Efficacy of bird deterrent devices in agricultural areas of the Fraser Valley of British Columbia: a pilot study

---

January 2009

Prepared for:

The Ministry of Agriculture and Lands (MAL),
Province of British Columbia
and
The Fraser Valley Regional District (FVRD)

Principal Investigator:

Professor Karen M.M. Steensma
Co-director, Environmental Studies Program
Assistant Professor, Department of Biology
Trinity Western University

Student assistants:

Amanda Edworthy, Katherine Hartline, Denise Wong,
Becky Kern and Amy Gardner

Executive Summary

A series of bird count stations were set up in the Sumas Prairie region of British Columbia, Canada in June 2008 in order to gauge the efficacy of bird deterrent devices over a single blueberry harvest season. Birds were counted in the early morning and late afternoon at six different stations for two weeks prior to the installation of deterrents in July. Three stations remained as control count sites throughout the study. The remaining three sites each had a different deterrent installed: an auditory bird distress caller, a propane cannon, and a hawk kite. Counts continued through August with deterrents in place, and on through September after all deterrents were removed. Statistical analysis revealed that both the hawk kite and the propane cannon showed significant decreases in starling population numbers initially, but starlings slowly returned to higher numbers after the initial introduction of these deterrents. The hawk kite deterrent effect lasted longer than the propane cannon effect within this pilot study. The bird distress caller showed no statistically significant deterrent effect although problems at the particular site apparently skewed results for that deterrent trial, as initial starling populations at that site were significantly higher than the control populations. Though the overall study was of a pilot nature and extremely limited in scope, the results point to some possible recommendations for starling management and to the potential value of further research on this topic.

Percent difference was used to assess the overall degree of change in starling abundance at each of two transition points: 1) The pre-deterrent to deterrent-deployed transition time, and 2) the deterrent-deployed to post-deterrent transition time.

Results

The vast majority of birds seen frequenting the treatment sites were European starlings, although occasional redwing blackbirds, robins and other birds were seen. As well, occasional predator birds such as bald eagles, red tail hawks, harriers, and merlins were seen in the vicinity.

Of the three deterrents used, the BirdGard audible distress caller (Fig. 2) appeared to show the least effect. In fact, the site had a high starling population to begin with, and this became a statistically significant difference just prior to deterrent introduction. Midway through the use of the deterrent, the starling numbers actually climbed to 110, much higher than both control and pre-deterrent numbers. Bird populations did begin to drop after mid-August. Another feature to note was that an onsite manure lagoon around which the starlings were congregating was pumped out on August 27th, at which time the bird count dropped to fewer than 20 birds. Thus, during the time it was operating, it appeared that the overall trend was for the BirdGard to actually attract birds to the site initially, followed by a precipitous mid-deterrent drop. However, the data here should not be considered valid after the date of the pumping incident since that apparently removed a major food source that had been attracting the birds.

The propane cannon showed an effect on starling numbers at the site tested, with peak effect occurring within the first 15 days after introduction of the deterrent (Fig. 3). Though starling numbers remained lower than background control numbers, they did begin to climb again after 15 days, showing no significant difference from the control after the peak effectiveness.

The hawk kite showed the strongest effect of the three deterrents (Fig. 4). Starling numbers took the steepest dive during the period in which the kite was introduced, with peak effect occurring 15 days after kite introduction, and bird numbers remaining significantly lower than background starling population levels for 10 more days. Numbers continued to remain

lower than controls and did not fully overlap with control numbers until about 15 days after the kite was removed.

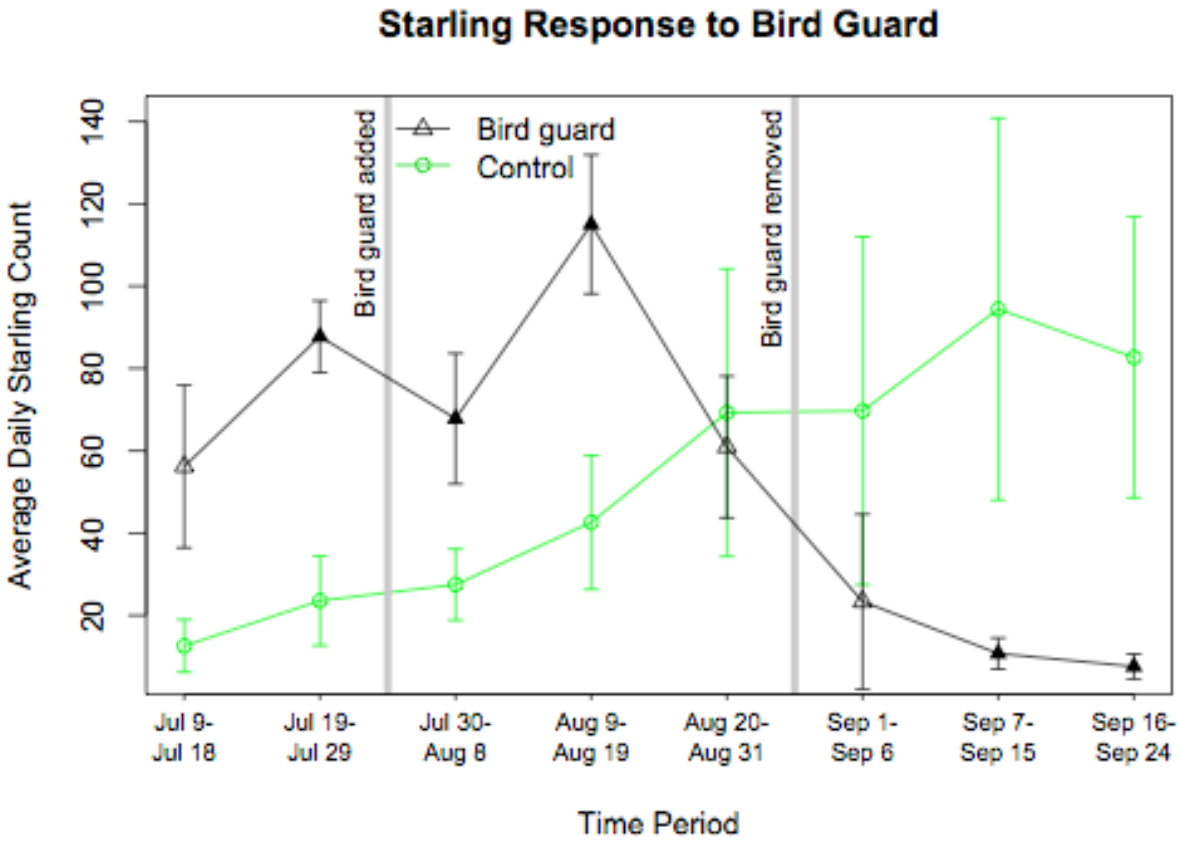

Figure 2. Starling population numbers in response to introduction of a BirdGard audible distress caller at a site in Sumas Prairie, BC. Filled triangles = significant difference from control, open = not significant.

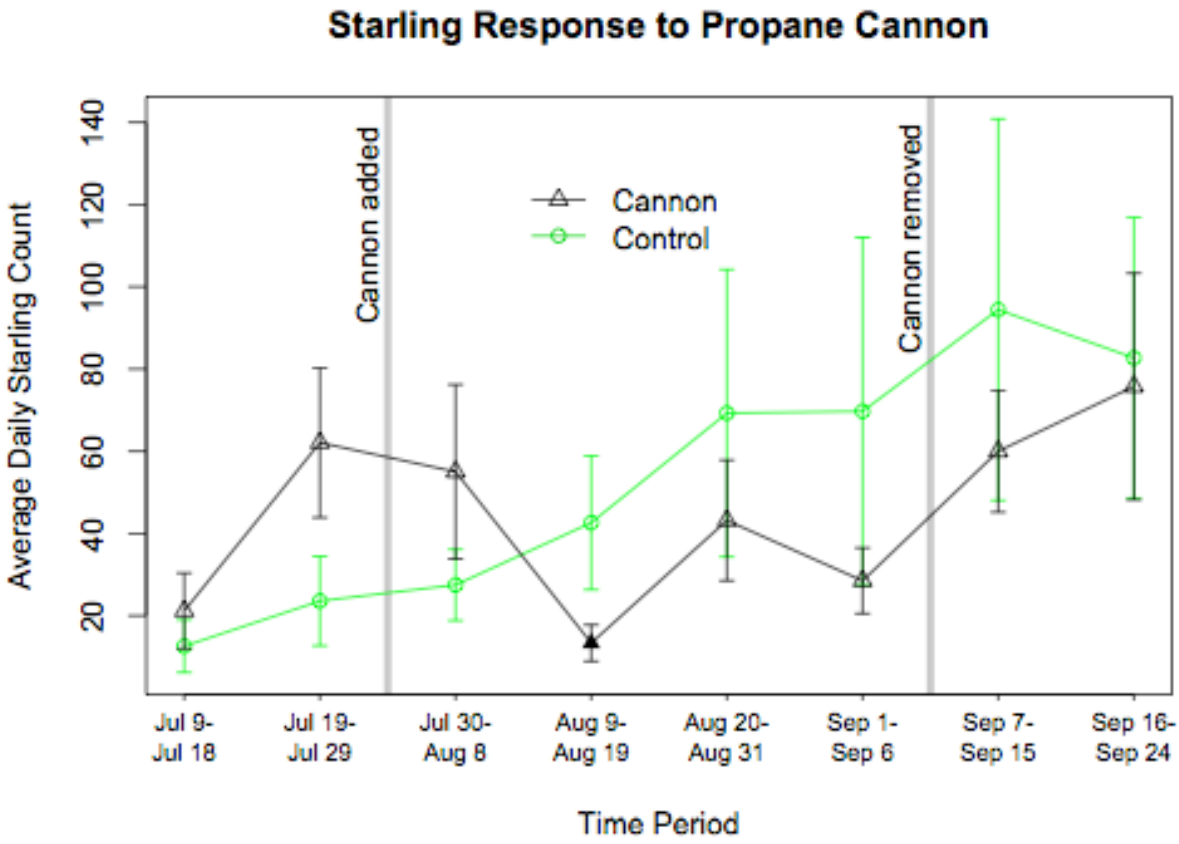

Figure 3. Starling population numbers in response to introduction of a propane cannon at a site in Sumas Prairie, BC. Filled triangles = significant difference from control; open = not significant.

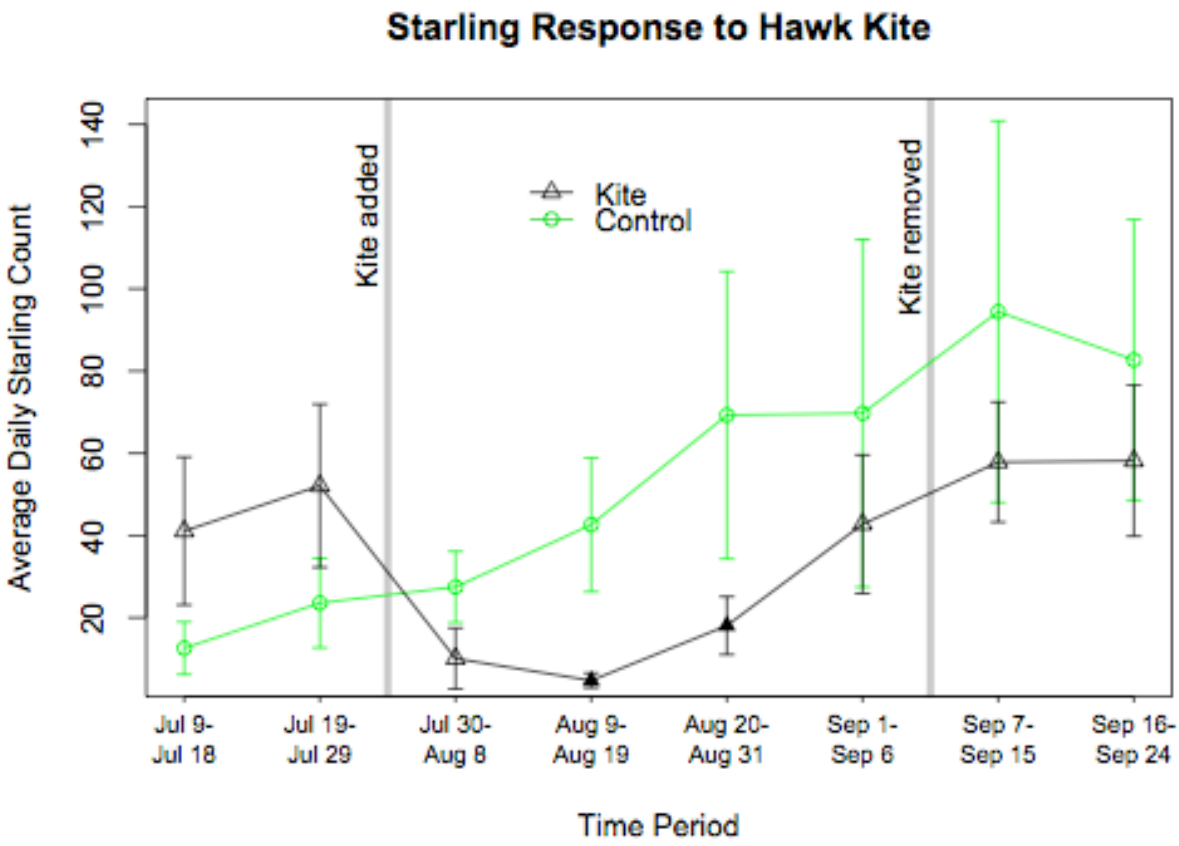

Figure 4. Starling population numbers in response to introduction of a hawk kite in Sumas Prairie, BC. Filled triangles = significant difference from control; open = not significantly different.

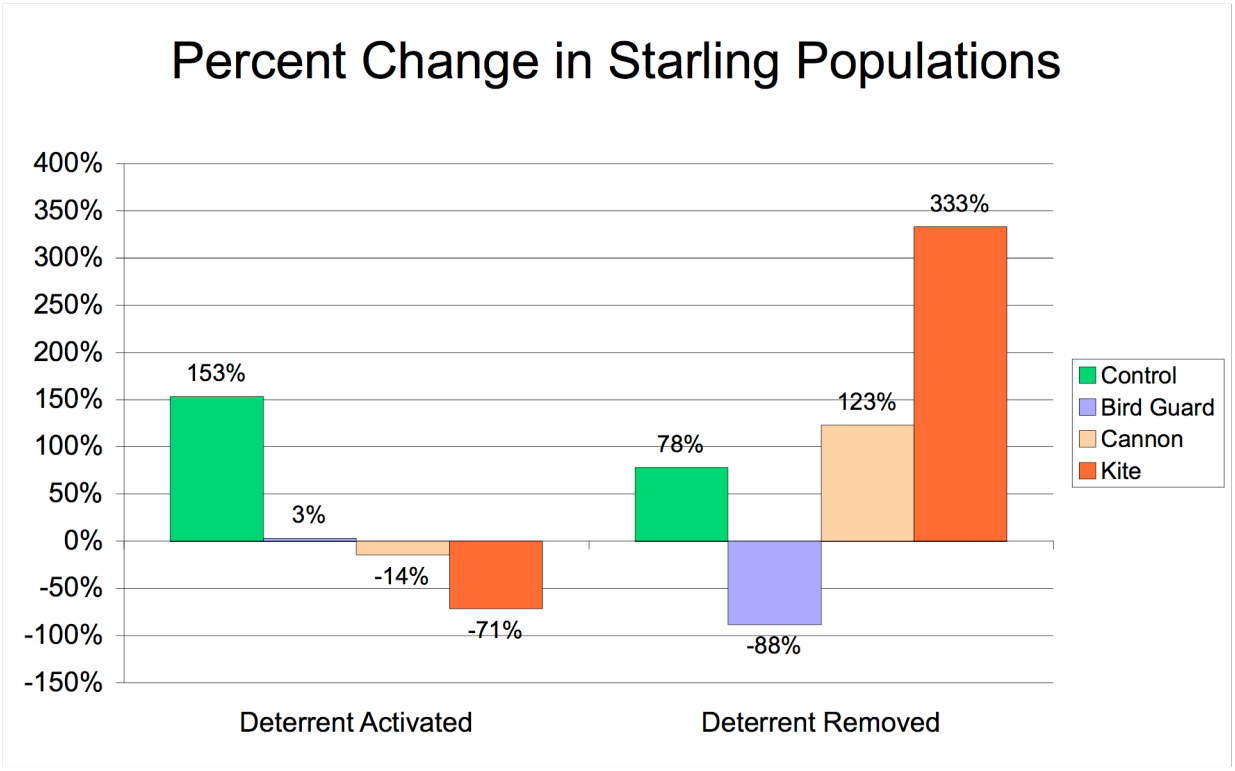

Figure 5. Percent difference in bird numbers at transition points for introduction and removal of various deterrent techniques at sites in Sumas Prairie, BC.

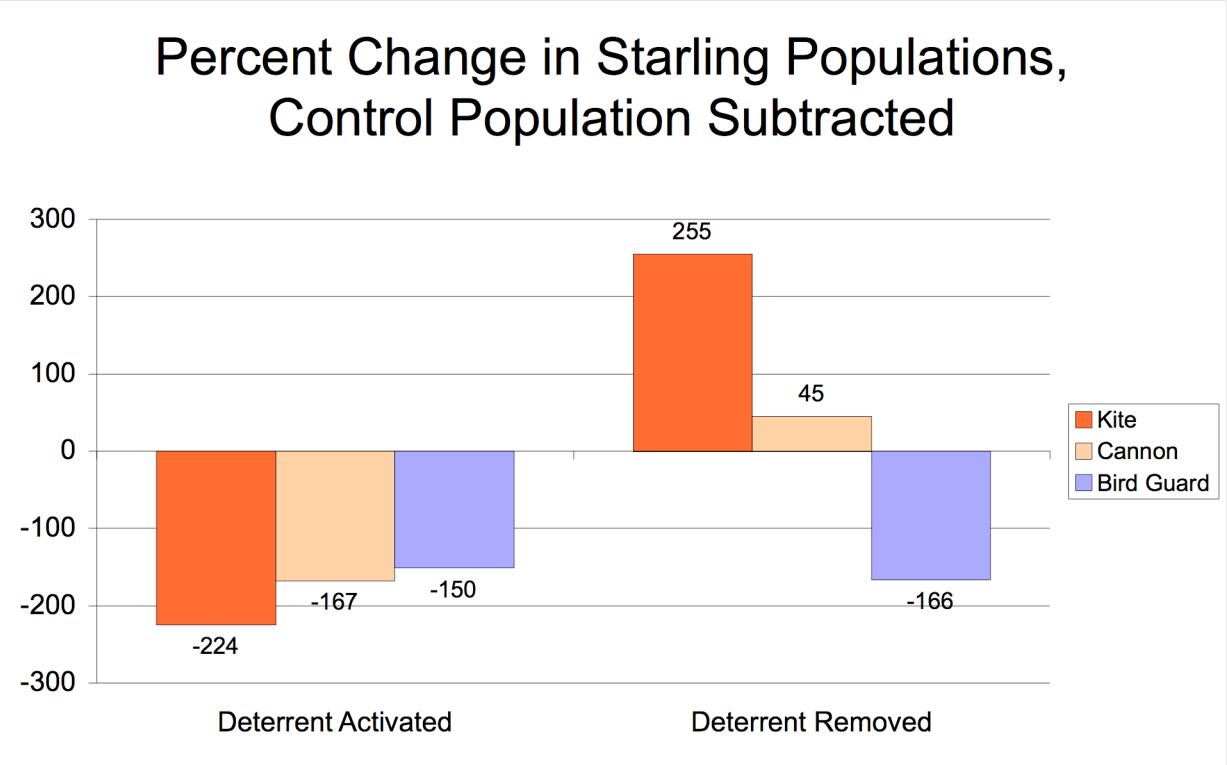

Figure 6. Percent difference in bird numbers at transition points for introduction and removal of various deterrent techniques at sites in Sumas Prairie, BC, with control population changes subtracted.

Summary and Recommendations

Based on both our literature and field research, we would summarize and make the following preliminary recommendations regarding bird deterrent techniques:

- **Bird distress callers such as the BirdGard may be effective in some situations but were not shown to be of use in this particular setting and application due to site problems**
- **Propane cannons can be of use in shorter-term applications**
- **Hawk kites can be of use in shorter-term applications**
- **Combinations of audible distress techniques and actual shooting of pest birds are more effective than audible distress alone.** Shooting is not an option within or adjacent to blueberry fields, however, due to the risk of contaminating fruit with shot.
- **Hawk kites in combination with actual shooting or predator-caused fatalities are more effective than hawk kites alone**
- **All of the above techniques are enhanced through randomization and combination/integration of audible and visual devices**
- **Falconry and presence of natural predators are considered highly effective deterrents**
- **Enhancement of native birds of prey through habitat improvement, and release of young birds of prey should be a top priority for cost-effective bird control research**

Acknowledgments

This study was made possible by a joint grant from the British Columbia Ministry of Agriculture and the Fraser Valley Regional District, and special thanks are given to Director Dick Bogstie and Ms. Siri Bertelson of FVRD, and to Mr. Mark Sweeney and Mr. Bert vanDalfsen of MAL . We are grateful for the graciousness of the following farms in allowing our presence during the course of the study: Cedarwal Farms, Driessen Farms, Bos Sod, Meier Dairy, Luymes Dairy, and Kielstra Dairy. The assistance of Mr. Mark Sweeney in obtaining plywood and feed was very much appreciated. The co-operation of Hi-Tech Distributors in providing and setting up the deterrent devices was appreciated. Ms. Melissa Oakes of TWU and A Rocha Canada provided budget oversight and Dr. Tracy Stobbe of the TWU School of Business consulted on the statistical analysis. Mr. Patrick Lilley of Raincoast Applied Ecology and Mr. Glen Carlson of A Rocha Canada provided initial advice on study design. Finally, various members of our families provided company on survey days and patience throughout the process.

Appendix 1. Landowner contact letter

30 June 2008

To: Select landowners in the Sumas Prairie area

As you are likely aware, the presence of starlings has increased in our area in recent years. The resulting damage to farm crops, and the efforts to deter these birds through various devices such as propane cannons and other means have created some controversy in the community.

The Ministry of Agriculture and the Fraser Valley Regional District have commissioned me to carry out a study this summer, to survey the overall bird population in the Sumas Prairie area, and to test the usefulness of several starling deterrent techniques.

Assisted by senior-level Trinity Western University environmental studies and biology students, and by volunteers with specific expertise on starlings, I will undertake the following approach:

- Identify locations in which starlings are particularly numerous
- Deliberately create feeding stations to attract starlings regularly
- Count numbers of starlings frequenting the stations
- Introduce various deterrent techniques to some of the feeding stations
- Continue to count starling numbers at all stations through September
- Analyze results statistically to determine effectiveness of these deterrents

This is a pilot study, and part of a larger overall study in the Fraser Valley and northwest Washington State, that is seeking solutions to starling problems. The goal is to identify solutions that are workable for farmers, farm neighbors, and the natural environment.

Your land may provide a suitable location for one of the feeding stations, if you are willing to participate in this research. If you are interested in allowing us space for the project, we will attempt to minimize disruption to your property, and the study will be concluded by mid- to late September.

Thank you for your consideration, and please feel free to contact me with any questions.

Karen M.M. Steensma
Assistant Professor of Biology
Co-director, Environmental Studies Program
steensma@twu.ca

Other partners: BC Blueberry Council, Whatcom Farm Friends, Washington Department of Fish and Wildlife, Washington State University Cooperative Extension,
A Rocha Canada & USA, and various BC & Washington dairy and blueberry farmers

7600 Glover Road
Langley, BC V2Y 1Y1
Canada
Tel: (604) 888-7511

Appendix 2. Sample data collection sheets

Luymes
Time: 9:21 am
Weather: Gray skies, cool breeze
Feed Added? None

Table 7: Avian Observation on July 23rd 2008				
Species		Number		Other Observations
Latin Name	Common Name	On feed	Within a 100 m radius	No birds seen on feed. All blueberries are still present on feed.
	House Sparrow	0	12	
	Rock Pigeon	0	3	
	Robin	0	1	
	European Starling	0	25	

Kielstra
Time: 7:50 am
Weather: Cold, cloudy, no precipitation
Feed Added? None

Table 13: Avian Observation on July 31st 2008				
Species		Number		Other Observations
Latin Name	Common Name	On feed	Within a 100 m radius	Cannon fired, birds fled yet within a minute of the last blast birds returned (20 returned to the powerline)
	European Starling	0	102	
	Female Brewer's Blackbird	0	2	
	Rock Pigeon	0	18	
	House Sparrow	0	3	

Appendix 3. Summary of t-test values for time periods shown in Figs. 2, 3, 4

Characteristics of starling populations at deterrent and control sites throughout the experiment

Site	Deterrent status (time period)	mean ± SE		Test statistic	*df*	*p**
		Deterrent	Control			
Kite	Off (1)	41.1 ± 18.0	12.6 ± 6.4	1.55	5	0.18
	Off (2)	52.1 ± 19.8	23.6 ± 10.9	1.37	6	0.22
	On (3)	10.1 ± 7.4	27.5 ± 8.7	-1.93	14	0.07
	On (4)	4.7 ± 1.8	42.6 ± 16.3	-3.96	21	**0.00**
	On (5)	18.1 ± 7.1	69.3 ± 34.9	-2.33	19	**0.03**
	On (6)	42.8 ± 16.8	69.7 ± 42.3	-0.91	13	0.38
	Off (7)	57.8 ± 14.6	94.4 ± 46.4	-1.20	22	0.24
	Off (8)	58.2 ± 18.3	82.7 ± 34.1	-0.91	17	0.38
Cannon	Off (1)	21.2 ± 9.2	12.6 ± 6.4	0.86	7	0.42
	Off (2)	62.1 ± 18.2	23.6 ± 10.9	2.00	6	0.09
	On (3)	55.0 ± 21.2	27.5 ± 8.7	1.26	8	0.24
	On (4)	13.4 ± 4.4	42.6 ± 16.3	-2.81	26	**0.01**
	On (5)	43.2 ± 14.7	69.3 ± 34.9	-1.03	20	0.32
	On (6)	28.5 ± 8.0	69.7 ± 42.3	-1.60	13	0.13
	Off (7)	60.0 ± 14.8	94.4 ± 46.4	-1.12	22	0.27
	Off (8)	75.8 ± 27.6	82.7 ± 34.1	-0.21	11	0.84
Bird Guard	Off (1)	56.2 ± 19.7	12.6 ± 6.4	2.17	5	0.08
	Off (2)	87.8 ± 8.7	23.6 ± 10.9	5.99	11	**0.00**
	On (3)	67.8 ± 15.9	27.5 ± 8.7	2.42	9	**0.04**
	On (4)	115.0 ± 16.9	42.6 ± 16.3	3.74	10	**0.00**
	On (5)	60.9 ± 17.2	69.3 ± 34.9	-0.31	18	0.76
	Off (6)	23.4 ± 21.2	69.7 ± 42.3	-1.43	11	0.18
	Off (7)	10.8 ± 3.8	94.4 ± 46.4	-3.09	18	**0.01**
	Off (8)	7.6 ± 3.0	82.7 ± 34.1	-3.77	18	**0.00**

*Values bolded if $p \leq 0.05$; indicates significant difference between deterrent and control means.