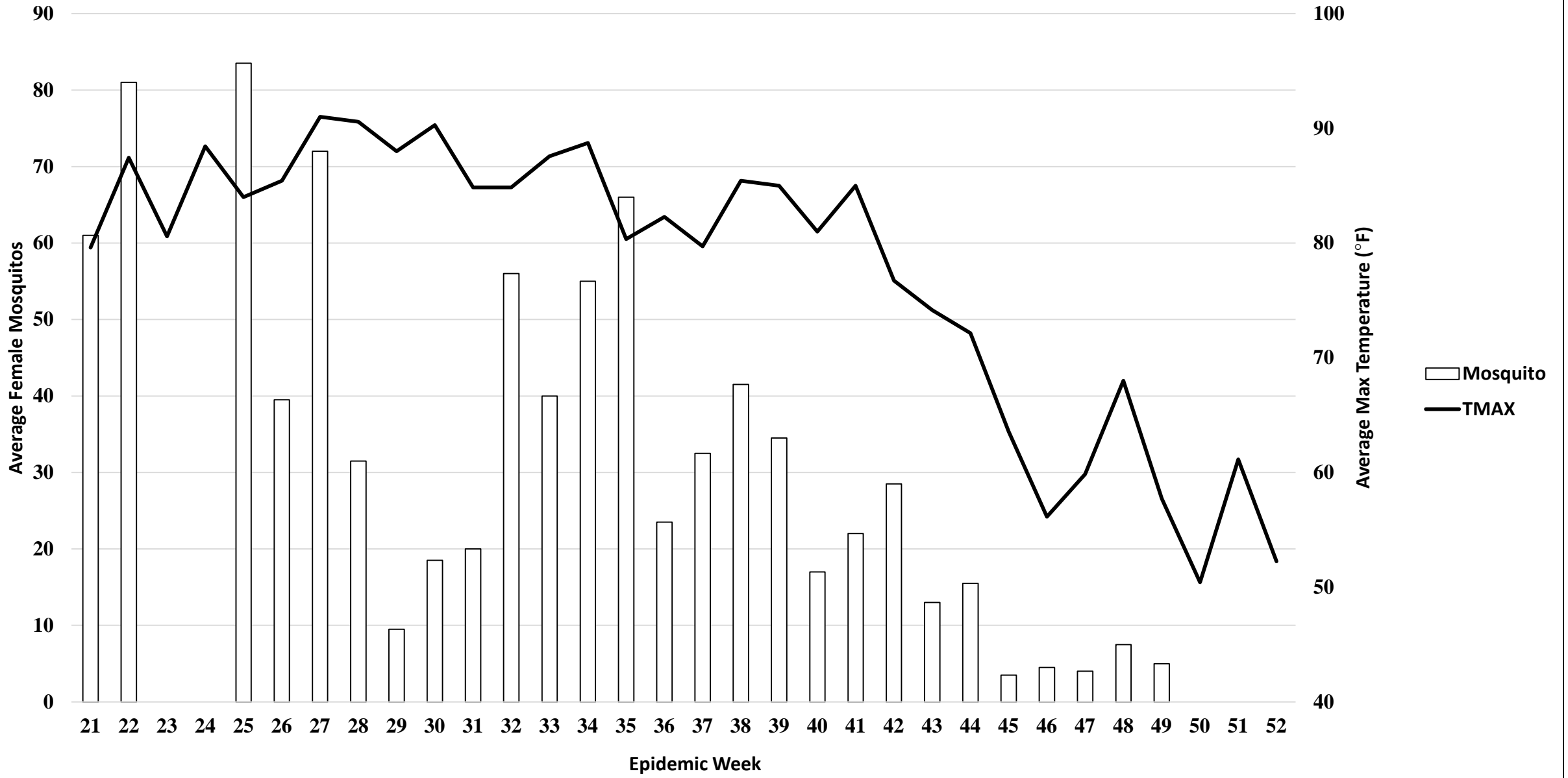


May June July August September October November December

Abundance with Precipitation



Abundance with Max Temperature



May

June

July

Aug

Sept

Oct

Nov

Dec

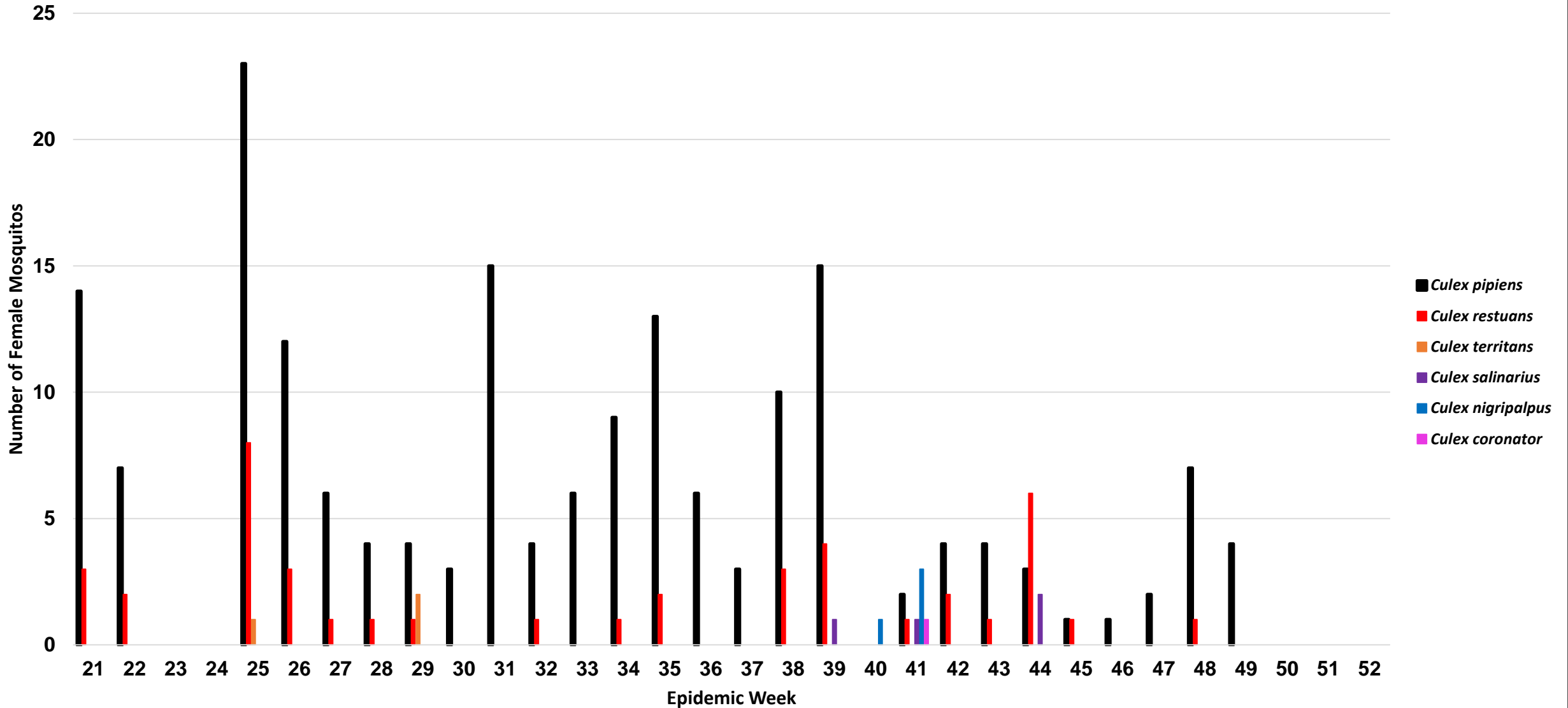
Mosquito Diversity

Table 1

Overall distribution of the number of species of *Culex* female mosquitos throughout the season

	Number of mosquitos	Percentage of total mosquitos	Epidemic Week
<i>Culex sp.</i>	847	78.2%	21,22,25-49
<i>Culex pipiens</i>	182	16.8%	21,22,25-39,40-49
<i>Culex restuans</i>	42	3.9%	21,22,25-29,32,34,35,38,39,41-45,48
<i>Culex salinarius</i>	4	0.4%	39,41,44
<i>Culex nigripalpus</i>	4	0.4%	40,41
<i>Culex territans</i>	3	0.3%	25,29
<i>Culex coronator</i>	1	0.1%	41
Total	1,083		

Female *Culex* Mosquito Diversity



May

June

July

Aug

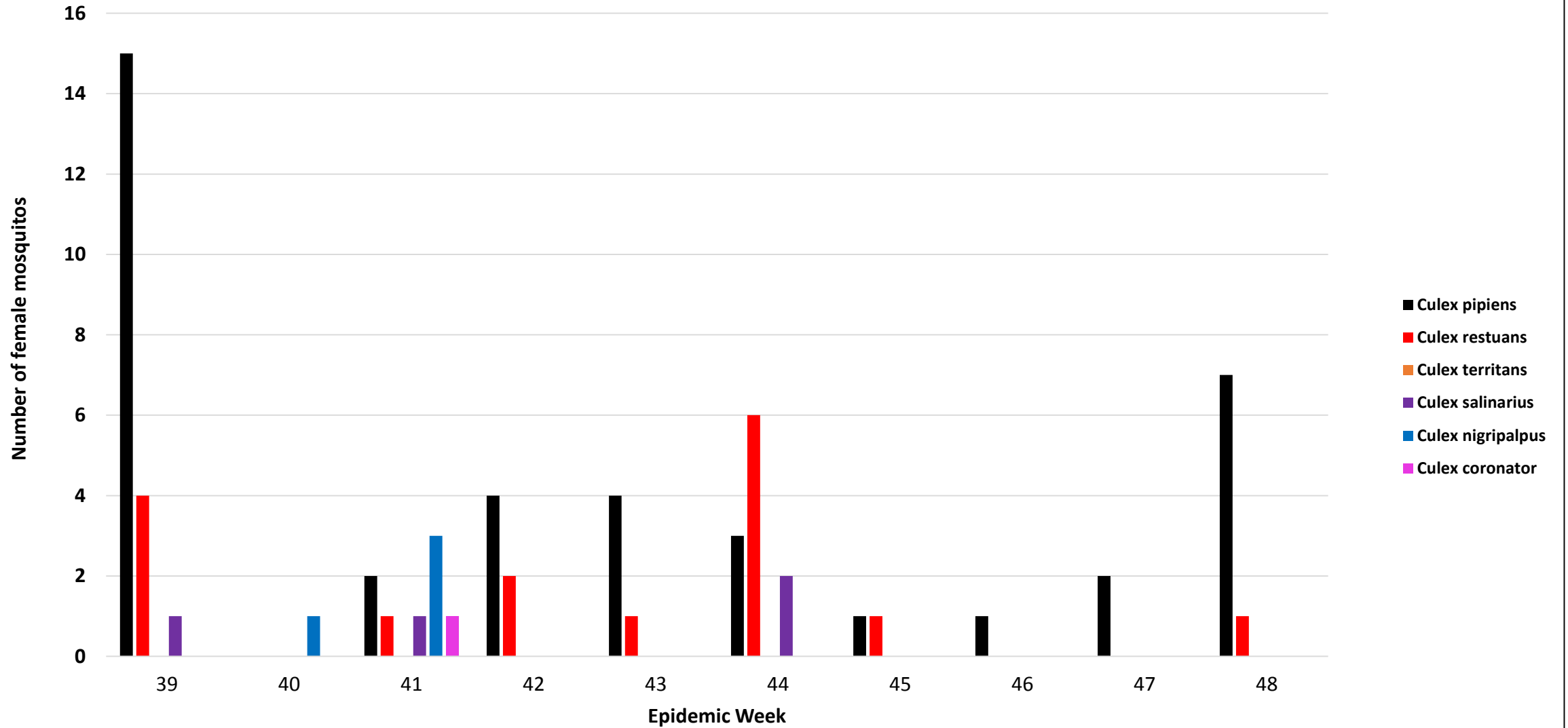
Sept

Oct

Nov

Dec

Female Culex Mosquito Diversity

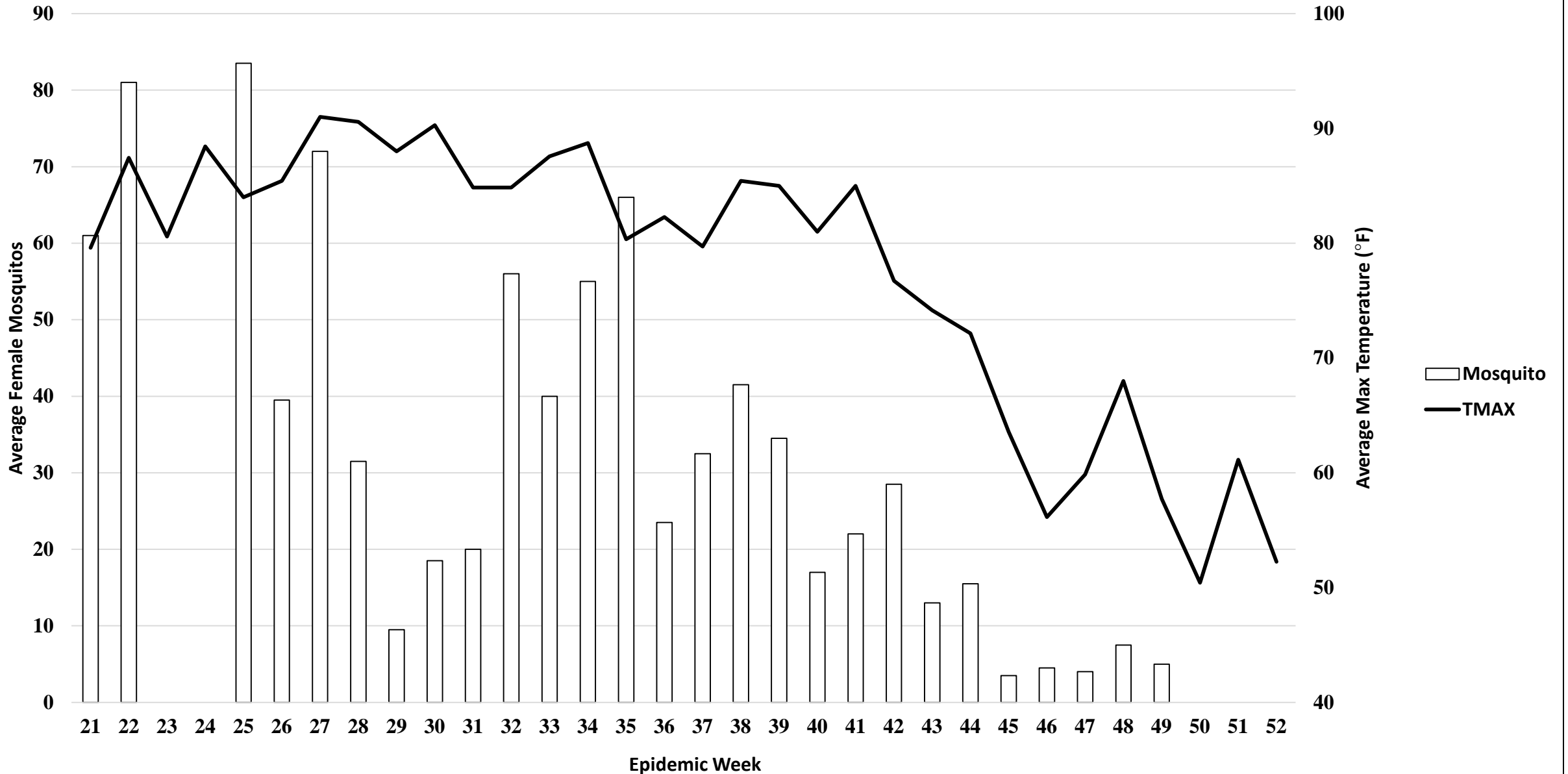


Sept

Oct

Nov

Abundance with Max Temperature



May

June

July

Aug

Sept

Oct

Nov

Dec

WNV Screening Procedure

- Mosquito pools homogenized with mortar and pestle in cell culture media
- RNA isolated from supernatant using Invitrogen TRIzol reagent
- RNA reversed transcribed into cDNA with random primer
- Screened for WNV via SYBR Green-based qPCR

Primer	Genome position ^a	Sequence (5'-3')	RT-PCR product size (bp)
WNENV-forward	1160-1180	TCAGCGATCTCTCCACCAAAG	70
WNENV-reverse	1209-1229	GGGTCAGCACGTTTGTCATTG	

WNV Screening

Table 2

	Pools screened for WNV	Number of mosquitos in the Pool	ID	CT Value	Date of trapping
Positive Pools	1	1	<i>Culex territans</i>	28.38	6-22-17, Epidemic week 25
Negative Pools	72				

Conclusions

- Highest abundance of *Culex* mosquitoes occurred between May and August. Appears to correlate with increased precipitation and max temperature
- Epidemic week 25 (June) was the most abundant week
- Single *Culex territans*, caught in epidemic week 25, tested positive for WNV
- *C. pipiens* and *C. restuans* were the most prevalent species found throughout study
- Greatest diversity found in the month of October

Future Directions

- Screen existing mosquito pools for the presence of natural *Wolbachia* sp. bacteria
- Screen existing mosquito pools for other mosquito-flaviviruses e.g. *Culex* flavivirus
- Redesign study to include multiple sites throughout Wayne Co. NC

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