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Pileated Woodpecker Damage to Electric Utility Poles: Evaluation of the Sonic Dissuader

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PRODUCT DESCRIPTION

This report summarizes some of the historical problems with current woodpecker deterrents and describes a cage test conducted at the National Wildlife Research Center (NWRC) in Ft. Collins, Colorado, to evaluate the Sonic Dissuader (by Myrica Systems, Inc.)—an electronic deterrent device designed to deter pileated woodpeckers (*Dryocopus pileatus*) from wooden utility structures. The Sonic Dissuader is a novel tool for deterring woodpecker damage in that it deters problem woodpeckers only when damage is actually occurring. Testing conducted at NWRC showed that although time spent pecking by woodpeckers was reduced by 70%, damage to poles equipped with Sonic Dissuaders still occurred. With some changes to the device, the potential exists for the device to perform better than current testing indicates. Working with Myrica Systems, Inc. (in Manitoba, Canada) on an updated version of the Sonic Dissuader might be warranted.

Results and Findings

The Sonic Dissuader is a new approach to deterring woodpeckers from electric utility poles. It avoids many of the standard problems with deterrents for the utility industry. The device could be a cost-effective tool for reducing woodpecker damage to electric utility poles, eliminating costly pole repairs or pole replacement.

Challenges and Objectives

This report should be read by utility managers and individuals seeking methods to prevent damage to wooden utility structures. The report will also benefit the utility industry, especially those experiencing damage from woodpeckers. This report could help a manager decide whether to invest in Sonic Dissuaders as a way to deter pileated woodpeckers from wooden utility structures.

Applications, Value, and Use

Future improvements to the Sonic Dissuader could include programming the device to respond immediately to each pecking event by a woodpecker and remotely activating the device, reducing false activations. These improvements might increase the effectiveness of the device. This device could be viable for other species of woodpeckers also known to do damage by installing different calls (for example, acorn woodpeckers and golden-fronted woodpeckers).

EPRI Perspective

The Electric Power Research Institute (EPRI) sponsors site-specific research with members through tailored collaboration. This project is an example, but clearly the issue addressed is one that many utilities have. Replacement costs for wooden poles damaged by woodpeckers are a

significant cost to the industry, and any measure to mitigate damage will result in cost savings and improve system reliability.

Approach

The goal of the project was to conduct pileated woodpecker cage testing of the Sonic Dissuader at the National Wildlife Research Center to determine its efficacy in deterring pecking. The report summarizes background information on pileated woodpecker damage, the current device tested, the results of the cage experiment, and potential field use.

Keywords

Damage
Dryocopus pileatus
Electronic deterrent
pileated woodpecker
Predator call
Territorial call
Wooden structures

ABSTRACT

Woodpecker damage to electric utility poles results in significant economic losses to utility companies. Pileated woodpeckers, one of the largest woodpeckers in North America, cause some of the most severe damage to electric utility poles. Many types of repellent techniques have been evaluated for reducing pileated woodpecker damage to electric utility poles; however, problems have been described for many of these techniques, including cost, difficulty of installation, longevity of the product, or defeat by the woodpeckers. The Sonic Dissuader, a deterrent device designed by Myrica Systems, Inc. (in Winnipeg, Manitoba, Canada), has shown some promise in field testing but warranted rigorous cage testing to quantify its ability and effectiveness.

Evaluation of the Sonic Dissuader efficacy on pileated woodpeckers was conducted in a controlled environment at the National Wildlife Research Center, in Fort Collins, Colorado. The Sonic Dissuader reduced the amount of time woodpeckers spent pecking on electric utility poles equipped with the device by 70% compared to electric utility poles with a control device ($F_{1,7} = 1.82$, $P = 0.219$). However, the Sonic Dissuader did not reduce the amount of time woodpeckers spent loafing or roosting on electric utility poles equipped with the device ($F_{1,7} = 3.83$, $P = 0.091$). This might be because the device is designed to broadcast only once within a 15-minute period instead of broadcasting immediately each time woodpecker pecking is detected. It is difficult to deter an animal from a behavior when they are being negatively stimulated only a portion of the time that the behavior is occurring. A cage test also limits alternative perching sites, which would be available along a utility corridor. Modifications to the device could be made that would possibly increase its effectiveness.

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INTRODUCTION

Background

Several species of woodpeckers including ladder-backed (*Picoides scalaris*), golden-fronted (*Melanerpes aurifrons*), red-headed (*Melanerpes erythrocephalus*), acorn (*Melanerpes formicivorous*) woodpeckers, and Northern flickers (*Colaptes auratus*) damage electric utility poles [1]. These woodpeckers range in size from the ladder-backed woodpecker (length = 15-18 cm, weight = 20-50 g) to the Northern flicker (length = 25-30 cm, weight = 110-160 g). These birds are mainly found in the southwestern United States, but acorn woodpeckers are also found along the pacific coast in Oregon and California, and Northern flickers can be found across the U.S.

Pileated woodpeckers (*Dryocopus pileatus*) (Figure 1-1) are one of the largest North American woodpeckers (length 38-51 cm, weight 250-350 g) with males weighing an average of 10-15% more than females [2]. Pileated woodpeckers cause some of the most severe damage to electric utility poles especially in the southern states bordering the Atlantic and Gulf of Mexico, eastern Texas to Southern North Carolina, Pennsylvania into New England, and the Eastern Canadian provinces. They occupy southern Canada, and western, mid-western, eastern and southeastern U.S. in habitat largely consisting of deciduous or coniferous forests [2]. The diet of pileated woodpeckers consists mainly of ants and beetle larvae; however, fruits and nuts are eaten when available [3]. Breeding bird surveys indicate that pileated woodpecker populations have increased dramatically in the last 30 years, especially from 1966 to 1979 when statewide populations in Massachusetts, Michigan, and the province of Nova Scotia increased 25.7%, 26.3%, and 40.5%, respectively. The U.S. population has increased 1.3% per year ($p<0.01$) for the period 1980-2005 [4]. Possible explanations for the range expansion of the pileated woodpecker include exclusion of fire leading to an increase in numbers of trees, and an increase in dead and dying trees due to expansion of tree diseases. Pileated woodpeckers are an important species in forest ecosystems providing cavities that are used by other birds, mammals, reptiles, and invertebrates for shelter and nesting [2].

Figure 1-1
Male Pileated Woodpecker Feeding Nestlings in Utility Pole

Woodpecker damage to electric utility poles has resulted in significant economic losses to utility companies. In 1981 and 1982, the Central Missouri Electric Corporation replaced 2,114 poles within their system because of direct and indirect damage caused by woodpeckers [5]. Alabama Power Company spent more than $3 million in a single year replacing poles damaged by woodpeckers [6]. In 2005, an inspection of 29 H-structures (115 kV) and 23 single poles (46 kV) on New York State Electric and Gas (NYSEG) system near Hammondsport and Plattsburgh, New York, respectively, identified various degrees of damage by woodpeckers, specifically pileated woodpeckers. Damage ranged from a small amount of wood "scrapes" removed to multiple 5 to 8 cm diameter holes (Figure 1-2). In addition, a survey of NYSEG operating divisions indicated that NYSEG spends from $270,000 to $300,000 annually to repair or replace poles damaged by woodpeckers (J. Cummings, pers. comm. 2008).

Figure 1-2
Pileated Woodpecker Roosting Cavities in a H-Structure Transmission Pole on New York State Electric and Gas (NYSEG) Hammondsport Line 04 May 2005

Woodpecker-caused damage to electric utility poles may be attributed to several factors depending on the species. For example, ladder-backed woodpeckers commonly drill holes on the undersides of crossarms of smaller poles, sometimes widening holes to the extent of creating a hole completely through the crossarm. The acorn woodpecker creates both large holes for roosting and nesting and smaller holes for storing acorns. Pileated woodpeckers create distinctive damage on electric utility poles, typically in the middle to upper portion of the pole below the crossarm. The holes tend to have a square-shaped outline and initially have an angular cone shaped appearance inside. As the hole is widened for use as a roosting/nesting cavity, it looses its square shape and appears more round [1].

Many types of repellent techniques have been evaluated for reducing pileated woodpecker damage to electric utility poles. These techniques consist largely of mechanical physical barriers such as wraps of solid metal or plastic, wire meshes of various gauges, and plastic mesh. An extensive list of chemicals has been evaluated and summarized [7,8]. Various additional chemical repellents have been tested with some success in cage trials at the National Wildlife Research Center (Cummings et al., unpublished data 2004), but have not been evaluated in the field. There have been problems described for many of these techniques including cost, difficulty of installation, longevity of the product, or defeat by the woodpeckers.

Devices that scare woodpeckers from electric utility poles have also been tested by various researchers with little success. Evaluation of stuffed owls and imitation snakes, both known predators of pileated woodpeckers and their eggs found no effect [9]. Scaring devices have been unsuccessful due to acclimatization of birds to the scare tactics [10]. The Sonic Dissuader, a deterrent device, designed by Myrica Systems, Inc. (Winnipeg, Manitoba, Canada), has shown some promise in field testing [11, 12]. The device detects drumming/pecking by woodpeckers on the poles and then emits a call (either pileated woodpecker or an avian predator call) to frighten the bird from the pole. Field testing of the device during a study on New York State Electric and Gas (NYSEG) system, found the results were inconclusive and device had some operational problems (Cummings et al., unpublished data 2006). The device has since been modified and now warrants rigorous cage testing to quantify the device's ability and effectiveness.

Sonic Dissuader

Two devices were used in this study, the Sonic Dissuader (Figure 1-3) and a control device (Figure 1-4). These devices were designed by Myrica Systems, Inc (Winnipeg, Manitoba, Canada) through funding from Manitoba Hydro during a 2 year project conducted in 2000-2002. Each unit when mounted on a pole is designed to detect vibrations caused from woodpeckers pecking on the pole that are different from vibrations caused from other sources. Each unit contains electronics for the purpose of data logging these events. When woodpecker vibrations are detected, they are logged digitally within each device. In addition, temperature and battery data are recorded to verify the environmental and charging conditions that the devices experience in the field. The devices contain a real time clock to keep track of the date and time of day. The Sonic Dissuader differs from the control box because it also emits sounds used to frighten away pileated woodpeckers, whereas the control device does not emit any sounds.

The Sonic Dissuader contains the following digital recordings of territorial sounds of pileated woodpeckers and of avian predators.

1. Call 1: Pileated woodpecker territorial announcement (4 sec)
2. Call 2: Pileated woodpecker threat chatter (16 sec)
3. Call 3: Pileated woodpecker communication chatter (21 sec)
4. Call 4: Pileated woodpecker drumming (4 sec)
5. Call 5: Merlin territorial announcement (5 sec)
6. Call 6: American Kestrel territorial announcement (6 sec)
7. Call 7: Red-tailed Hawk territorial announcement (4 sec)

Calls are played in sequence from 1-7. These calls are emitted as audio sounds from each Sonic Dissuader when the correct combinations of time of day, triggering events and sufficient battery voltage are met. A call can only be broadcast once within each 15 minute period. The Sonic Dissuader is powered by a solar charged lead-acid gel-cell and the control device is powered by a 6 volt lantern battery.

Figure 1-3
Sonic Dissuader Device Designed by Myrica Systems, Inc. (Winnipeg, Manitoba, Canada) Tested at NWRC 14 August-05 October 2007

Figure 1-4
Control device designed by Myrica Systems, Inc. (Winnipeg, Manitoba, Canada) Tested at NWRC 14 August-05 October 2007

Objectives

Few studies have determined if specific calls of woodpeckers, or other avian predators can be used to deter pileated woodpeckers. It is known that sound can be used to modify woodpecker behavior. For example, taped calls of pileated woodpeckers have been used to lure pileated woodpeckers to mist nets [13].

The objectives of this study were to:

- Determine efficacy of the Sonic Dissuader (Myrica Systems, Inc) for detecting and deterring woodpecker damage to electric utility poles.
- Compare the effectiveness of the seven Sonic Dissuader individual calls to deter woodpeckers from electric utility poles.
- Determine pileated woodpecker habituation to Sonic Dissuader calls.

2
METHODS AND PROCEDURES

Experiment Setup

Pileated woodpeckers were trapped from 10 April 2007 through 19 April 2007 in the Mark Twain National Forest-Rolla Ranger District, Rolla, Missouri and the Ozark National Forest-Cass Ranger District, Cass, Arkansas using mist nets and a taped pileated woodpecker call [13]. Woodpeckers were transported to the National Wildlife Research Center (NWRC) Fort Collins, Colorado and each bird housed individually in either indoor or outdoor aviaries 2.6 m x 2.6 m x 5.3 m within the NWRC Animal Research Building (ARB) or Outdoor Animal Research Facility (OARF). A net cage of the same size as the holding cage was inserted into the holding cage to prevent woodpeckers from any physical contact with the wire holding cage. The daily diet consisted of 20 grams (g) of canine diet canned dog food (beef), 35 g of mealworms, and 50 g of mixed fruit (apples, oranges, bananas, and grapes) (J. Phillips, Caldwell, TX Zoo, 1997 pers comm., modified by J. Davis, NWRC 1997). During holding, each bird was provided with free access to one untreated southern yellow pine (*Pinus palustris*) pole section (approximately 1.2 m in height and 30 cm in diameter).

Experimental testing was conducted in the OARF flight pen (Figure 2-1) from 14 August 2007 through 05 October 2007. Within the flight pen, two 6 meter electric utility poles were installed 26.5 m apart, one with a Sonic Dissuader, the other with a control device. At the beginning of the first test, the Sonic Dissuader was randomly assigned to one pole; the control device to the other. Each device was mounted facing southwest to capture sun on the solar array, 1.5 m from the pole top. One woodpecker at a time was transferred to the flight pen and then evaluated for five consecutive days. At the end of each five day trial, the devices were alternated between the two poles and a new woodpecker placed in the flight pen. This was repeated for all eight woodpeckers resulting in 40 observation days.

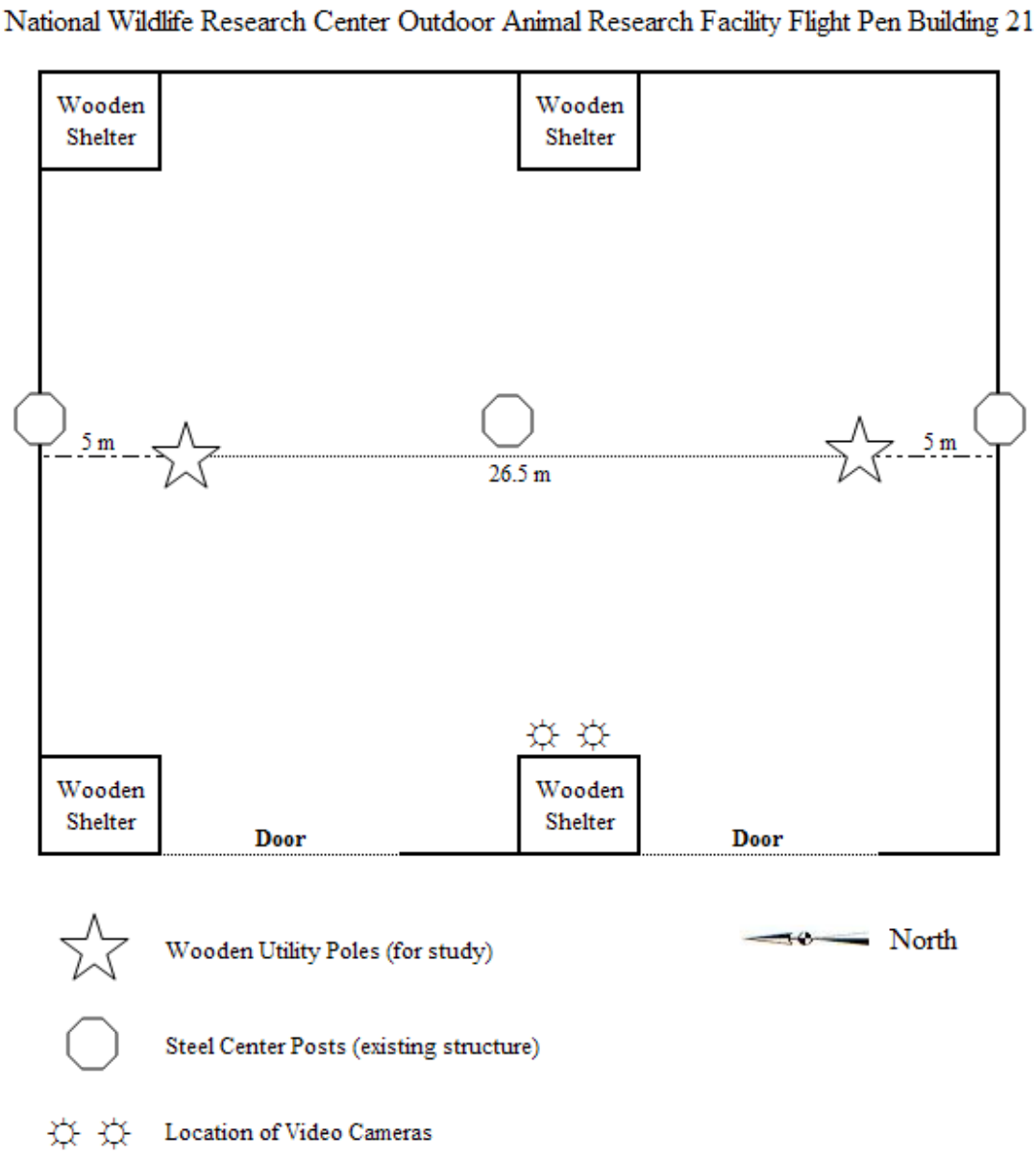

Figure 2-1
NWRC Flight Pen Setup to Evaluate the Effectiveness of the Sonic Dissuader to Reduce Pileated Woodpecker Damage to Electric utility poles, 14 August 2007 through 05 October 2007

Each bird was released into the flight pen between 0600 and 0700 on day 1 of testing and remained for a 5 day testing period. The standard diet was placed in the center of the pen and offered daily, water was available *ad libitum*. Both the pole with Sonic Dissuader (treatment) and the pole with the control box (control) were videotaped separately and tapes reviewed after the devices were removed. Both the Sonic Dissuader and the control device have data recorders, which recorded the 15 minute time period woodpeckers were detected on the pole and the total number of events recorded for that 15 minute period. The Sonic Dissuader also logged which of the 7 calls were emitted.

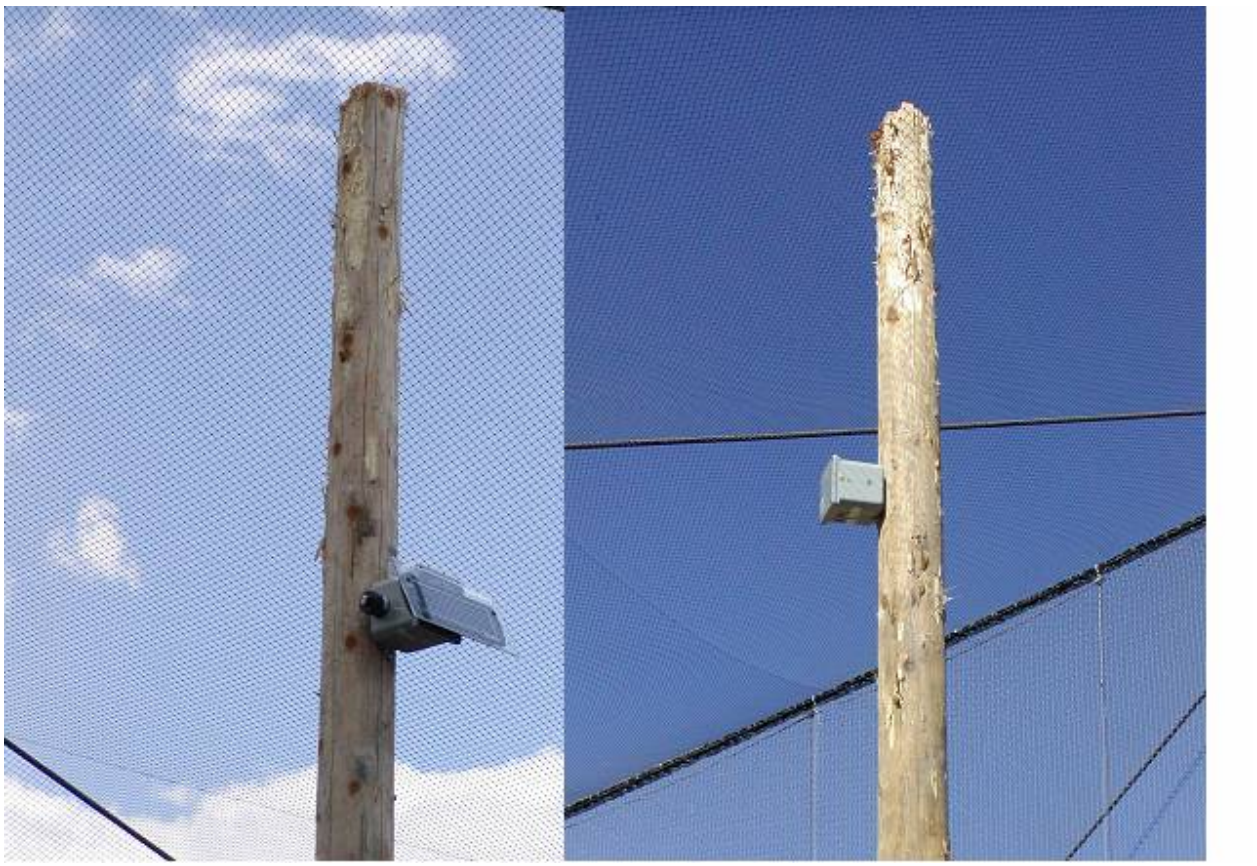

Figure 2-2
Sonic Dissuader (Left) and Control Device (Right) Installation on Electric utility poles for Testing Conducted 14 August through 05 October 2007

Sonic Dissuader and control poles were taped (both video and sound) with video recorders during daylight hours (0545-2030) (Figure 2-3). From the tapes, we collected data on the total amount of time spent on the treated or control pole, and the total amount of time spent pecking (causing damage) on the treated or control pole. We also recorded the call number heard, time of the broadcast, and the amount of pecking that was done before and after the broadcast.

Woodchips produced from woodpecker damage to either Sonic Dissuader or control poles were collected at the end of the 5 day testing period to assess the amount of damage. Woodchips were dried for 24 hours in a drying oven at 180°F to standardize moisture content and weighed to nearest tenth of a gram.

Figure 2-3
Video Camera Location within Wooden Shelter of NWRC Flight Pen During Testing Conducted 14 August 2007 through 05 October 2007

Statistical Analysis

We summed the number of seconds on each pole and total number of seconds pecking on each pole, for each bird on each day. We used these totals to compare effectiveness of treatments (i.e., Sonic Dissuader vs. control) and to investigate habituation to the Sonic Dissuader. These data were analyzed using an analysis of variance (ANOVA) (PROC GLM, SAS Institute Inc., 2003), with days used as the repeated measures. The weight of woodchips removed by each bird also was compared using an analysis of variance. Additionally, we summed the number of times each Sonic Dissuader call was broadcasted for each bird, each day and logged the seconds until a bird departed from the pole. We then determined the effectiveness of the 7 individual calls based on the time to departure with ANOVA (PROC GLM, SAS Institute Inc., 2003) with days as the repeated measures.

3
RESULTS

All pileated woodpeckers perched on both Sonic Dissuader and control poles. Birds spent an average of 2 hours 9 minutes 33 seconds on poles with Sonic Dissuaders, and 2 hours 8 minutes 47 seconds on poles with control devices (Figure 3-1). We were unable to detect a significant difference between time perching on the Sonic Dissuader pole versus the control pole ($F_{1,7}$ = 3.83, P = 0.091). There was also no day effect in time spent on the pole ($F_{4,22}$ = 0.05, P = 0.996).

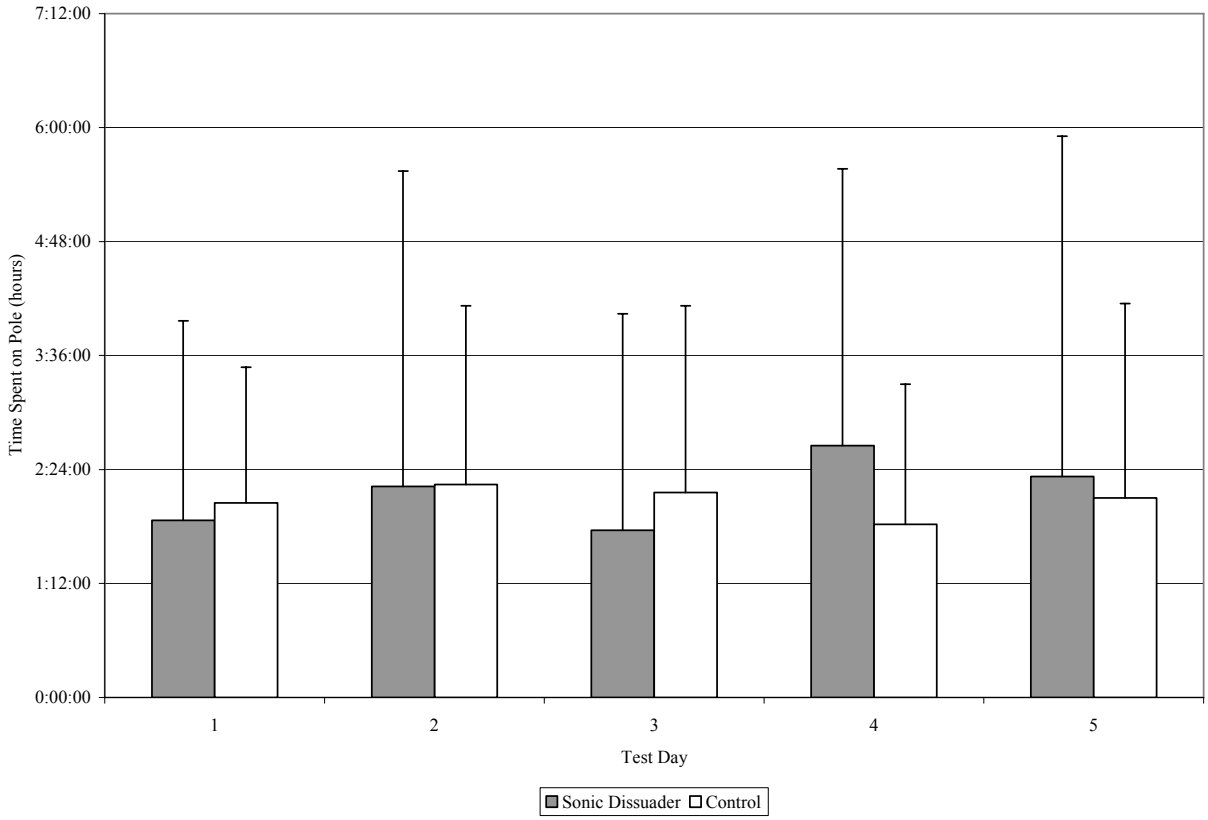

Figure 3-1
Average Time Spent on Pole by Pileated Woodpeckers (n=8) by Day During Testing at NWRC Conducted 14 August 2007 through 05 October 2007

Pileated woodpeckers spent an average of 8 minutes 21.2 seconds pecking on poles with Sonic Dissuaders, and 27 minutes 29.1 seconds pecking on poles with control devices (Figure 3-2). This represents a 70% reduction in pileated woodpecker pecking on poles equipped with the Sonic Dissuader versus poles equipped with the control device. However, due to extreme

variation among birds (for example, one bird pecked for 11,000 seconds and another for only 8 seconds), we were unable to detect a statistical difference between time pecking on poles with Sonic Dissuaders versus time pecking on poles with control devices ($F_{1,7} = 1.82$, $P = 0.219$). Additionally, there was no significant increase or decrease in time pecking on either pole across 5 days of testing ($F_{4,22} = 0.22$, $P = 0.923$).

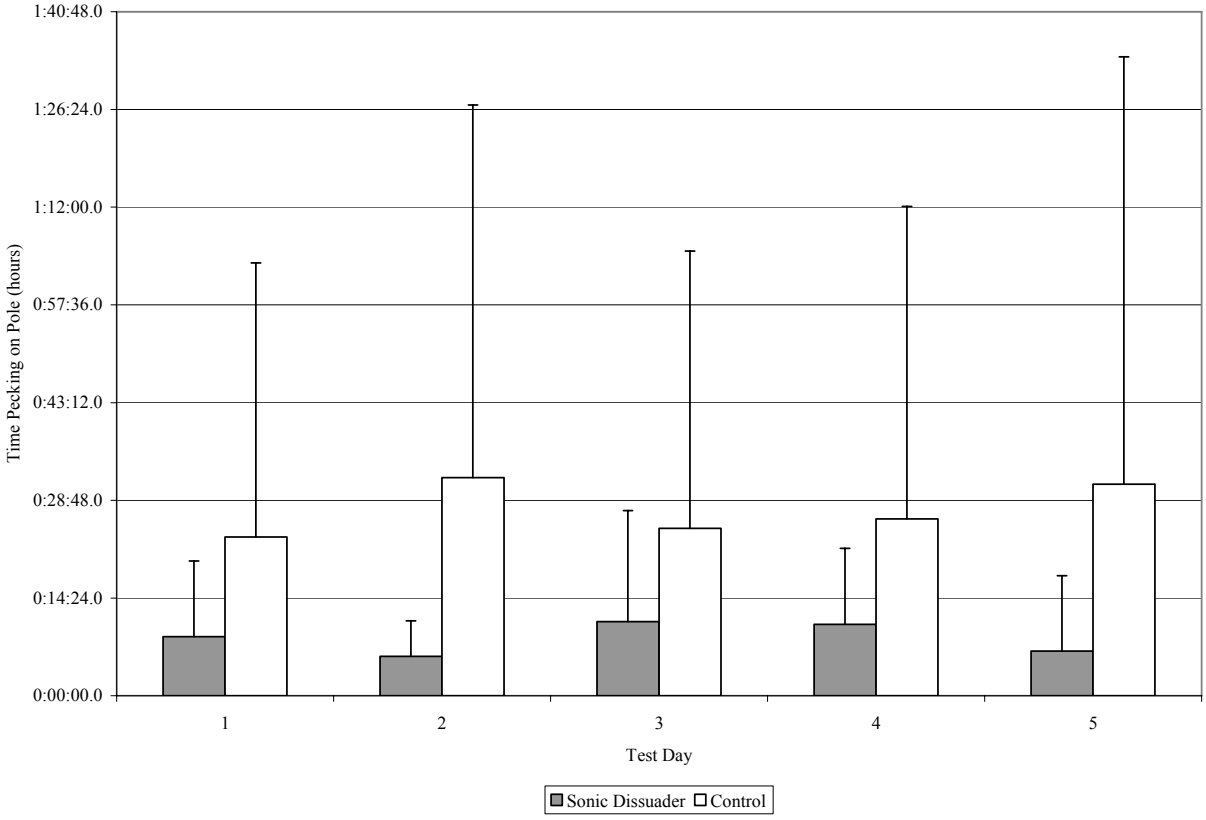

Figure 3-2
Average Time Pecking on Poles by Pileated Woodpeckers (n=8) by Day During Testing at NWRC Conducted 14 August 2007 through 05 October 2007

The Sonic Dissuader broadcast 570 times during the 40 days of testing, 21 of these broadcasts were due to weather events (e.g., rain, wind, or thunder). The remaining 549 broadcasts are shown in Figure 3-3 broken out by call, and in Figure 3-4 broken out by test day. Due to a video failure, 63 of the broadcasts from bird 4 could not to be verified.

Average times to departure by call ranged from 1 minute 51 seconds to 5 minutes 19 seconds. However, time in minutes it took birds to leave the pole due to the Sonic dissuader had maximum values ranging from 14 minutes 44 seconds up to 103 minutes 49 seconds (Table 3-1). We were not able to detect a statistical difference between the seven different bird calls based on the time it took birds to depart after a call broadcast ($F_{6,8} = 1.14$, $P = 0.422$). Average time pecking after broadcast by the sonic dissuader ranged from 20.8 seconds up to 30.7 seconds pecking (Table 3-1). We were also not able to detect a statistical difference between the seven different bird calls based on the average time spent pecking after a broadcast.

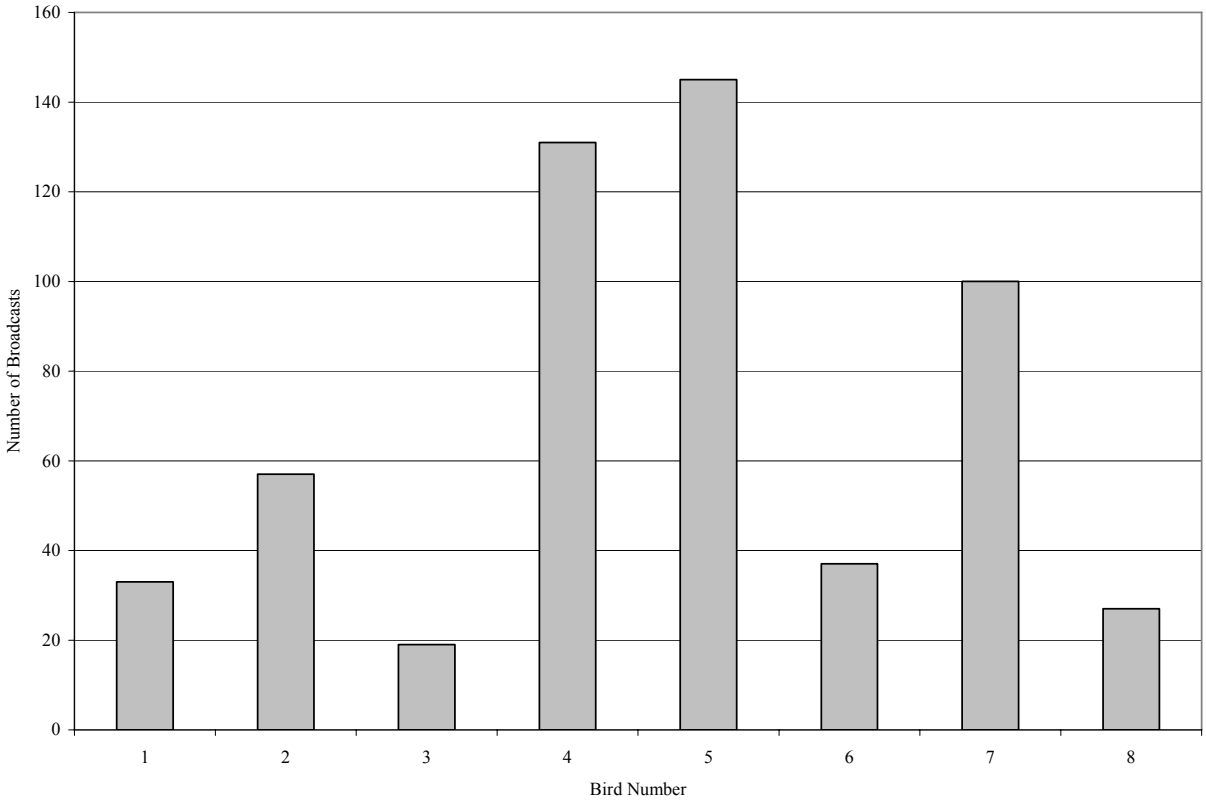

Figure 3-3
Number of Broadcasts by Bird for Each Five Day Test Period Testing at NWRC Conducted 14 August 2007 through 05 October 2007

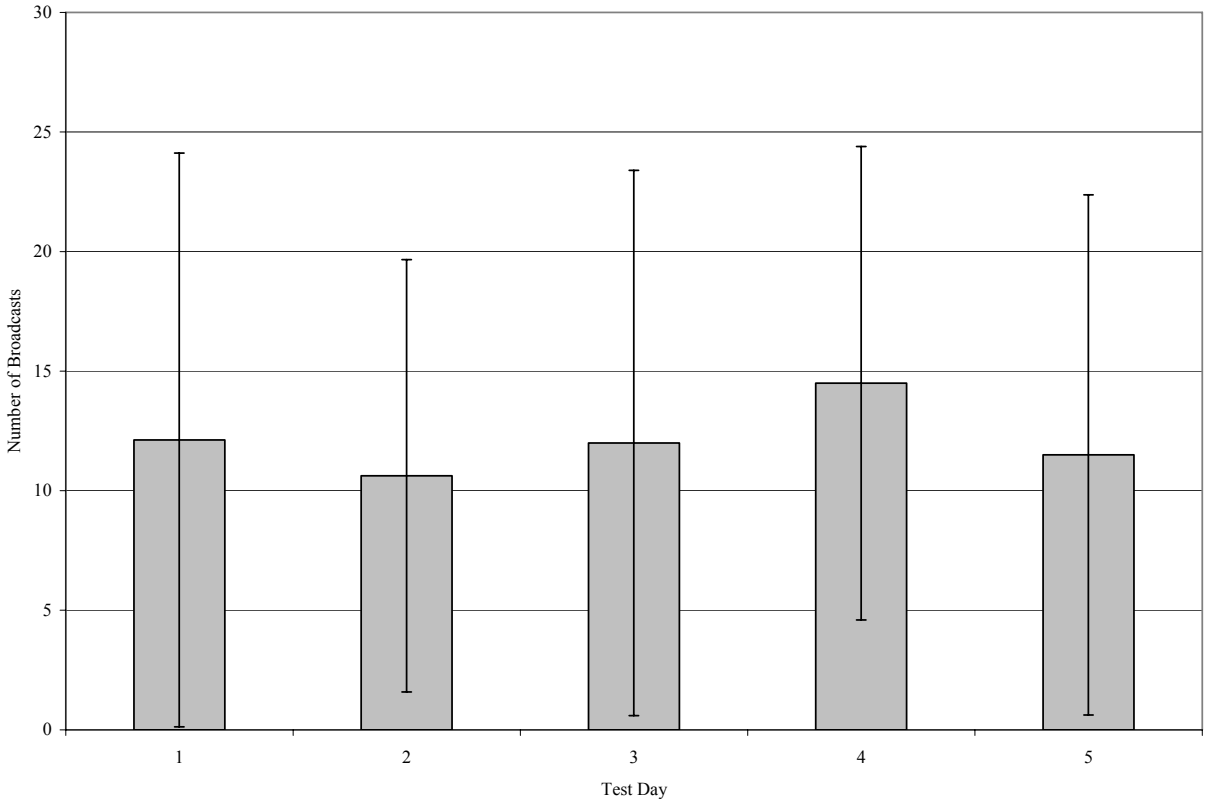

Figure 3-4
Average Number of Broadcasts per Day during Testing at NWRC Conducted 14 August 2007 through 05 October 2007

Table 3-1
Response to Sonic Dissuader Calls

Call Number	Total # Broadcasts	No Bird Departure (#)[1]	Average Time to Departure	Maximum Time to Departure	Average Time Pecking After a Sonic Broadcast
1-Territory Call	69	8	0:04:06.3	0:36:45.0	0:00:29.5
2-Threat Chatter	72	9	0:05:00.0	1:15:05.0	0:00:20.8
3-Comm Chatter	67	12	0:01:51.8	0:14:44.0	0:00:30.0
4-Drumming	69	10	0:02:47.6	0:32:29.0	0:00:30.7
5-Merlin falcon	69	7	0:05:19.7	1:43:49.0	0:00:21.4
6-Am. kestrel	68	10	0:02:15.7	0:16:24.0	0:00:23.8
7-Red-tailed hawk	72	9	0:03:05.9	0:20:48.0	0:00:23.8

[1] No departure indicates that bird remained on pole through the next broadcast.

Woodchip damage to poles varied by bird. Bird 1 removed the least amount of woodchips, 1.1 g from the Sonic Dissuader pole and 13.8 g from the control pole, and bird 7 removed the greatest amount of woodchips 53.8 g from the Sonic Dissuader pole and 386.5 g from the control pole (Table 3-2). However, using a single factor ANOVA there was no statistical difference between grams of woodchips collected from Sonic Dissuader poles versus control ($F_{1,7} = 0.87$, P=0.3829).

Table 3-2
Woodchips Removed (g) at completion of 5 day test period by bird

Bird Number	Sonic Dissuader (g)	Control (g)
1	1.1	13.8
2	42.5	21.4
3	20.3	22.3
4	192.5	82.9
5	69.8	25.7
6	9.9	35.4
7	53.8	386.5
8	47.6	219.7
Average	**54.7**	**101.0**

4
DISCUSSION

Sonic Dissuader Function

Mechanical methods for repelling woodpeckers and preventing damage to electric utility poles have consistently shown little success. Stuffed owls and imitation snakes, both known predators of pileated woodpeckers and their eggs, have shown no effect [9]. Scaring devices in general have been unsuccessful due to acclimatization of birds to the device over time [10]. Most scaring devices broadcast a set call or series of calls at predefined intervals and are most frequently used to protect an area, such as a field or crop. In order to delay acclimatization to the calls, broadcasting devices generally need to be relocated periodically during use. The Sonic Dissuader is similar to motion controlled devices in that it is mounted directly on the commodity it is protecting and is broadcasting only when the target animal is actually causing damage.

The Sonic Dissuader functioned during this cage study as the manufacturers claimed. The data logger for the Sonic Dissuader showed that the 8 birds were on the pole doing damage for 928-15 minute periods. We were able to verify 90% of these observations with video analysis. There were 98 time periods where recorded activity was attributed to wind, rain, or thunder when no bird was observed on the pole and evidence of weather was occurring. The Sonic Dissuader is programmed to not broadcast at night, but 35-15 minute periods had recorded activity at night, and 15 of those broadcast a call. The Sonic Dissuader successfully detected every pecking event, as designed. Through video analysis we observed woodpeckers on the pole during time periods when the Sonic Dissuader had no recorded activity. However, this was expected because the device uses pecking as a triggering mechanism.

Video Analysis

Video analysis of cage testing with the Sonic Dissuader did not show a reduction in average time spent perching on poles equipped with Sonic Dissuaders versus control. There was a large amount of variation among the birds in terms of time spent on each pole. For example, bird 5, a male pileated woodpecker, spent an average of 8 hours a day perching on the Sonic Dissuader pole. This does not include non-daylight hours (2031-0544) during which the bird is believed to have spent roosting on the Sonic Dissuader pole. In contrast, Bird 7, a male pileated woodpecker, spent an average of 2 hours a day perching on the Sonic Dissuader pole.

Analysis of average time spent pecking showed that the Sonic Dissuader was able to reduce amount of time spent pecking on poles equipped with the device by 70% compared to controls. However, damage to both Sonic Dissuader and control poles still occurred. Because of the great variation in damage between individual birds we are unable to statistically detect differences

between the treatments and controls. For example, bird 5, a male pileated woodpecker, caused 69.8 g of damage (woodchips removed) to the pole equipped with the Sonic Dissuader. This damage was caused during 2 hours and 18 minutes of pecking. The Sonic Dissuader pole at the end of the 5 day test period had 2-5.0 cm holes (Figure 4-1). In contrast, bird 1, a female pileated woodpecker caused only 1.1 g of damage (woodchips removed) to the Sonic Dissuader pole. This damage was caused during only 8 minutes of pecking.

The Sonic Dissuader utilizes 7 different calls. Four of these calls are typical pileated woodpecker calls. The remaining 3 are predator calls from predators found throughout most of the pileated woodpecker territory. Based on a comparison of the average amount of time to departure after a call was broadcast to the average amount of time pecking after a call was broadcast, one call does not produce a greater deterrent effect than any of the other calls.

A potential reason for the variation among responses to the calls perhaps is the difference in age of the test birds. There is limited literature on woodpecker response to calls; however, a study with a different bird, the Ortolan bunting (Emberiza hortulana), recently showed the strength of a response to different threats depended on the age of the male. Although not a woodpecker species, second year male buntings showed a stronger reaction to threat calls as compared to after second year male buntings [15]. The woodpeckers used in this study varied in age from second year to after fourth year. One of the test woodpeckers is known to be at least 7 years old due to banding records.

There were varying responses to the sonic dissuader and times were noted when a bird would not flush through several calls. The number of times a bird was not flushed ranged from 7 to 12 times (Table 3-1). This happened up through a maximum of 4 calls.

Analysis of the video data showed that there was no day effect to the treatment. In other words, the average response by birds did not increase or decrease on either treated or control poles as test day increased. This suggests that the woodpeckers as a group were not habituating to the calls over time.

Figure 4-1
Photo of Bird 5 Test Poles (Sonic Dissuader Pole at Left, Control Pole at Right) from Testing Conducted at NWRC from 14 August through 05 October 2007

Field Use

The results of this trial demonstrated that the transportation of the units and initial installation must be well coordinated. Because the units are considered “on” as soon as they are manufactured, the gel-cells begin loosing charge, if it is not kept in sunlight. Sonic Dissuaders would need to be installed immediately after shipping or stored outdoors to ensure the device would be ready upon installation. Before experiment testing began, all Sonic Dissuaders had to be checked for proper charge and then charged to ensure they would work once installed on the pole. The device does include a toggle switch to turn the broadcasts on or off, but not to turn the device itself on or off.

Once installed on the pole there is no method to determine if the device is functional. There is an LED that flashes, but that only indicates that the unit has enough battery to flash, not necessarily to broadcast. A mechanism to ensure activity without having to climb the pole would be advantageous.

Conclusions

While the Sonic Dissuader was able to reduce the amount of time spent pecking on the treated pole, some damage still occurred. This may be due to the design of the device to only broadcast once within a 15 minute period. During testing, woodpeckers were observed pecking on the Sonic Dissuader pole, the call would broadcast and the bird would depart (within varying amounts of time, as mentioned earlier). However, if the bird returned within the same 15 minute interval and continued pecking, the potential exists for no call to broadcast for up to 14 minutes. It is difficult to deter an animal from a behavior when they are only being negatively stimulated a portion of the time that the behavior is occurring. Additionally, the experimental design used for this study forced birds to use one of two poles. It did not give options that would be available in the wild. If woodpeckers respond similarly in the wild as they did during cage testing, some birds would be deterred from the pole and might never return so long as there were other options for pecking.

The time spent pecking on Sonic Dissuader poles was reduced and modifications to the device could be made that would possibly increase effectiveness (i.e., broadcast whenever pecking occurs). In addition, a method for determining that the device is working when mounted on a utility pole would be beneficial.

A
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B
ADDITIONAL FIGURES

Time Spent on Pole

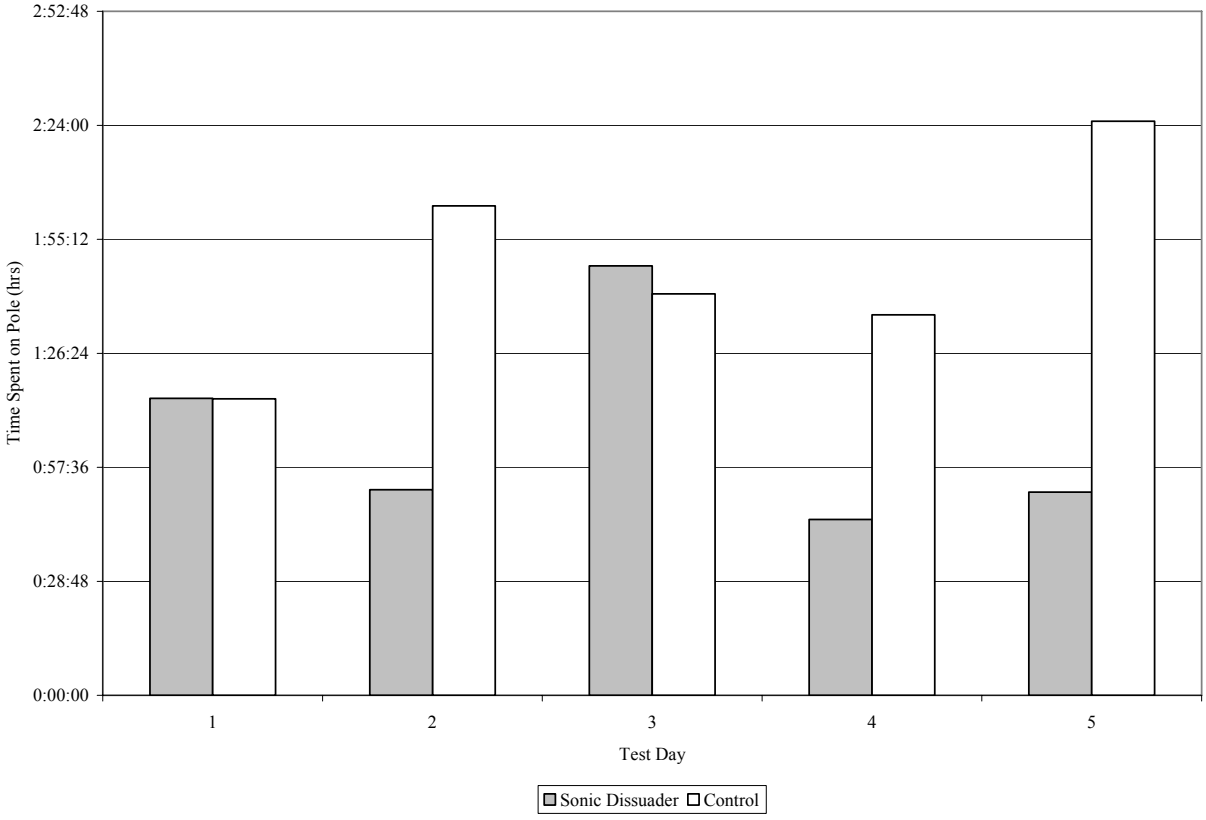


Figure B-1
Total Time Spent on Pole by Pileated Woodpecker 1 by Day During Testing at NWRC
Conducted 14 August 2007 through 18 August 2007

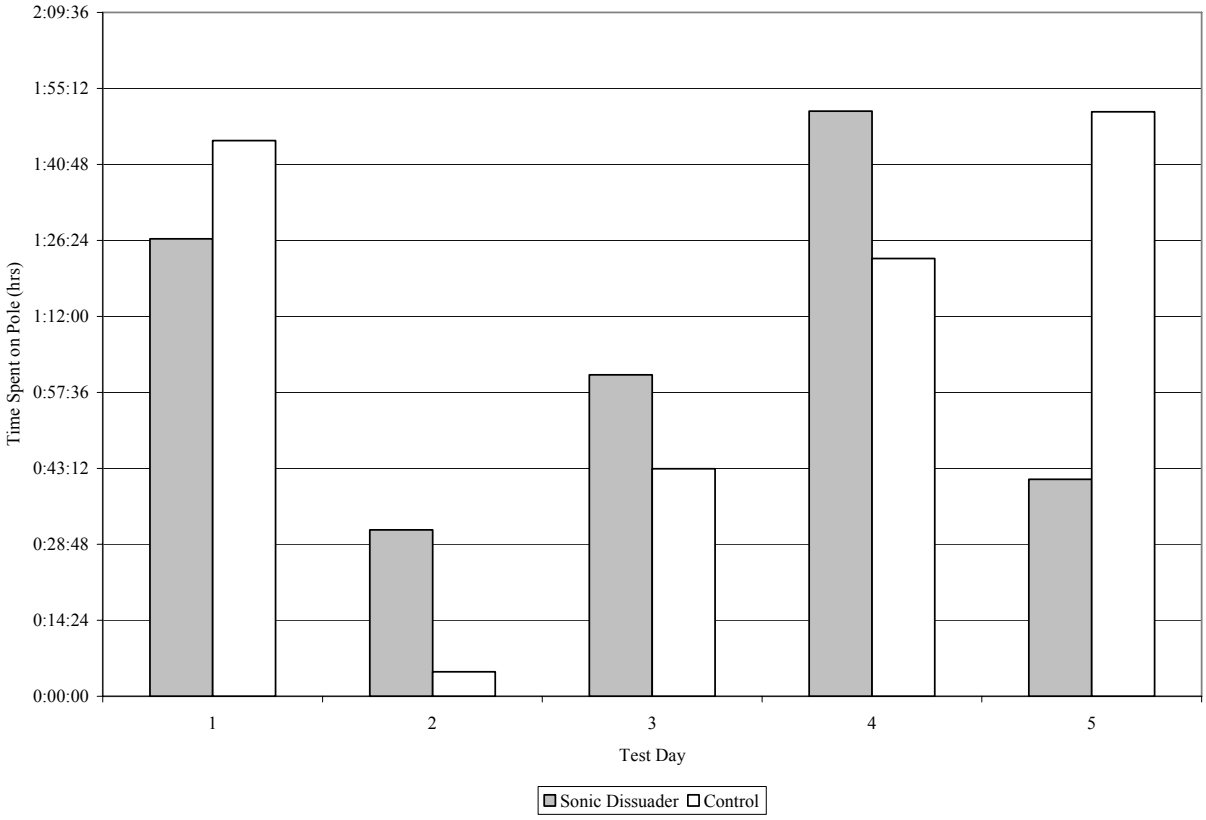


Figure B-2
Total Time Spent on Pole by Pileated Woodpecker 2 by Day During Testing at NWRC Conducted 20 August 2007 through 24 August 2007

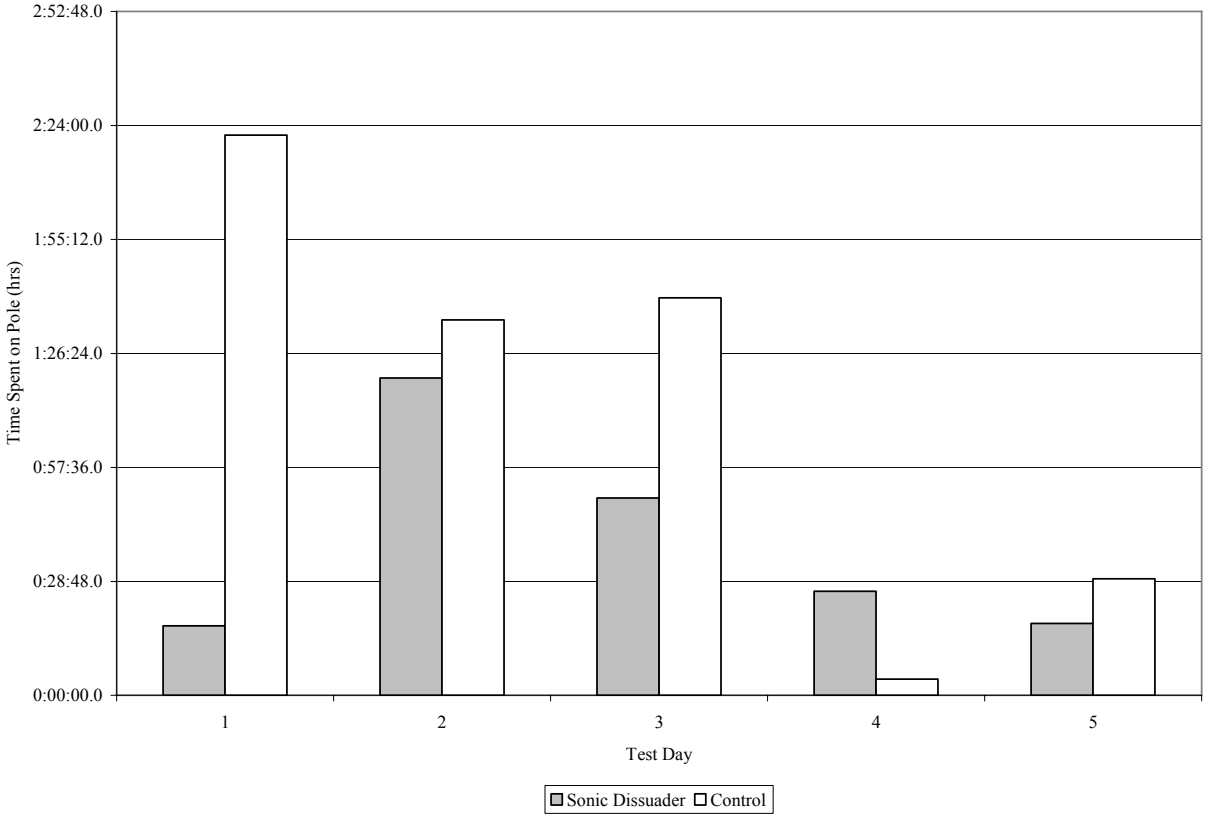


Figure B-3
Total Time Spent on Pole by Pileated Woodpecker 3 by Day During Testing at NWRC Conducted 26 August 2007 through 30 August 2007

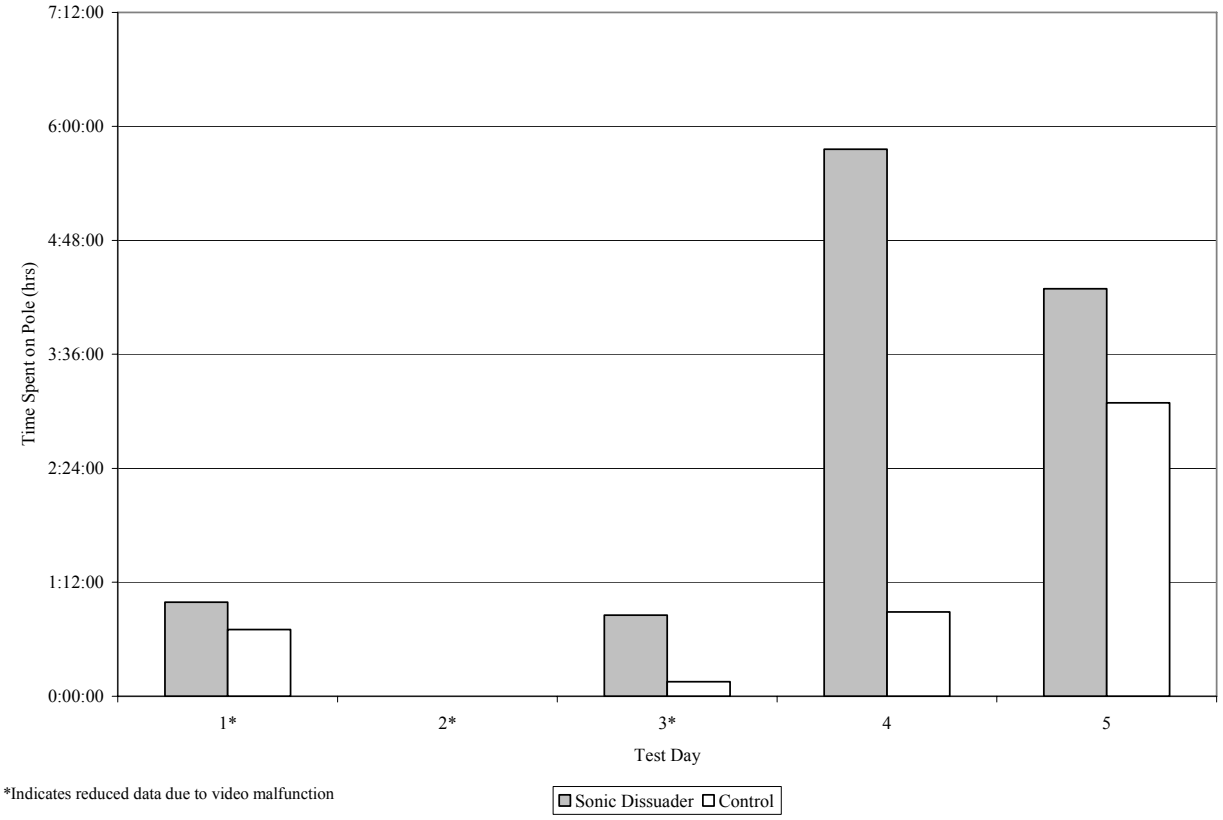


Figure B-4
Total Time Spent on Pole by Pileated Woodpecker 4 by Day During Testing at NWRC
Conducted 01 September 2007 through 05 September 2007

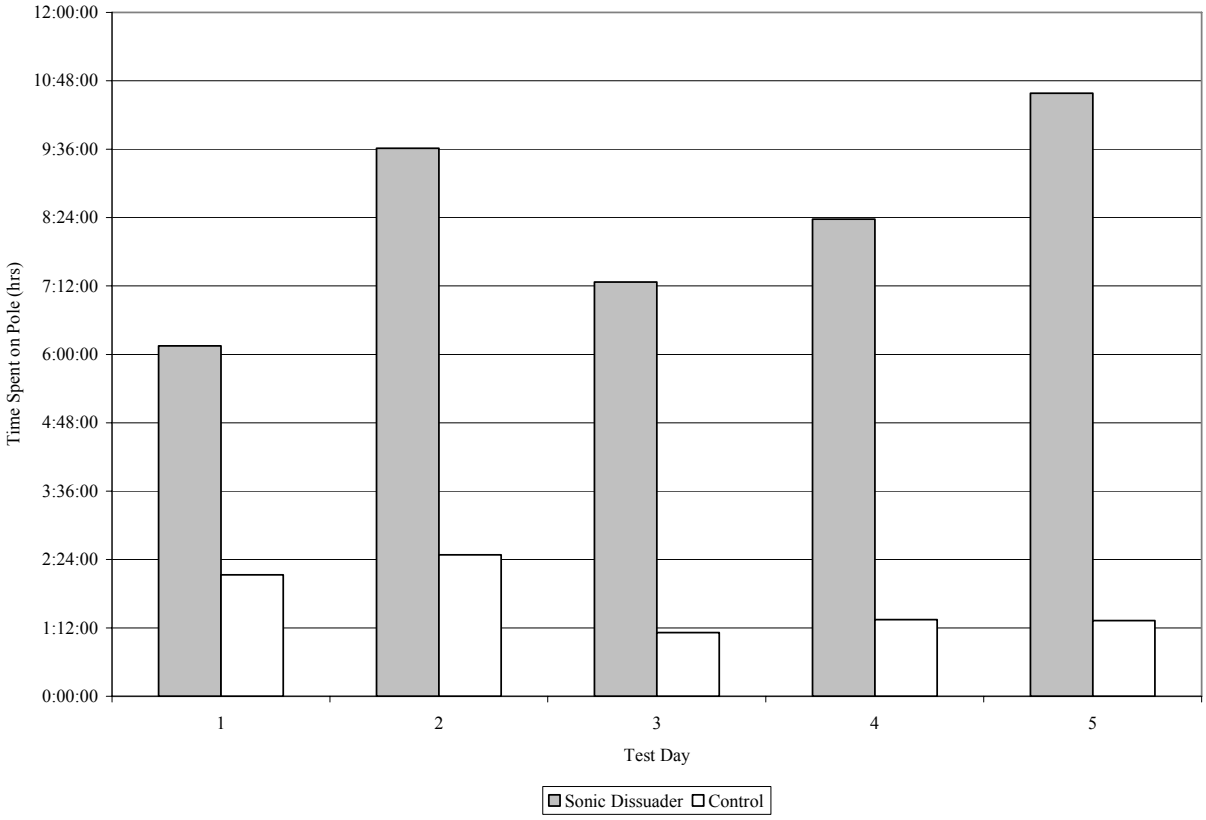


Figure B-5
Total Time Spent on Pole by Pileated Woodpecker 5 by Day During Testing at NWRC
Conducted 07 September 2007 through 11 September 2007

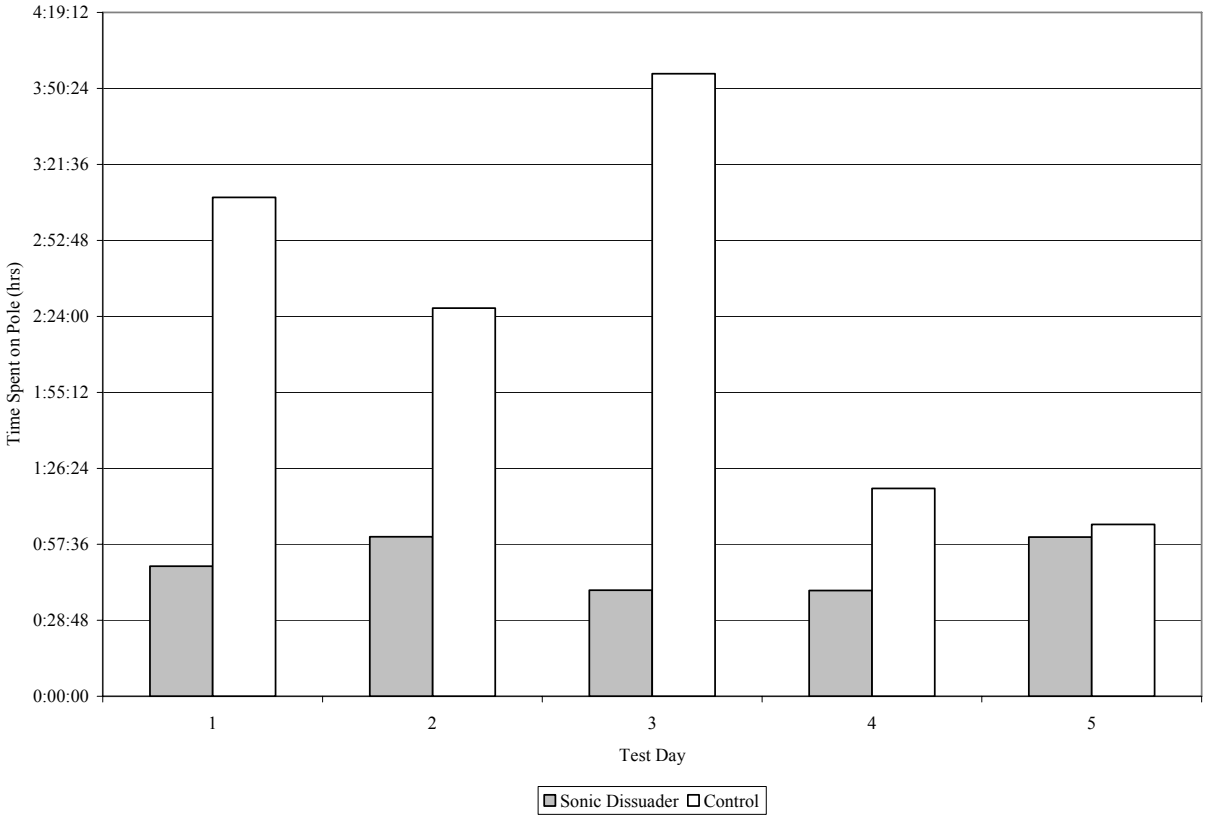


Figure B-6
Total Time Spent on Pole by Pileated Woodpecker 6 by Day During Testing at NWRC
Conducted 18 September 2007 through 22 September 2007

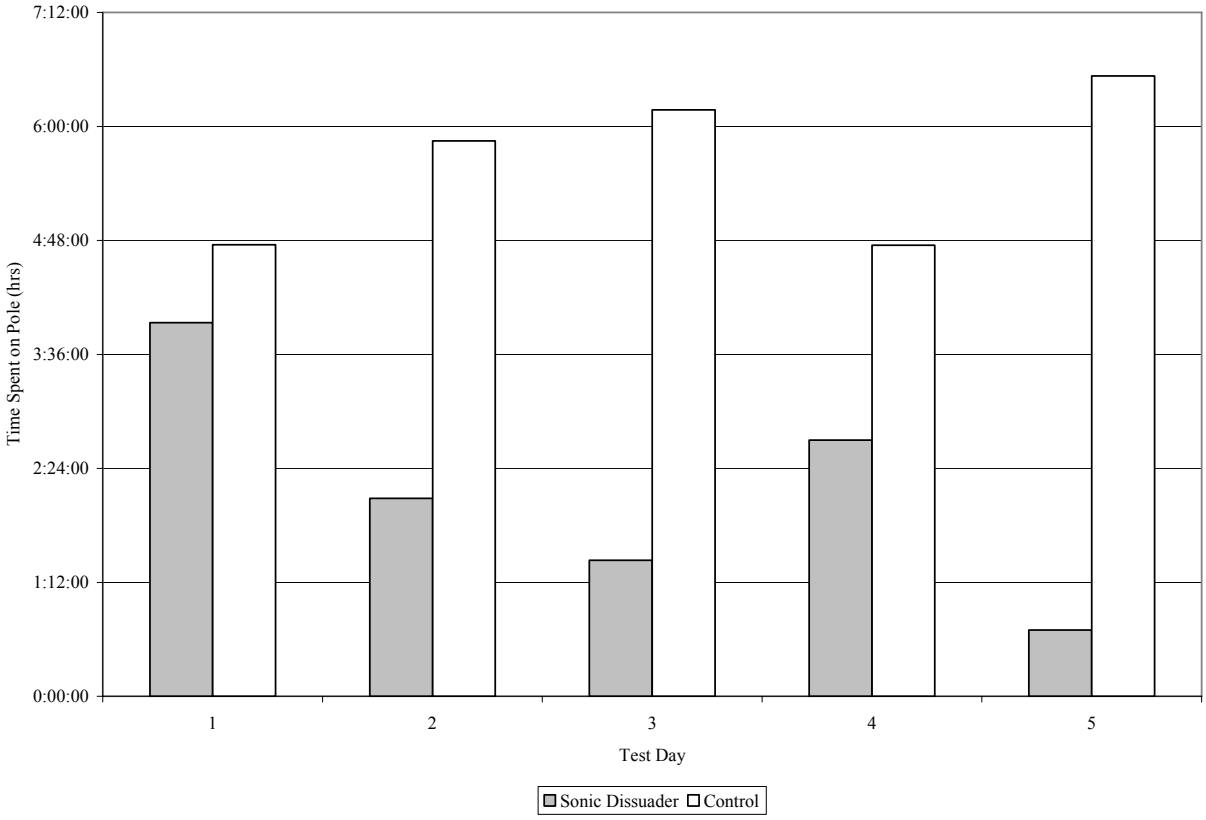


Figure B-7
Total Time Spent on Pole by Pileated Woodpecker 7 by Day During Testing at NWRC Conducted 25 September 2007 through 30 September 2007

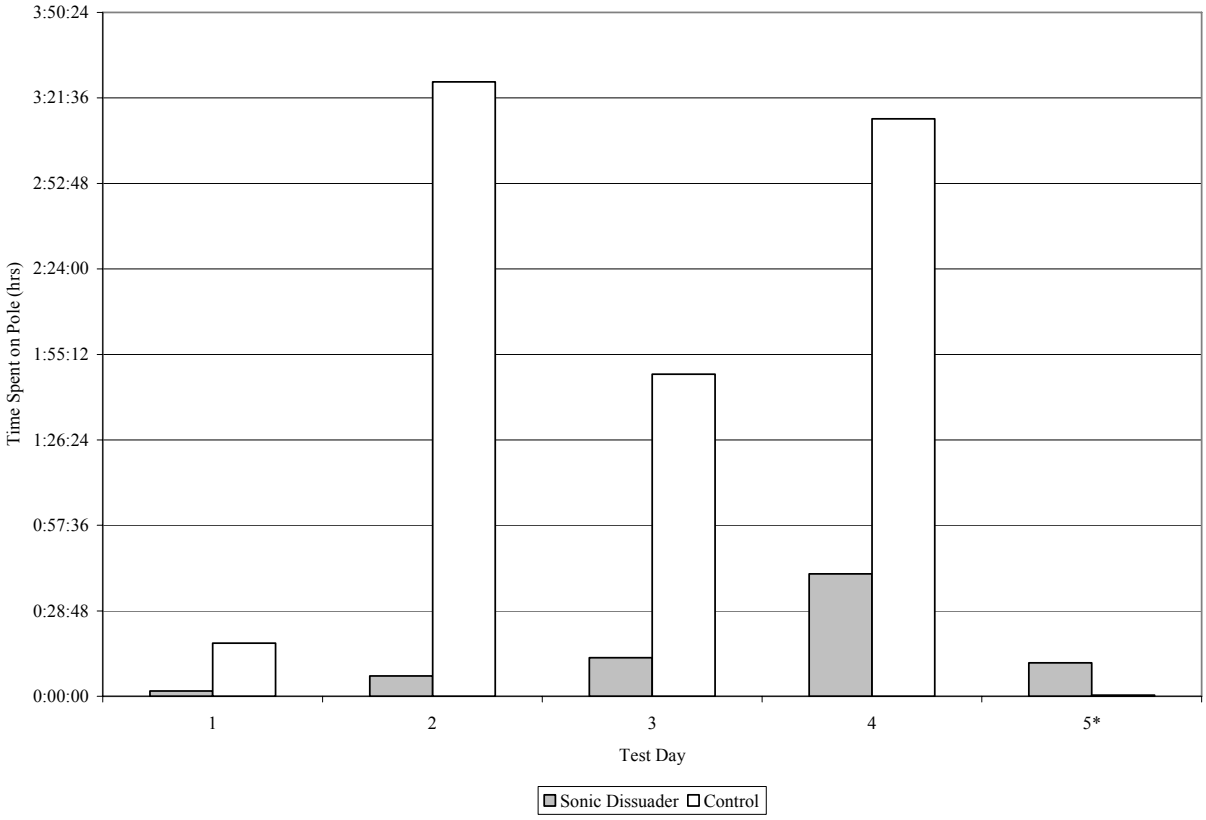


Figure B-8
Total Time Spent on Pole by Pileated Woodpecker 8 by Day During Testing at NWRC
Conducted 01 October 2007 through 05 October 2007

Time Pecking on Poles

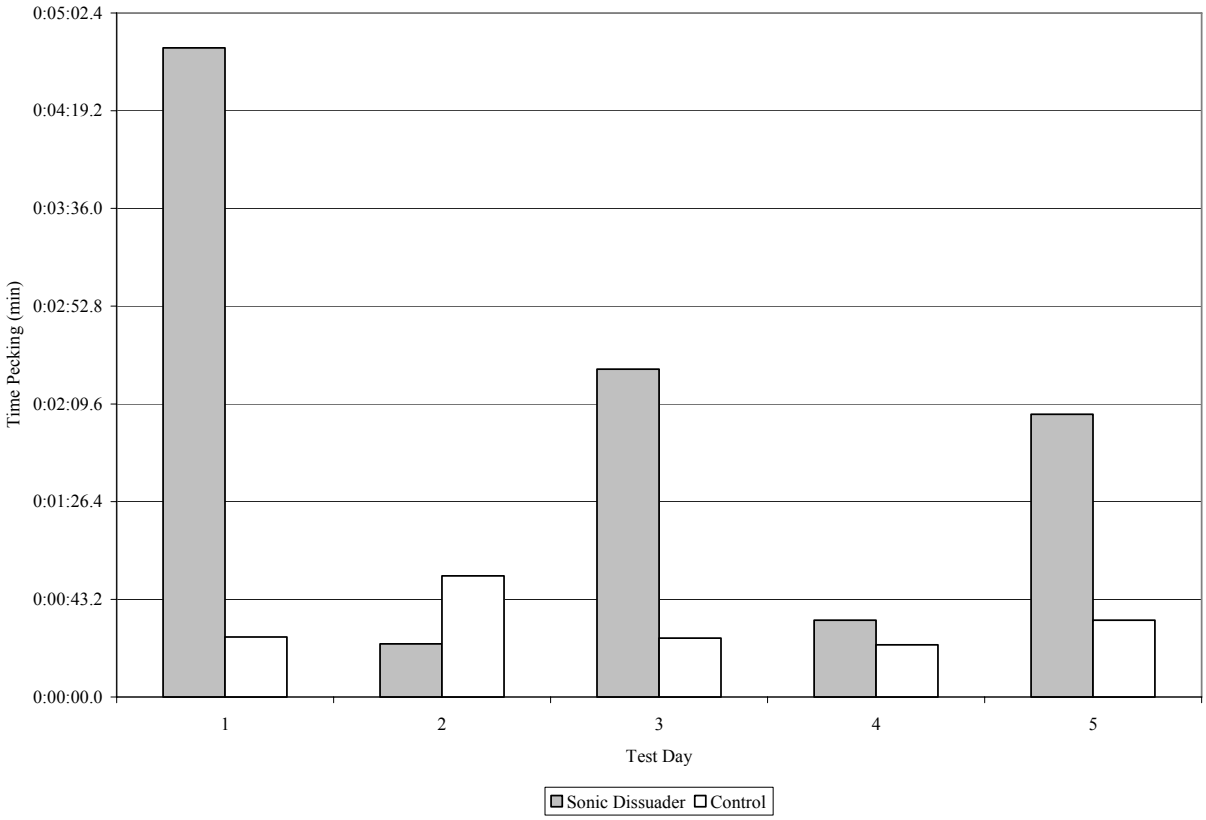


Figure B-9
Total Time Pecking on Poles by Pileated Woodpecker 1 by Day During Testing at NWRC Conducted 14 August 2007 through 18 August 2007

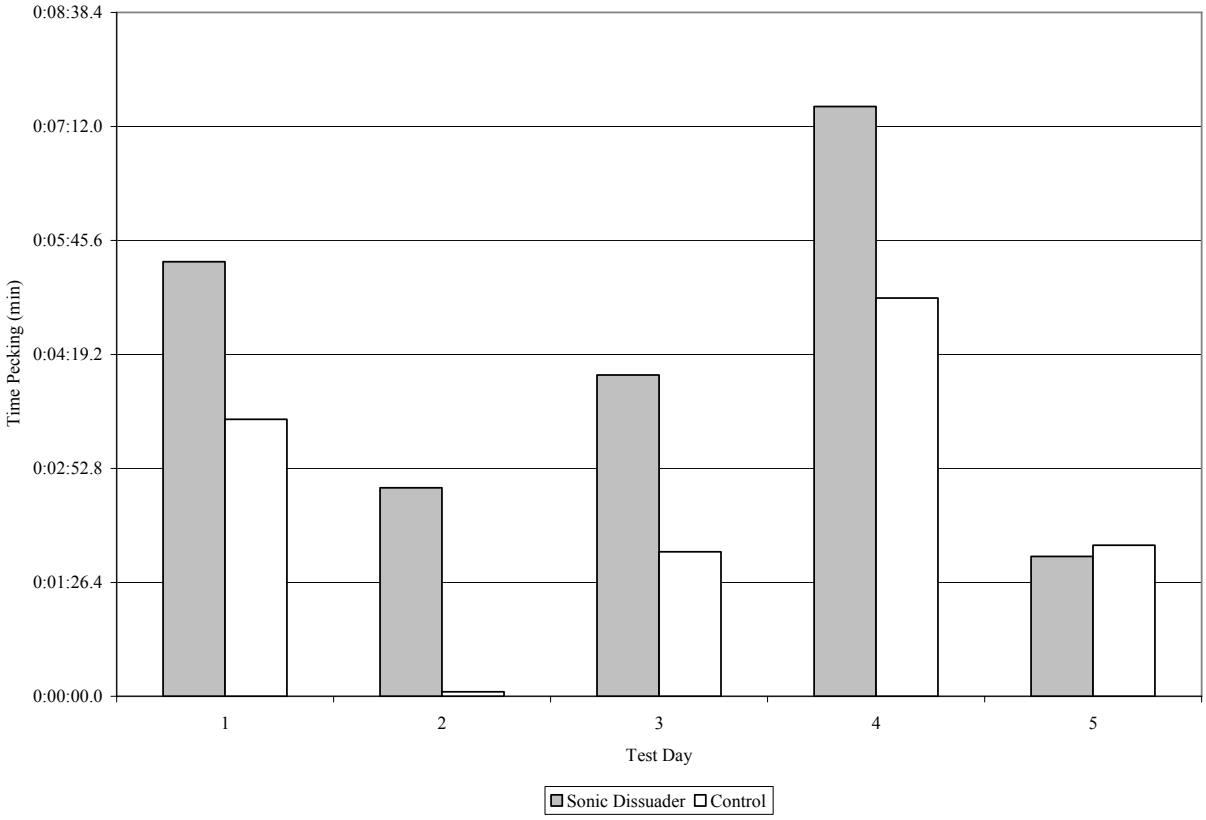


Figure B-10
Total Time Pecking on Poles by Pileated Woodpecker 2 by Day During Testing at NWRC Conducted 20 August 2007 through 24 August 2007

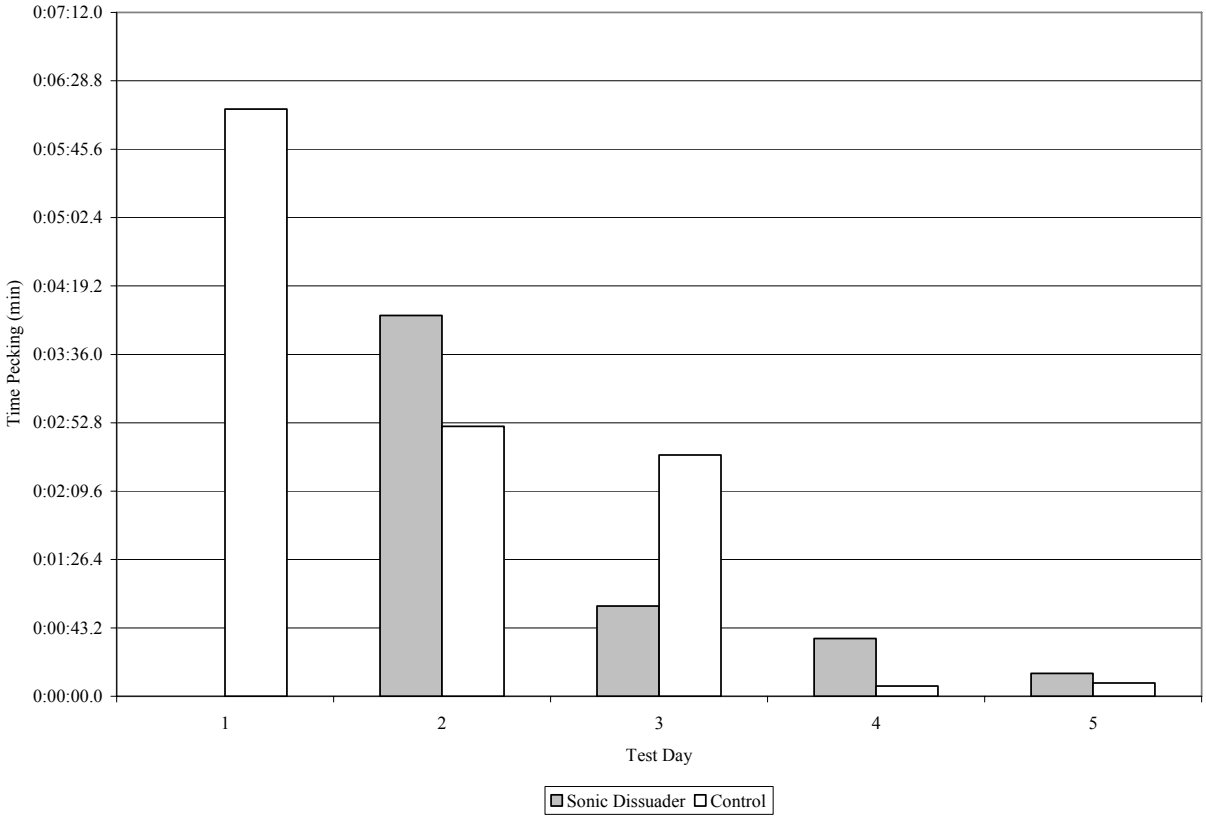


Figure B-11
Total Time Pecking on Poles by Pileated Woodpecker 3 by Day During Testing at NWRC Conducted 26 August 2007 through 30 August 2007

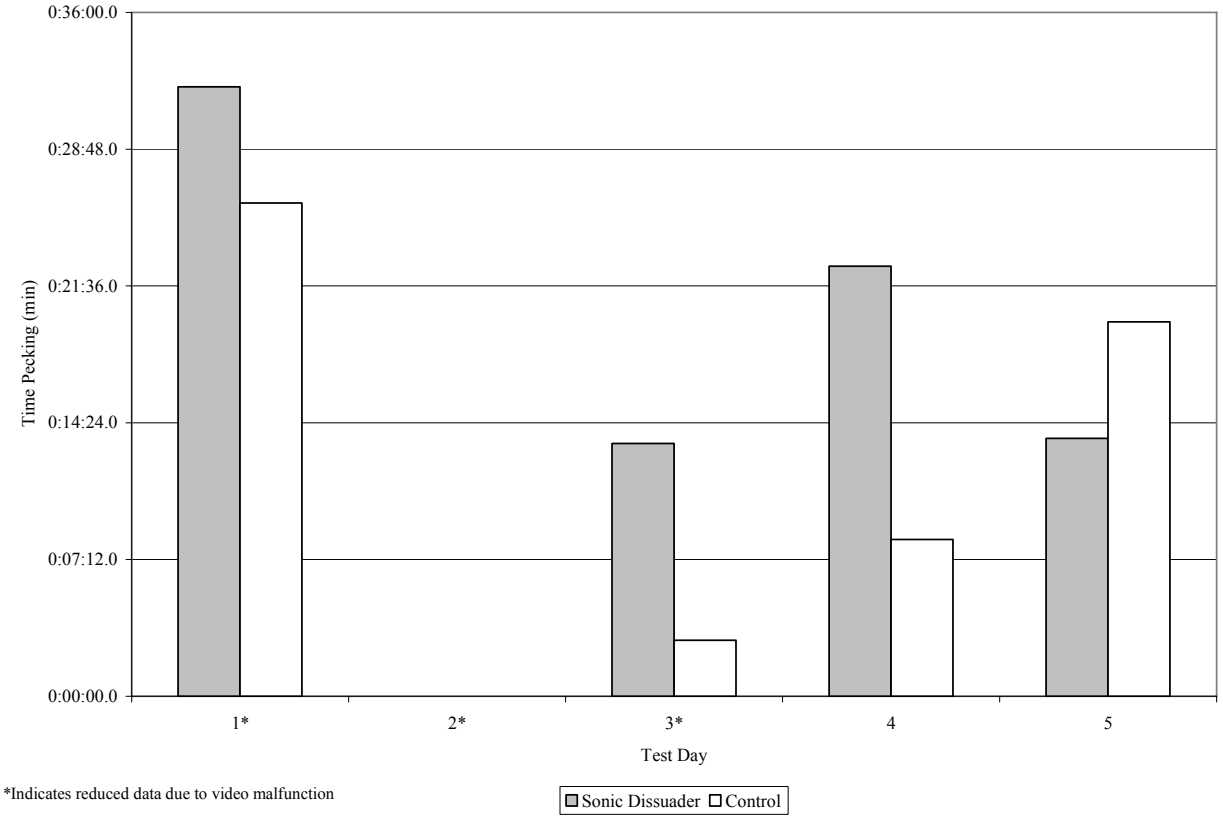


Figure B-12
Total Time Pecking on Poles by Pileated Woodpecker 4 by Day During Testing at NWRC Conducted 01 September 2007 through 05 September 2007

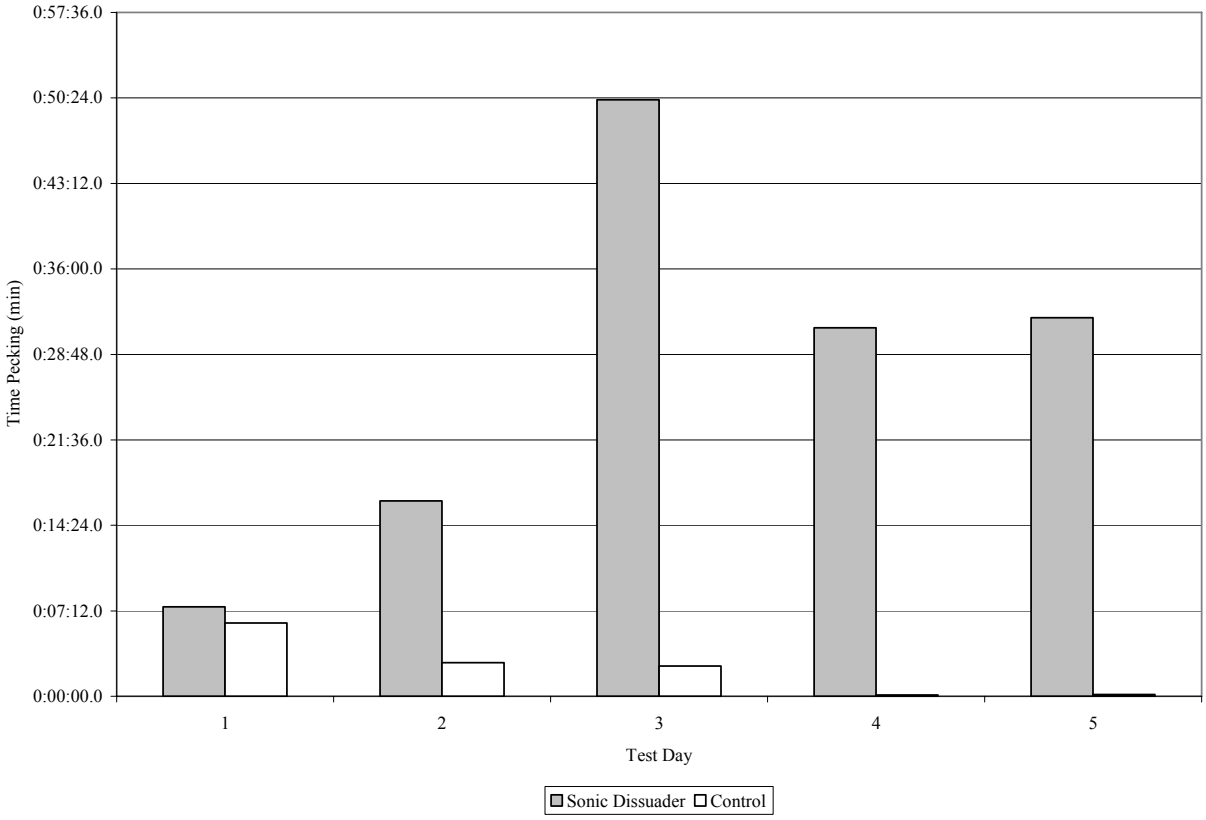


Figure B-13
Total Time Pecking on Poles by Pileated Woodpecker 5 by Day During Testing at NWRC Conducted 7 September 2007 through 11 September 2007

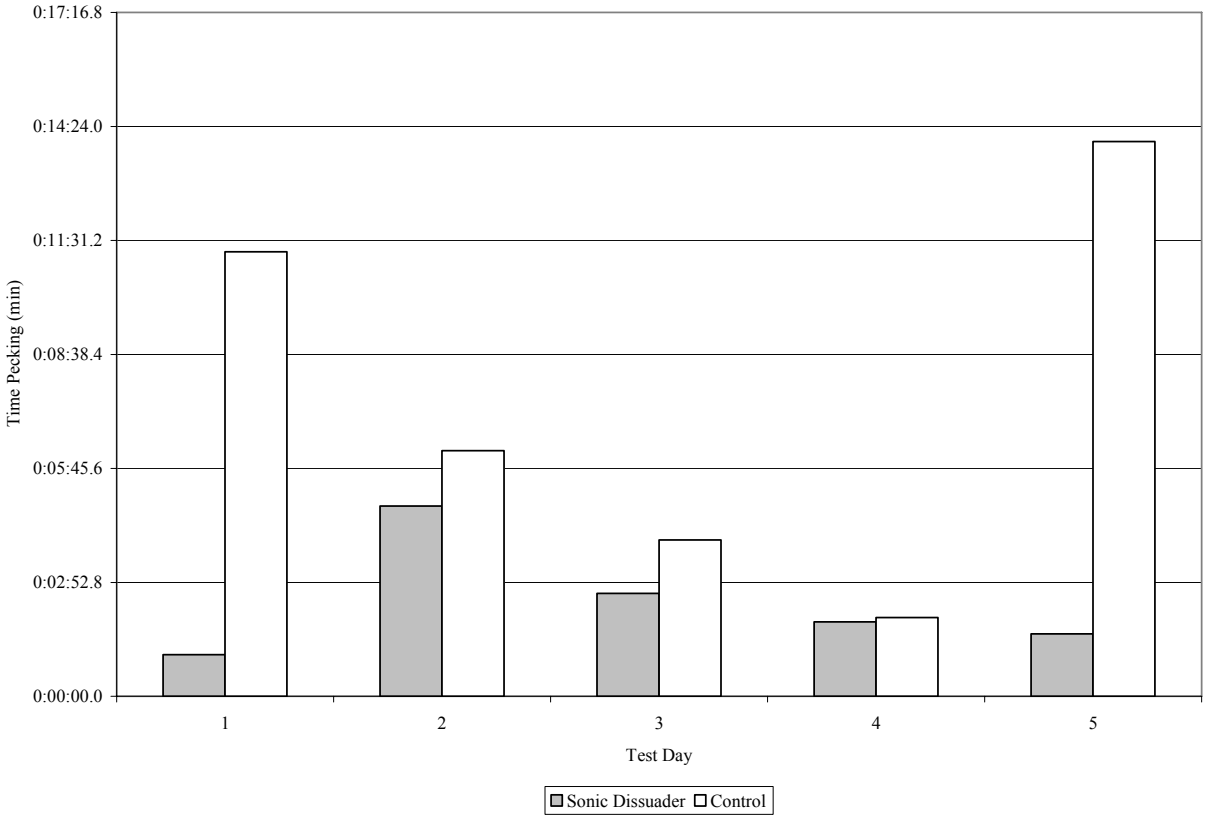


Figure B-14
Total Time Pecking on Poles by Pileated Woodpecker 6 by Day During Testing at NWRC Conducted 18 September 2007 through 22 September 2007

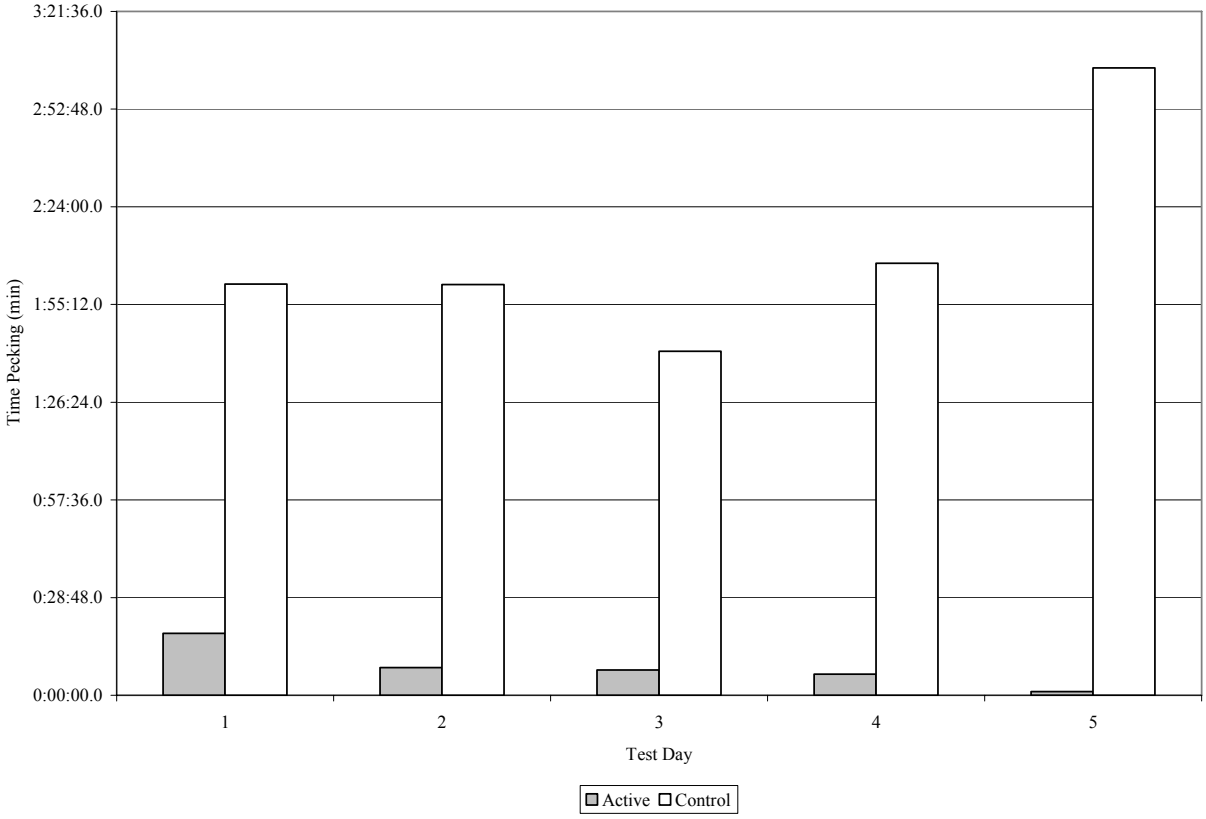


Figure B-15
Total Time Pecking on Poles by Pileated Woodpecker 7 by Day During Testing at NWRC Conducted 25 September 2007 through 30 September 2007

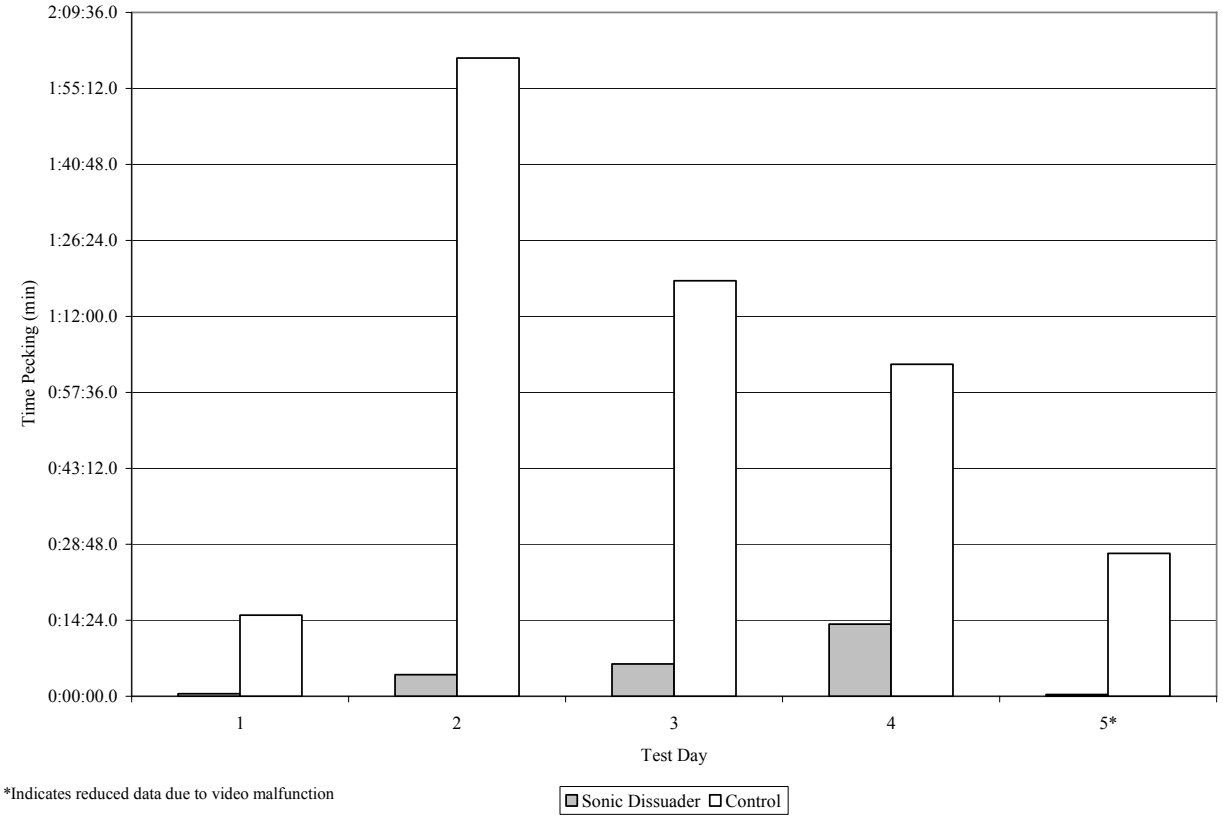


Figure B-16
Total Time Pecking on Poles by Pileated Woodpecker 8 by Day During Testing at NWRC Conducted 01 October 2007 through 05 October 2007

Broadcasts

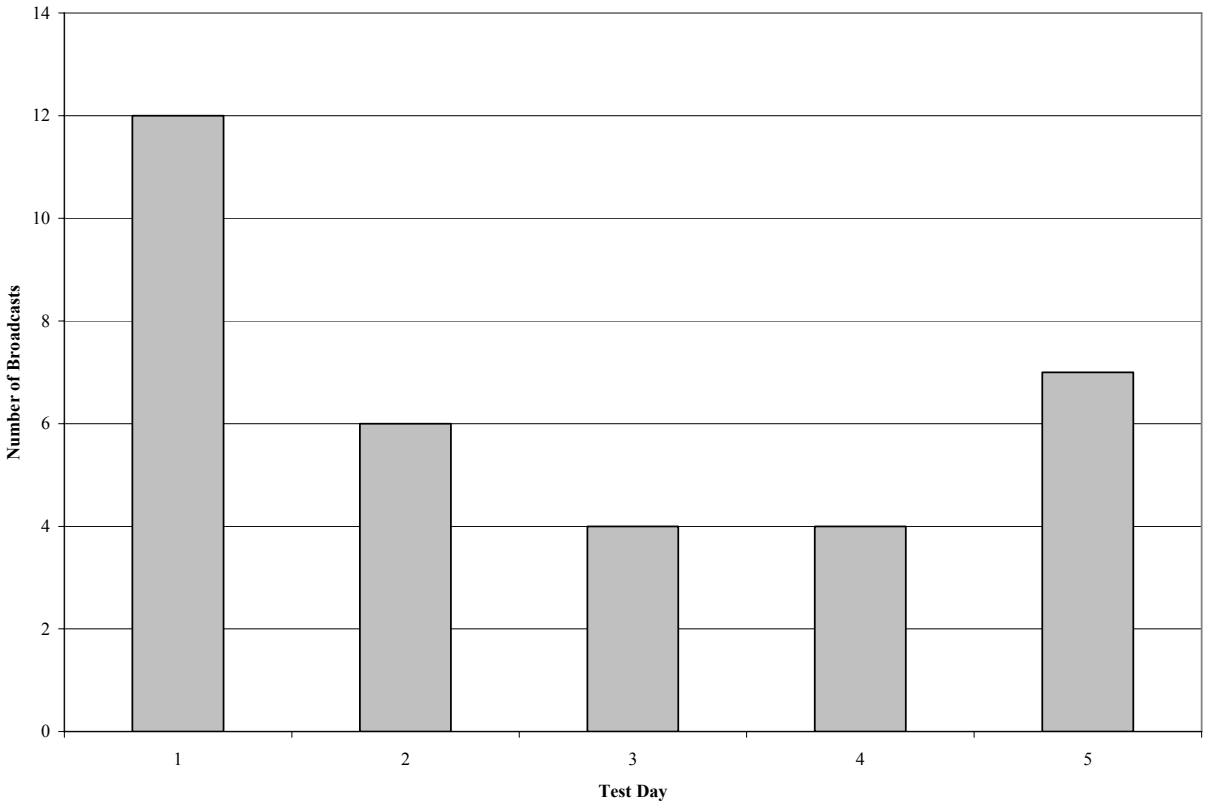


Figure B-17
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 1 by Day During Testing at NWRC Conducted 14 August 2007 through 18 August 2007

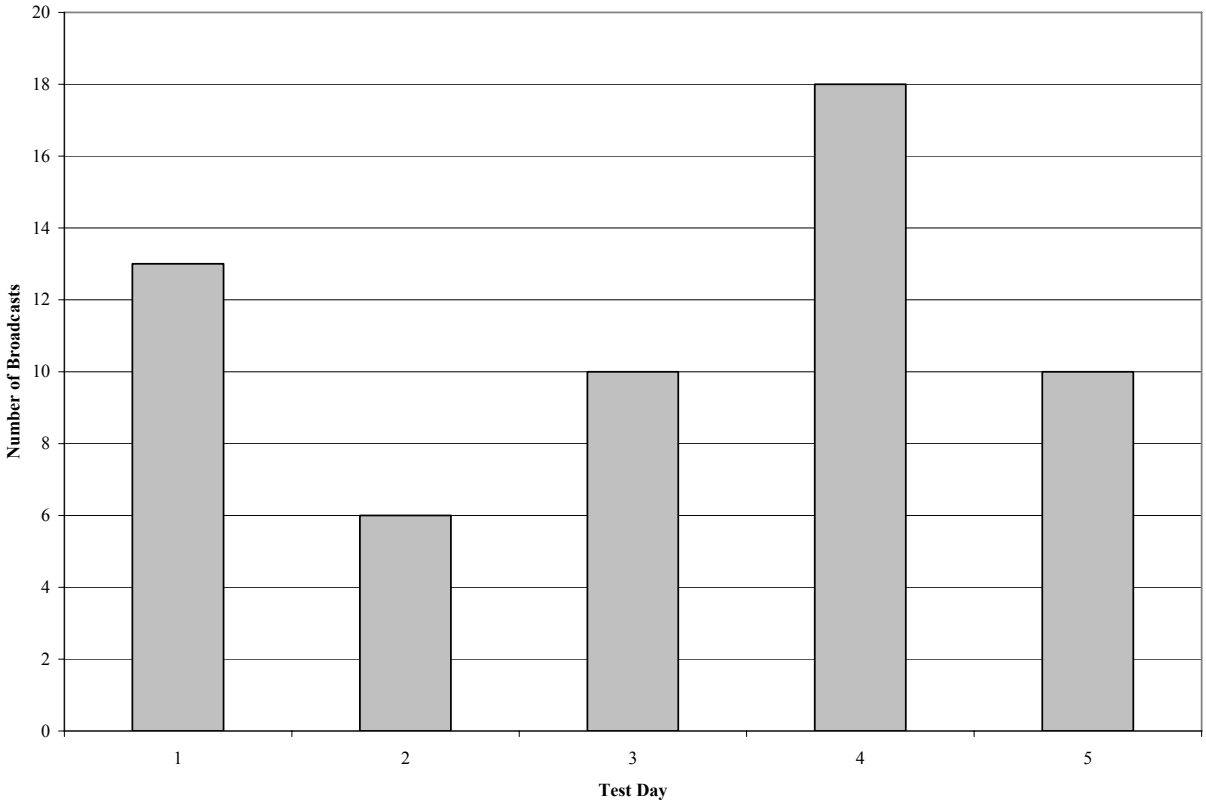


Figure B-18
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 2 by Day During Testing at NWRC Conducted 20 August 2007 through 24 August 2007

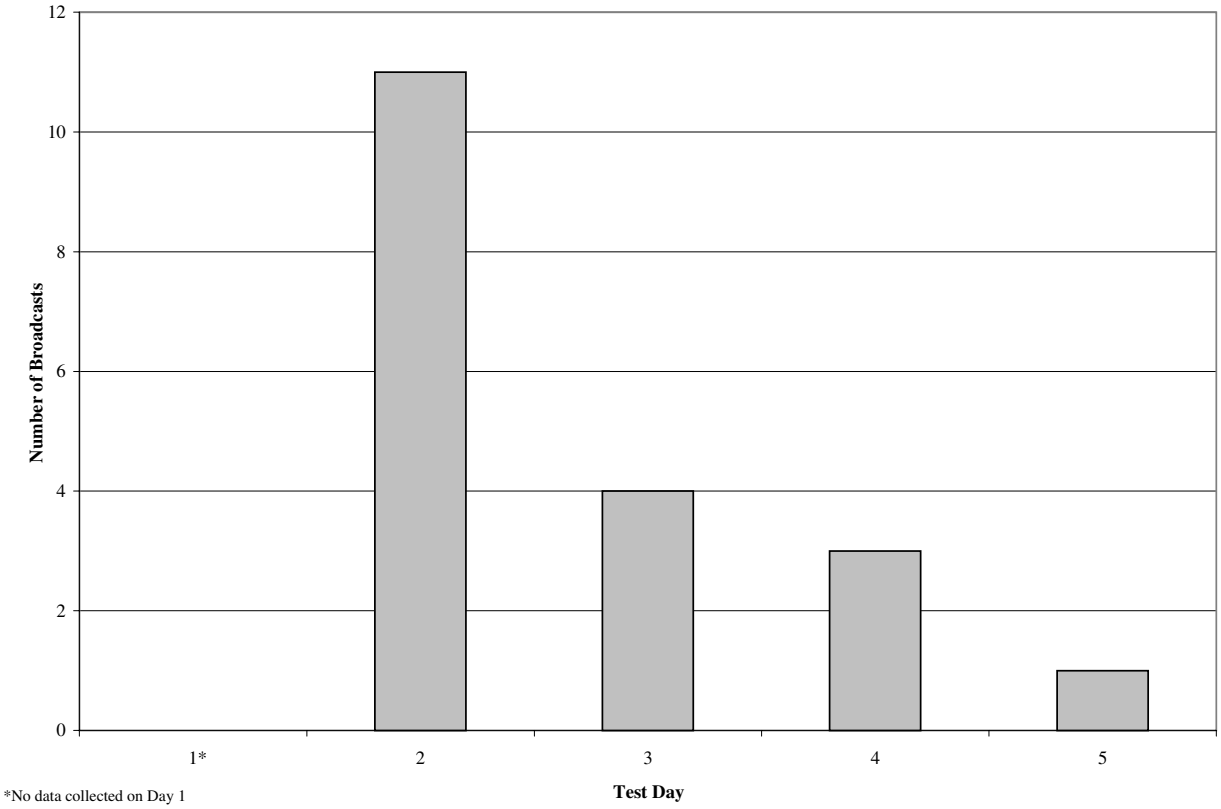


Figure B-19
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 3 by Day During Testing at NWRC Conducted 26 August 2007 through 30 August 2007

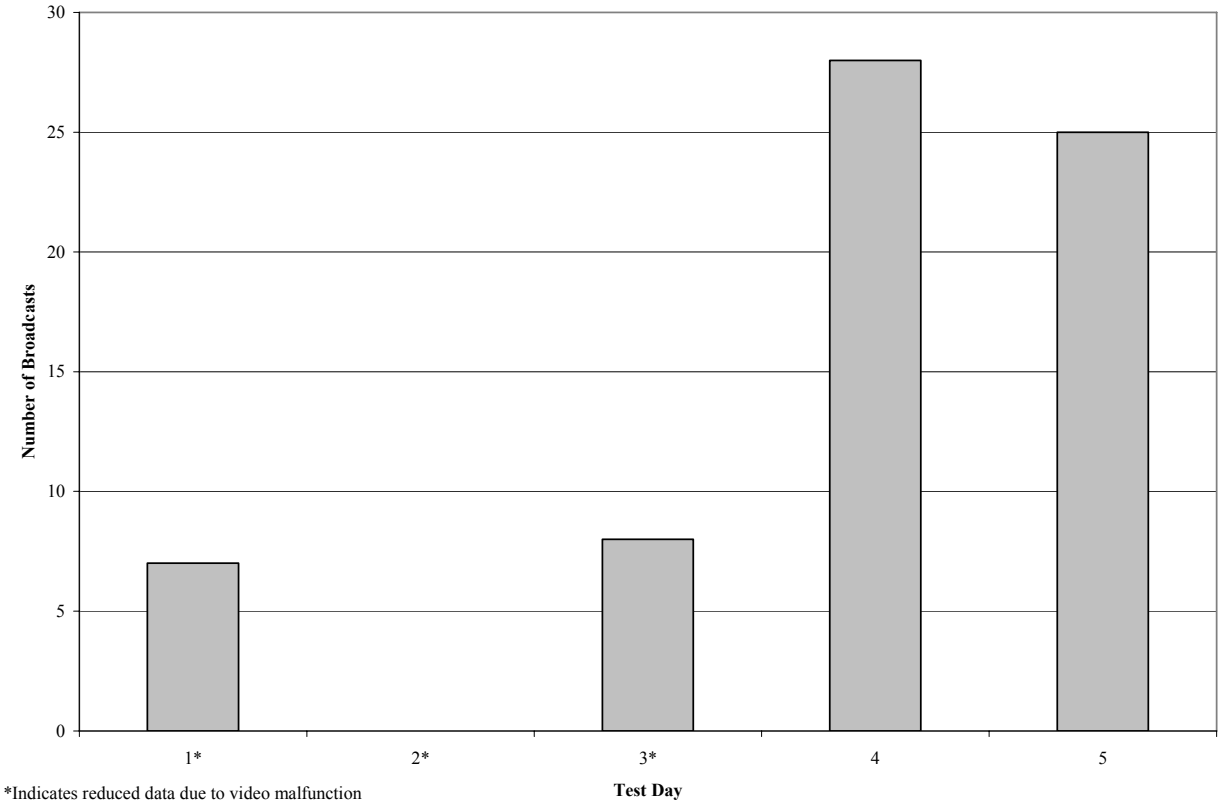


Figure B-20
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 4 by Day During Testing at NWRC Conducted 01 September 2007 through 05 September 2007

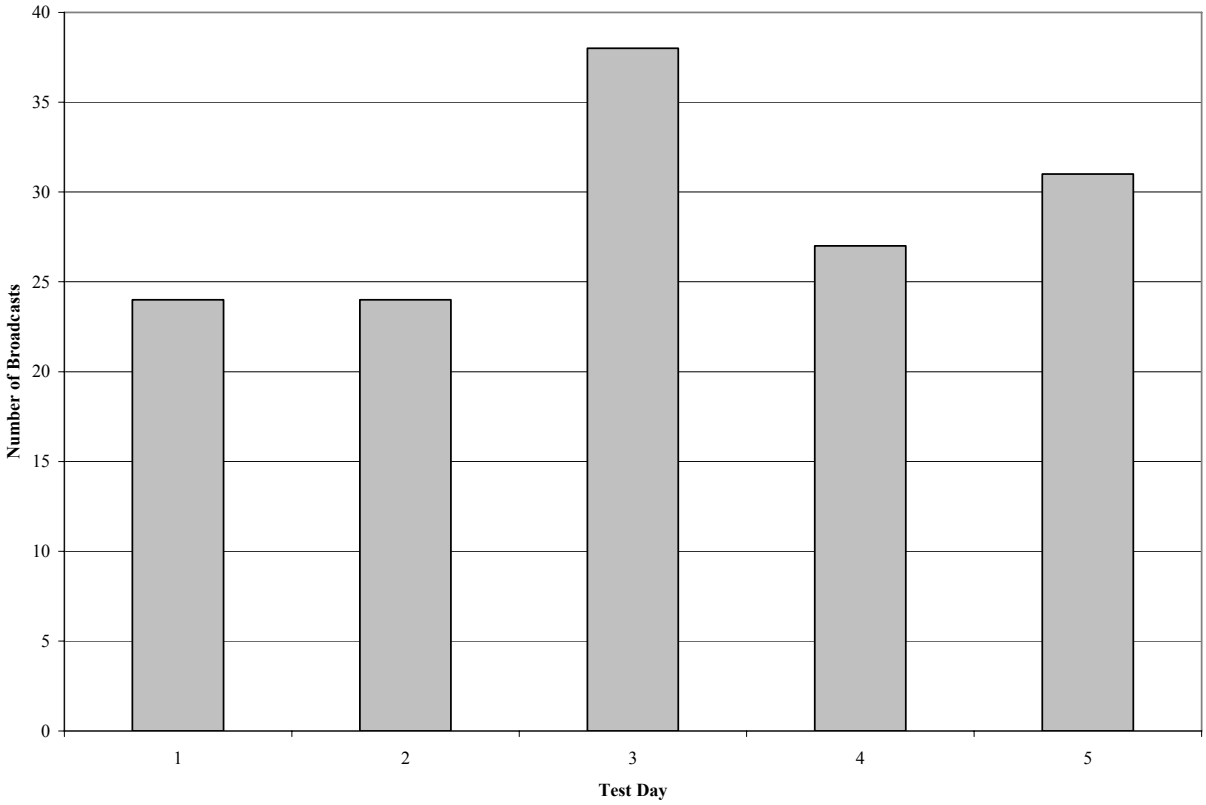
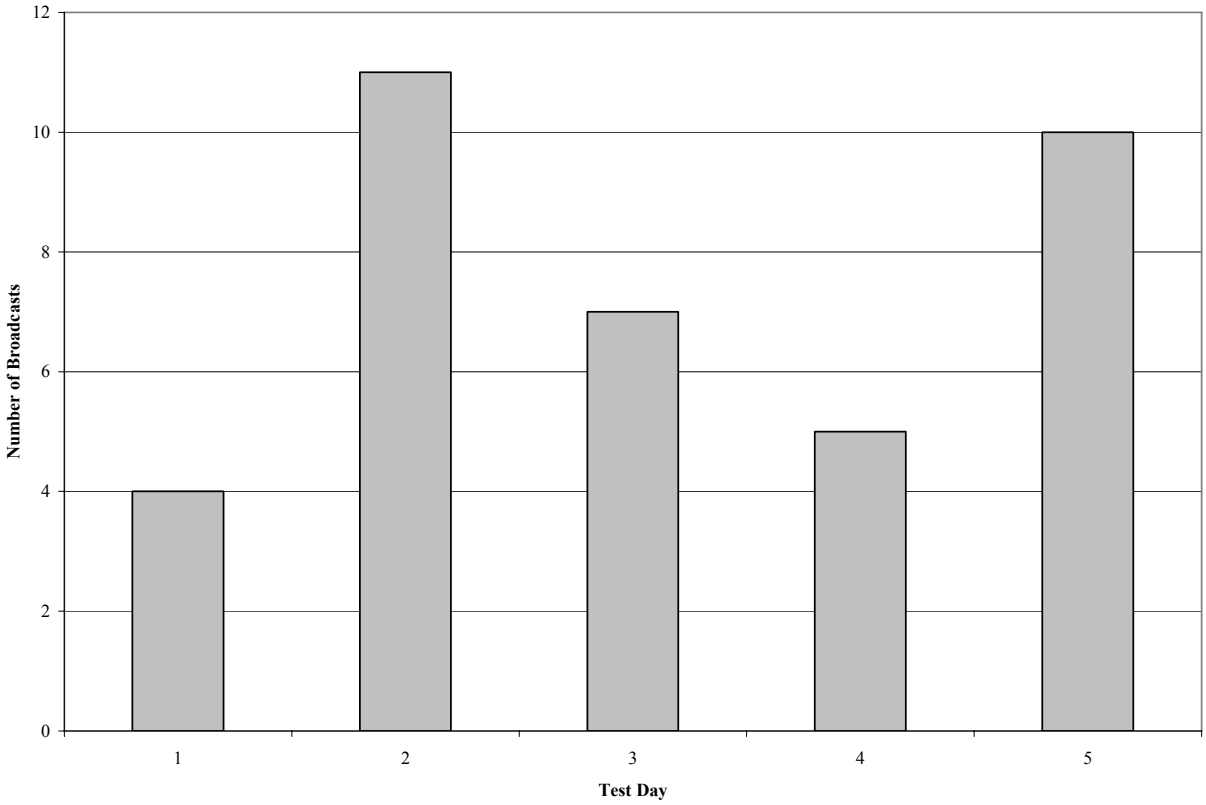


Figure B-21
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 5 by Day During Testing at NWRC Conducted 7 September 2007 through 11 September 2007



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Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 6 by Day During Testing at NWRC Conducted 18 September 2007 through 22 September 2007

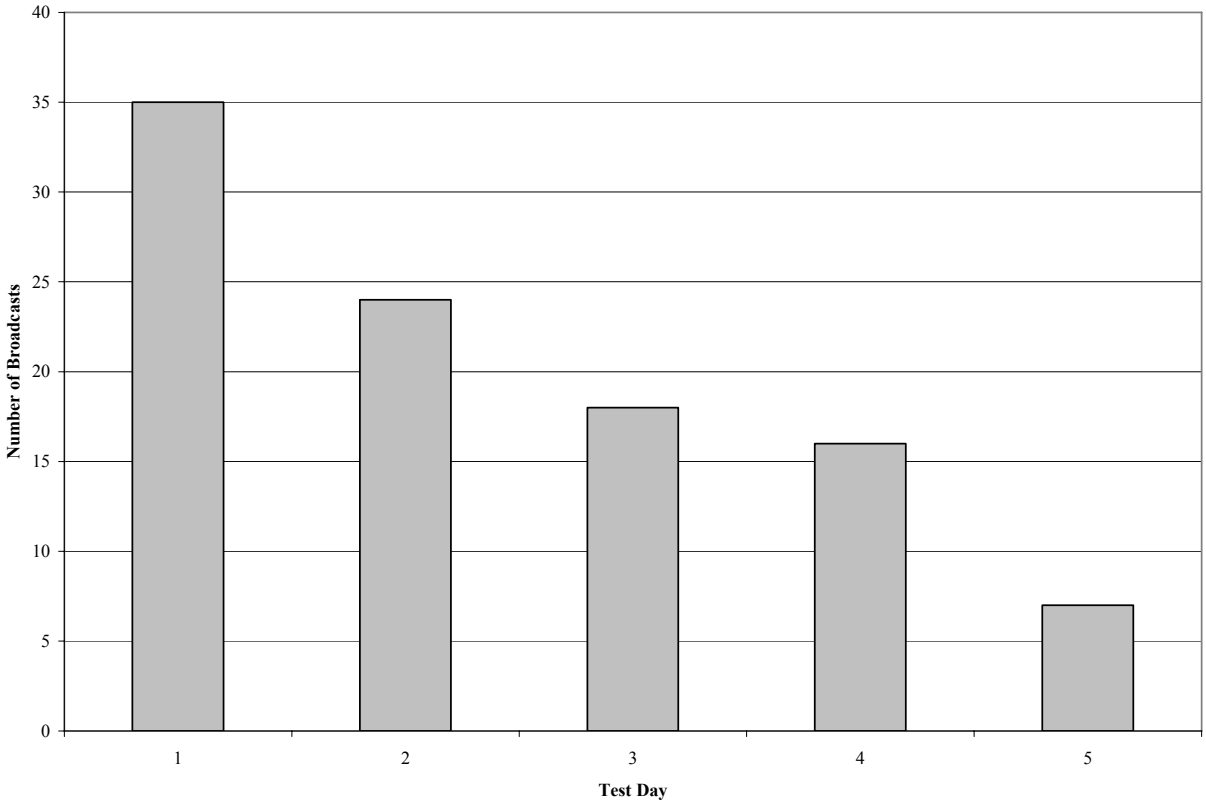

Figure B-23
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 7 by Day During Testing at NWRC Conducted 25 September 2007 through 30 September 2007

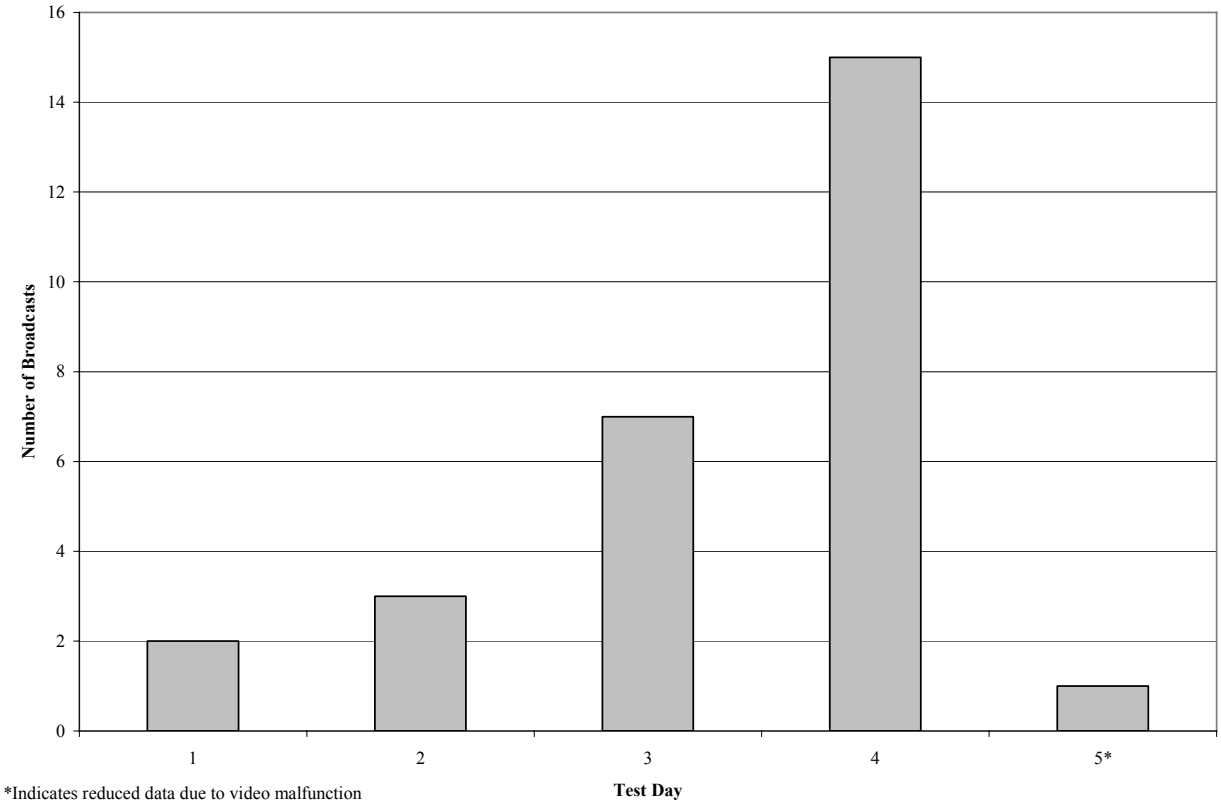

Figure B-24
Number of Sonic Dissuader Broadcasts for Pileated Woodpecker 8 by Day During Testing at NWRC Conducted 01 October 2007 through 05 October 2007

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