FINAL REPORT

NON-PESTICIDAL MOSQUITO CONTROL PILOT STUDY IN ST. ANDREWS STATE PARK

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John P. Smith, Principal Investigator

OBJECTIVES

1. Biweekly monitor mosquito production within 4 experimental plots (2 treatments and 2 controls) in St. Andrews State Park over 8-month period;

2. Monitor weather data (rainfall, wind speed/direction and temperature/relative humidity in study area;

3. Calculate population reduction in treatments adjusted by natural fluctuation in controls; and,

4. Plot and statistically analyze differences in treatment and controls as well as chart mosquito species composition.

METHODS

Study Area:

This study was conducted under DEP permit at St. Andrews State Park located in Panama City Beach, Florida. The 128 acre study area was surrounded by salt marsh and a lagoon to the north and by coastal beach scrub and the Gulf of Mexico to the south. Several interior freshwater marshes were adjacent to the scrub separating the study site from the park's primary camping area. The study area was divided into four 32 acre sites referred to as S1-S4 (Figure 1).

Surveillance:

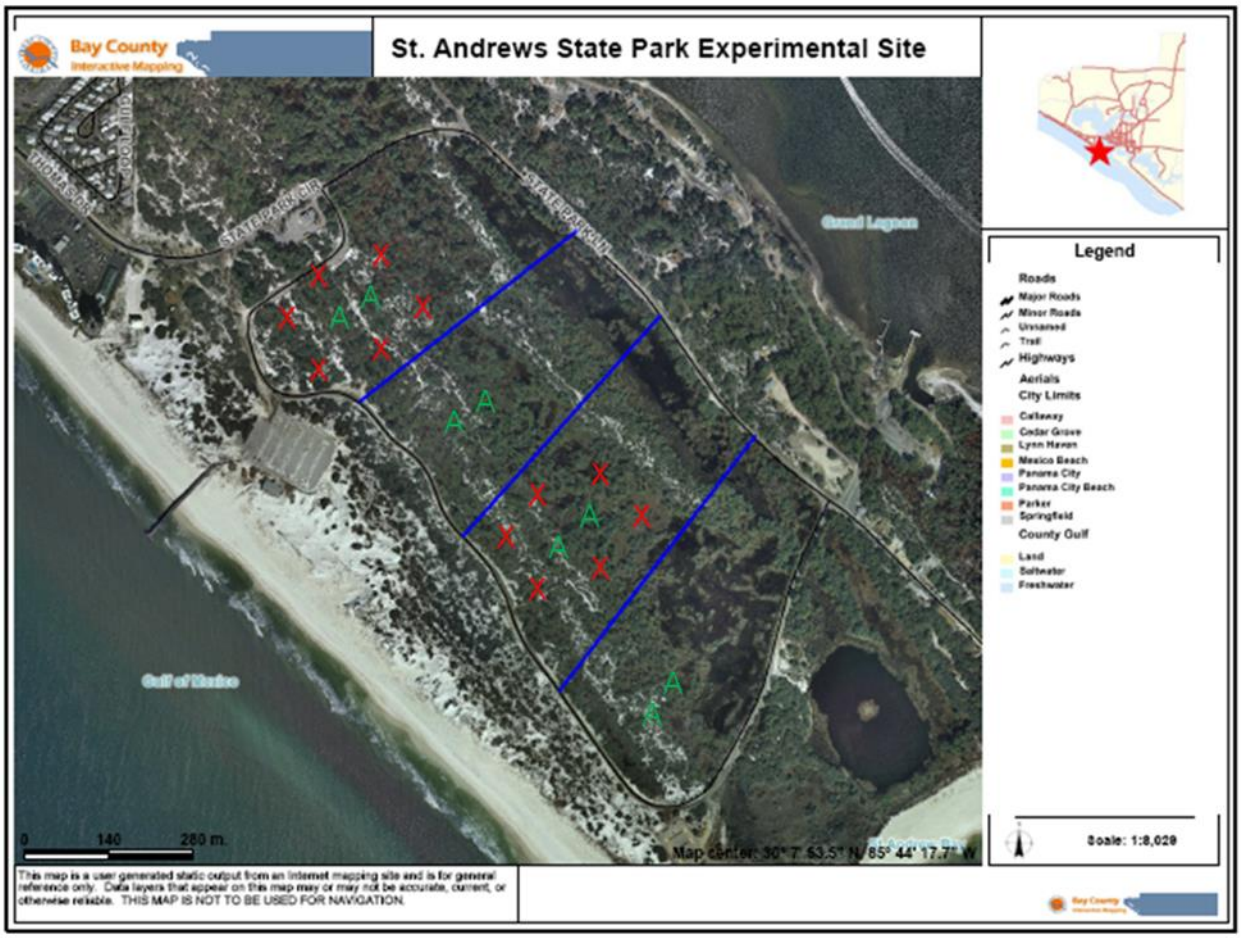
Eight CO_2-baited ABC light traps were positioned two per site 60-70 yards apart at four sites consisting of two non-treated controls and two treatments (i.e., sites supplied with MM-X traps) (Figure 1 – "A" denotes ABC traps and "X" represents MM-X). The ABC light traps were used to monitor baseline mosquito populations within the treatments and controls and were operated twice per week for 24 hrs starting one month prior to treatment application (i.e., pretreatment). Precipitation was measured with rain gauges deployed at each ABC trap site. Temperature, humidity and wind speed and direction were obtained from the nearest weather station located approximately 3-4 miles away.

Treatments:

Each of the two treatment sites were supplied with six MM-X traps equipped with CO_2 and octenol (Figure 1). The traps were position 60-70 yards apart in a large circle surrounding the ABC traps. We did not use oak-leaf infusion beneath the traps as proposed because FDEP preferred that we did not disrupt the soil in the park. We also determined in separate studies that oak-leaf infusion did not enhance trap catch significantly, and that CO_2 and octenol collected the most mosquitoes. The control sites were left untreated (i.e., no MM-

X traps). The MM-X traps were set to run 24/7 with CO_2 emitted during the crepuscular and throughout the evening hours. Layout of the treatments was: treatment, control, treatment and control site. The MM-X traps were operated for one month at the initial location and then rotated to the adjacent treatment site and so on each month until a cycle through all sites was completed over four months in a 4 treatment X 4 location Latin-square design. The entire experiment was repeated a second time over the following four months. Thus, traps were operated continuously from the first week in March, 2008 until the third week in November, 2008.

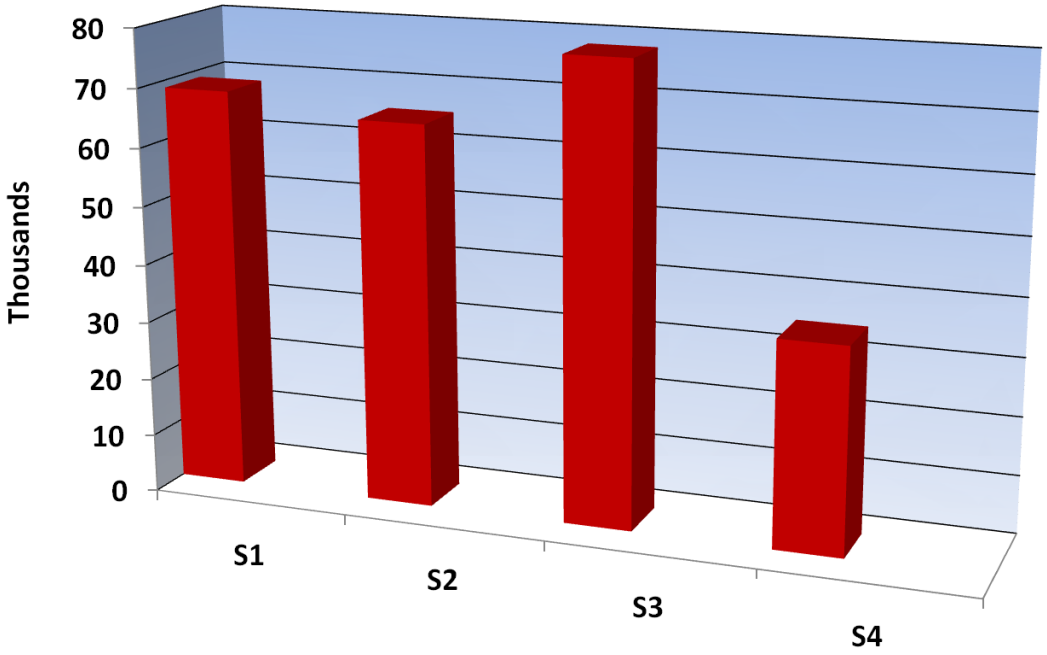
Figure 1. St. Andrews State Park experimental site with four study plots (separated by blue lines) and trap configuration (X – MM-X control traps and A – ABC surveillance traps).



RESULTS

The predominant mosquito species in order of abundance were *Anopheles crucians, Aedes taeniorhynchus, Culex salinarius, Culex erraticus*, *Aedes vexans and Aedes canadensis*. The first four species accounted for well over 90% of the mosquitoes collected. The total number of mosquitoes removed by the MM-X traps was calculated volumetrically to be approximately 250,000 for all four sites (Figure 2).

Figure 2. Total number of mosquitoes extracted by MM-X treatment traps in four study sites.

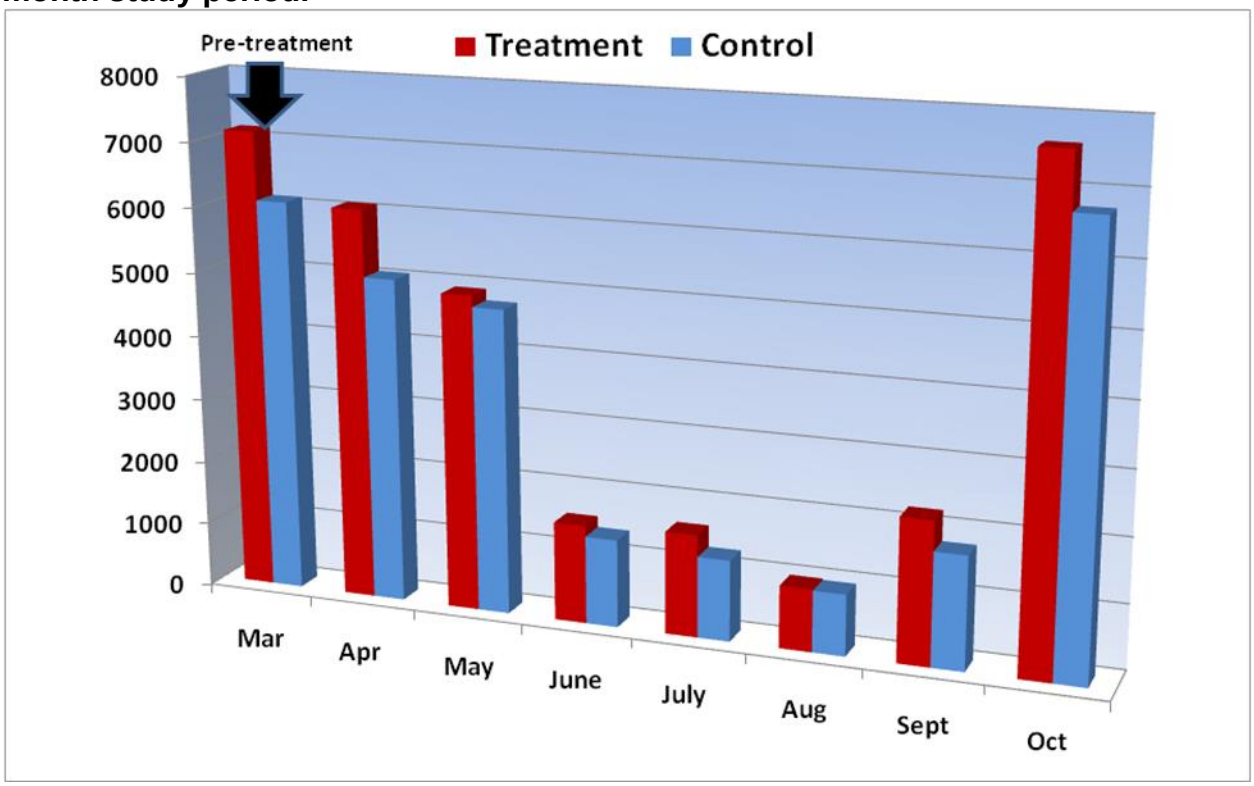


The total number of mosquitoes collected in the ABC surveillance traps in the treatment and control sites are presented in Figure 3. This represents the monthly combined total for all species collected in the four ABC traps for the treatment and control sites. Pretreatment numbers (i.e., the time period prior to deployment of the MM-X traps) in March were very high because St. Andrews State Park received a record amount of rainfall during the spring. The entire Park maintained standing floodwater throughout February, March and into April. When the floodwaters receded, the Park dried out and mosquito numbers reduced substantially through the summer. Later in the fall, rainfall and tide levels produced excessive broods of *Aedes taeniorhynchus*.

As can be seen in Figure 3, there was no difference in mosquito populations between the treatment and the control sites during any of the months studied. In fact, the actual numbers were slightly higher in the treatment sites for every month. It appears as though the MM-X traps actually lured more mosquitoes into the area than would be there naturally. Those that came to the traps were greater in number than the traps could remove. A more extensive

analysis of variance will be conducted on these data, but it is doubtful that there will be any statistically significant differences. This analysis along with environmental data will be presented in a manuscript submitted for publication in the Journal of the American Mosquito Control Association.

Figure 3. Mosquito population in treatment and control sites over eight-month study period.



CONCLUSIONS

Based on our findings using the configuration of MM-X traps as studied in this project, control was not achieved. In fact, one of the interesting side lines was that in October during a massive *Ae. taeniorhynchus* emergence, the mosquito problem was so severe the Park manager called to request spraying because many of the campers were complaining and leaving the Park.

The goal of achieving non-pesticidal control of mosquitoes is a worthy pursuit; however, based on our findings it appears it will require either more traps, smaller treatment area, and/or lower mosquito populations.

This study emphasizes the importance of maintaining pesticidal options available for control. Had this been a disease problem area, clearly reliance on traps would have jeopardized the health and safety of the Park workers and visitors. In closing, I would also like to add that the amount of effort required to maintain this trapping network was monumental. Labor and CO_2 requirements were substantial, clearly exceeding the cost of a pesticide application or two.

ACKNOWLEDGMENTS

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