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Evaluation of the Allsopp Helikite® as a Bird Scaring Device

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Abstract: We evaluated the effectiveness of Allsopp Helikites® as a gull (*Larus* spp.) deterrent at loafing and nesting areas and as a bird deterrent in a sunflower field. In 1998, a 10-day trial was conducted at two 0.5-ha ponds at the Erie County, Ohio landfill (EC) and a 2-week trial on two 0.1-ha plots on the Tru-Serv Corporation (TSC) warehouse roof in Cuyahoga County, Ohio. Also in 1998, a 5-week trial in a sunflower field was conducted in Erie County, Ohio. In 1999, a 24-day trial was conducted at the Service Liqueur Distributors (SLD), Inc. warehouse roof, 1.6 km from the Albany, NY landfill. At the EC landfill the mean number (±SE) of ring-billed (*L. delawarensis*) and herring gulls (*L. argentatus*) on the treated pond decreased ($P < 0.05$) from 421 ± 292 to <1 after Helikite deployment, whereas the mean number of gulls on the untreated pond increased ($P < 0.05$) from 73 ± 135 to 412 ± 456. At the TSC roof, the herring gull nest density differed ($P < 0.01$) between areas covered and not covered by Helikites. Nest density under Helikites decreased from 41/ha to 18/ha within 7 days of deployment. Nest density in areas not covered by Helikites increased from 23/ha to 42/ha within 14 days of deployment. At the SLD warehouse, when Helikites were not in place, the mean number (± SD) of gulls on the roof was 41 (± 38). When Helikites were in place, no gulls were observed on the roof at any time. Mean damage to sunflower heads remained similar in the Helikite-treated and untreated plots until the last week of measurement when damage in the untreated plot increased to 26% seed loss/head whereas damage in the treated plot remained at about 8%. Helikites are a high-maintenance tool and are limited by weather conditions, electrical lines, and structures that can damage Helikites. We conclude that Allsopp Helikites have the potential to deter gulls from preferred loafing and nesting areas and could be included as part of an integrated management program to disperse gulls. Further research on Helikites is needed to determine optimum deployment heights, habituation rates for gulls and other species, and the actual sphere of influence of the kite for various species.

Key Words: balloon, deterrent, Helikite®, herring gull, *Larus argentatus*, ring-billed gull, *Larus delawarensis*, loafing, nesting, bird control

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INTRODUCTION

Bird species such as gulls (*Larus* spp.), blackbirds (Icterinae) and starlings (*Sturnus vulgaris*) often come into conflict with human activities (Ludwig 1966, Blokpoel and Tessier 1986, Dolbeer 1994, Wywialowski 1996, Belant 1997, Dolbeer et al. 2000). Populations of some gull species (e.g., ring-billed gull *L. delawarensis*, laughing gull *L. atricilla*) that conflict with human activities have increased in North America in recent years (Ludwig 1966, Blokpoel and Tessier 1986, Tyson et al. 1999, Sauer et al. 2001). Birds have adapted to habitats created by humans (e.g., putrescible-waste landfills, rooftops, golf courses) (Belant 1993), causing a concurrent increase in bird/people conflicts (Vermeer et al. 1988, Blokpoel and Tessier 1992) including bird hazards to aircraft (Belant et al. 1993, Belant et al. 1995, Dolbeer et al. 2000).

The killing of nuisance birds is often undesirable, infeasible, or biologically unsound (Dolbeer 1998); therefore, a demand exists for effective, nonlethal means of deterring birds from problem sites. Numerous harassment and frightening techniques are available to reduce conflicts involving gulls (Solman 1994). Unfortunately, many of these techniques are expensive, require multiple years to achieve desired results, and may be short-term in their effects. Quantitative evaluations often show devices to be ineffective (Dolbeer et al. 1988, Bomford and O'Brien 1990, Belant et al. 1998).

A recent addition to bird control equipment is the Allsopp Helikite® device (Allsopp Helikites® Ltd., Hampshire, England). The device is a 0.9-m diameter, helium-filled balloon with a kite and stabilizer attached that allows flights in high winds. Balloons alone (Pearson et al. 1967, Feare 1974, Mott 1985), balloons carrying hawk models (Conover 1982, Hothem and DeHaven 1982, Conover 1984), and eyespot balloons (Shirota et al. 1983, Avery et al. 1988) have shown promise as bird scaring devices in agricultural situations. These balloon variations have not been tested at landfills or at nesting colonies.

Our purpose was to conduct field evaluations of Helikites at gull loafing and nesting areas and in an area of crop damage. Our null hypothesis was that birds would not disperse in response to the device.

STUDY AREA

Landfill

The Erie County (EC), Ohio landfill is located 7 km south of Lake Erie. In March 1998 the landfill received an average of 181 metric tons of refuse a day, 6 days per week. The landfill consistently attracts large numbers of gulls. Belant et al. (1995) recorded a mean of 813 herring (*L. argentatus*) and ring-billed gulls in 570 observations, 1991-1992. Two 0.5-ha ponds, about 300 m apart and located within 200 m of the active face of the landfill, are used as loafing sites by the gulls.

Rooftop Nesting

Tru-Serv Corporation (TSC) in Westlake, Cuyahoga County, Ohio is a warehouse with a flat 3.6-ha roof that is divided into eight 0.45-ha units with a 0.5-m high wall between units. Herring gulls have nested on this roof since at least 1994, averaging about 70 nests/year (J. Sutherland, TSC, pers. comm.).

Rooftop Loafing

Service Liqueur Distributors (SLD), Inc. in Albany, Albany County, New York is a warehouse with a flat 2.8-ha roof. The building is located 1.6 km from the City of Albany landfill and has had up to 100 herring, ring-billed, and great black-backed gulls (*L. marinus*) gulls roosting on the roof during daylight hours. Based upon putrescible waste found on the roof and from observations taken at the Albany landfill (J. Gansowski, USDA/Wildlife Services, unpubl. data), we believe the gulls from this roof fed at the City of Albany landfill.

Sunflower Field

A 48 × 189-m field was planted with oil-seed sunflowers in spring 1998 in Erie County, Ohio. This field has been historically planted to corn or sunflowers with damage occurring to sunflowers primarily by American goldfinches (*Carduelis tristis*), and mourning doves (*Zenaida macroura*) (Dolbeer et al. 1986).

METHODS

Landfill

Each pond was considered an experimental unit. The rest of the EC landfill served as an index of fluctuations in gull numbers and change in loafing and feeding areas in response to landfill activities. During 1998, both ponds and the landfill were observed for a 5-day pretreatment period (9-13 March) followed by a 5-day treatment period (16-20 March). Gull counts were conducted each day at about 0930, 1130 and 1500 hrs. At each pond a complete count of gulls on and within 20 m of the pond was made. The estimated number of gulls at the rest of the landfill was classified in one of the following categories: 100, 500, 1,000, 2,000, 3,000, 4,000, or 5,000. The pond with the most gull activity during the pretreatment period was selected to receive the Helikite. On day 1 of the treatment period, the Helikite was deployed at 0800 hrs to a height of 20 m, thereby covering an area of about 0.1 ha. The Helikite was left in position for the 5-day treatment period except for 1 night when it was removed at 1600 hrs due to severe weather and re-deployed at 0900 hrs the following day.

We tested the null hypothesis that there was no difference in gull numbers at a pond between pretreatment and treatment periods by calculating 95% confidence coefficients for the observed proportion (p_o) of birds using the ponds as:

$$p_o \pm Z_{(\alpha/2K)}[p_o(1 - p_o)/N]^{1/2},$$

where K = the number of habitats (in this case loafing areas) and N = the mean number of gulls at the east and west ponds during the 10-day trial (Haney and Solow 1992).

The observed proportion of gulls using a pond was calculated by dividing the mean number of gulls observed on the pond during the 5-day treatment period by the mean number of gulls observed on both ponds during the 10-day trial. The expected number of gulls using a pond was determined by dividing the mean number of gulls observed on a pond during the pretreatment period by the mean number of gulls at both ponds during the trial. If confidence coefficients for the observed proportion of gulls at a pond did not include the expected value, the observed and expected proportions differed significantly ($\alpha = 0.05$, $Z_{(\alpha/2x2)} = 2.24$). We recognize that our inference for treatment effects at landfills is restricted to the EC landfill only.

Rooftop Nesting

On 1 May 1998, all nests (72) were removed from the TSC roof. On 5 May, two Helikites were anchored and deployed to heights of 14 and 18 m above the roof along the center line of the roof in units with the greatest nesting activity. The area under the Helikites was 0.06 and 0.11 ha respectively. Distance of nests within 14-18 m of the Helikite anchors and total number of nests in the units were recorded at least once/week through 19 May.

Nest density (nests/ha) was calculated for the area under the Helikites and for the remaining area in units which contained a Helikite. A Chi-square test was used to determine if there was a difference in nest density between the areas covered and not covered by a Helikite (Zar 1996).

Rooftop Loafing

On 22 January 1999, counts of gulls roosting on the SLD roof were begun. Counts were conducted 1-2 times/day between 0800-0900 hrs and 1200-1400 hrs, and 2-5 times/week from a hill adjacent to the building. On 2 March, 2 Helikites were placed 100 m apart on opposite ends of the roof and tethered to soar 14-18 m above the roof. Daily counts were continued through 26 March. Due to the magnitude of difference between pretreatment and treatment periods, statistical tests were not needed.

Sunflower Field

On 20 October 1998, two circular plots with 18.3-m radii (0.1 ha) were established 110 m apart, in a 0.9-ha field of oil-seed sunflowers. A pole was placed in the center of each plot such that the top of the pole was above the sunflowers. A white ribbon was placed at the top of the pole in the untreated plot and the anchor string attached to a Helikite was attached to the top of the pole 2 times/week. Two random transects were selected through the center of each plot. The observer selected plants (n = 100) closest to the transect to sample for damage by visually estimating the percentage of seeds missing from the head (Dolbeer 1975). Because of insufficient replication (2 plots), we relied on separation of standard error bars to identify any difference in damage between the treated and control plot (Johnson 1999; see also Brown et al. 2000).

RESULTS

Landfill

The number of gulls at the EC landfill per observation during the 10-day trial ranged from 100-5,000 with a mean of 2,000. During the pretreatment period, the west pond averaged 421 ± 386 gulls compared to 73 ± 182 for the east pond. After the Helikite was deployed on the west pond, the mean number of gulls observed during in the treated plot. The maximum height of the Helikite above the ground was 18.3 m. Bird damage was assessed the treatment period on the west pond declined ($P < 0.05$) over 99% to <1 (Figure 1). In contrast, the number of gulls on the east pond increased 5.6-fold to 412 ± 601. The expected and observed proportions of gulls for the west pond during the treatment period were 0.93 and 0.01 respectively. The expected and observed proportions for the east pond during the treatment period were 0.16 and 0.91 respectively.

Rooftop Nesting

Herring gull nest density differed ($X^2 = 15.11$, 2 df, $P < 0.001$) between areas covered and not covered by a Helikite (Figure 2). Nest density under Helikites decreased from 41/ha to 18/ha within 7 days of deployment. Nest density in areas not covered by Helikites increased from 23/ha to 42/ha within 14 days of deployment.

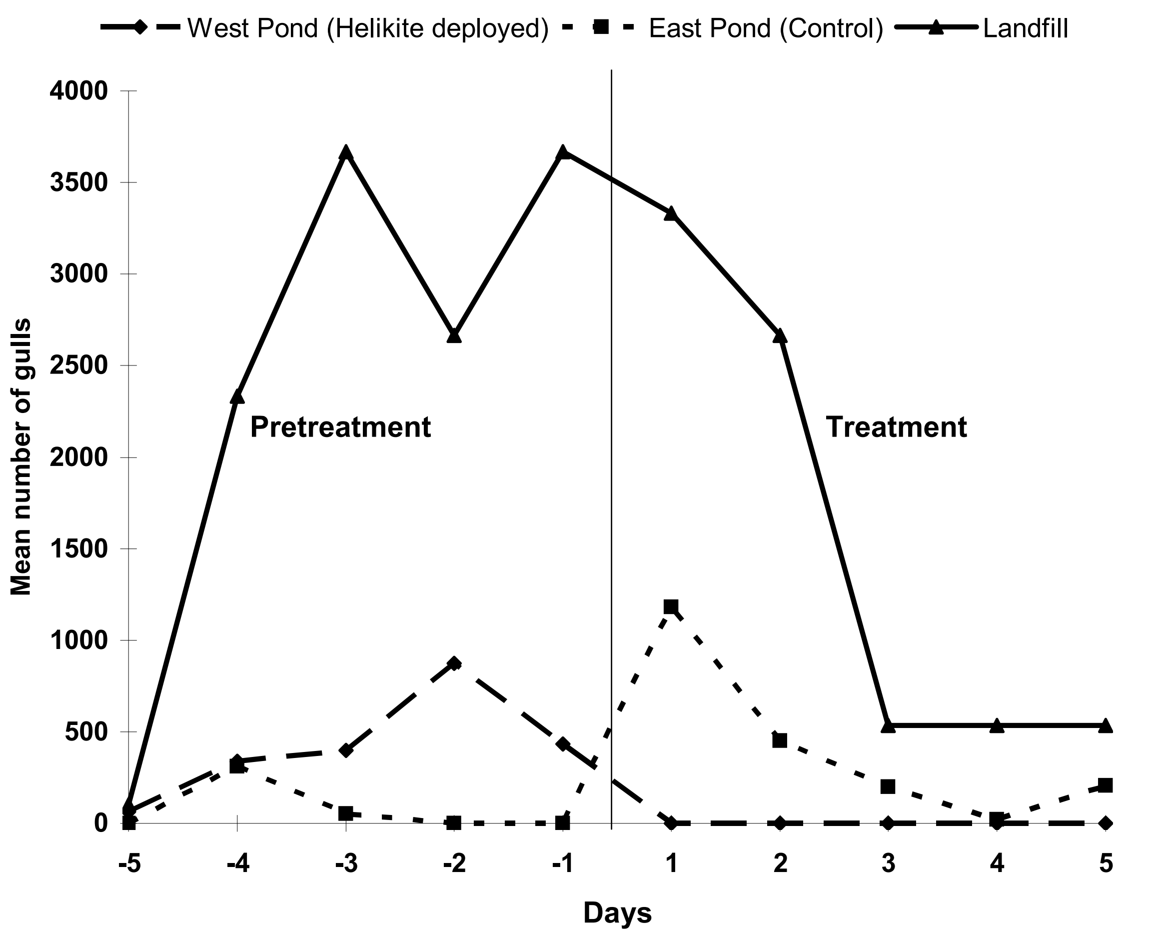

Figure 1. Mean number of gulls at the Erie County, Ohio landfill and associated ponds during 5-day pretreatment period and 5-day treatment period when a Helikite® was deployed at the west pond, March 1998.

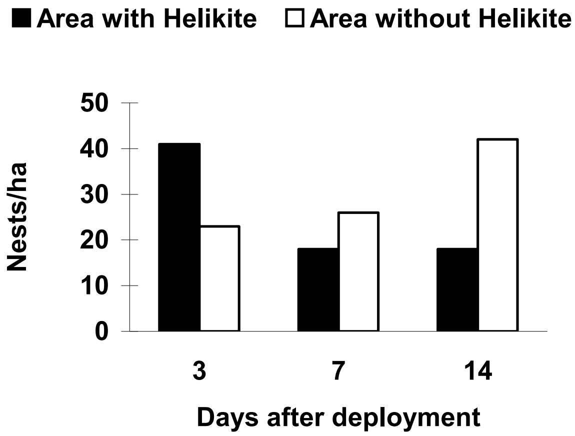

Figure 2. Density of herring gull nests on selected portions of the Tru-Serv Corporation warehouse roof with and without Helikites, Cuyahoga County, Ohio, May 1998.

Rooftop Loafing

When Helikites were not in place or downed due to snow, the mean number (±SD) of gulls observed on the roof during 17 observations was 41 (±38). In March, when Helikites were in the air over the roof, no gulls were observed on the roof during 26 observations. On one day in March when the Helikites were out of service due to a snow storm, there were 74 gulls observed on the roof. After Helikite re-deployment, the gulls left the roof.

Helikites were checked daily. Over 21 days of deployment they required repair work on 9 days. Problems encountered included 8 punctured balloons, requiring replacement of the mylar balloon at a cost of about $3.00/balloon, 8 tears to the kite material, and 2 tail replacements. All damages were caused when Helikites either collided with the roof in winds exceeding 32 km/h or were downed due to precipitation.

Sunflowers

The mean damage per head (±SE) in the treated plot was 5.8 % (±0.5) whereas the mean damage per head in the untreated plot was 8.5 % (±0.6). No apparent differences in damage were noted until the last 2 sampling days when damage in the untreated plot was 18.4% and 26.3% compared to 9.8% and 8.3 % in the treated plot (Figure 3).

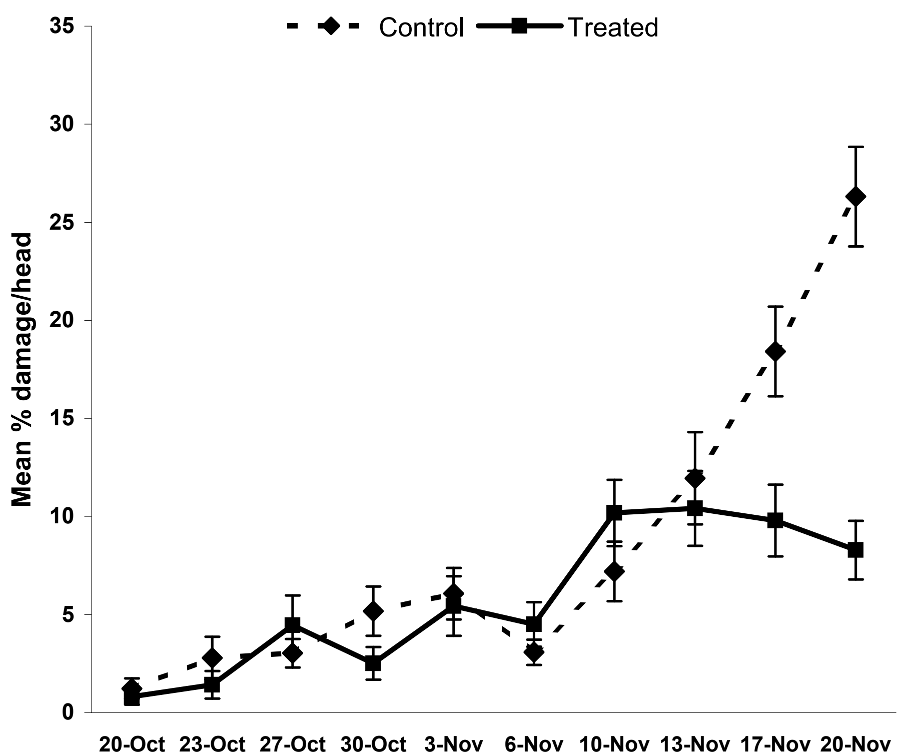

Figure 3. Mean percent damage per sunflower head in 0.1-ha plots treated with and without a Helikite in a 0.9-ha field in Erie County, Ohio, 1998.

DISCUSSION

Gull behavior was modified by the presence of a Helikite device. At the EC landfill, use of a popular loafing area (pond) was virtually eliminated for 5 days. On the first day of Helikite deployment, gulls were generally observed approaching the pond and then departing without landing. During the first 5 hours following deployment, gulls occasionally landed in corners of the pond not under the Helikite but their stay was limited to $\leq$ 5 minutes. Strong wind and rain did force the Helikite to the ground on one afternoon, but even there the Helikite was moving and gulls were not observed on or adjacent to the pond.

Helikites were also effective at keeping roosting or loafing gulls from the SLD rooftop. The one day of gull activity on the roof during March when the Helikites were downed due to snow was significant, because it indicated that gulls were still in the region and actively seeking daytime roosting areas. The snowfall also demonstrated the relatively high maintenance required by Helikites due to changing weather conditions, loss of helium, and damage to Helikites caused by striking objects on the roof. Helikites are also limited on rooftops to use in areas away from power lines because Helikites conduct electricity.

A cultural means of reducing bird damage to crops is to plant alternate or lure crops (Cleary 1994, Dolbeer 1994, Johnson 1994). Birds prefer to feed on these areas because they are made more attractive than the protected crop due to location, or because no frightening devices are located at the lure location. The presence of an alternative, yet similar, loafing site (e.g., the east pond or adjacent rooftops) may have enhanced the efficacy of the Helikite at the EC landfill and the SLD warehouse rooftop.

The decrease in gull use of the EC landfill west pond was also notable because in a previous experiment at the west pond, gull use was not altered when mylar flagging was used as a scare device (Belant and Ickes 1997). However, at a loafing area away from the west pond, mylar flags reduced use of the area. Thus, the Helikite worked at a highly attractive loafing area where a different, yet proven, scare device had not worked.

Turnover rate of gulls at the EC landfill at the end of the breeding season was calculated to be 2.6 hours (Belant et al. 1993). If pre-breeding season gulls behave similarly, then new gulls were constantly arriving at the landfill and our counts were on a changing population. New birds and presumably previously-exposed birds did not land nor were observed to attempt to land at the pond when the Helikite was present.

Herring gulls are less susceptible to disturbance (Ickes et al. 1998) and some deterrents (Belant and Ickes 1997) during the nesting season than at other times of year. The reduction in nest density under Helikites at the TSC roof therefore is notable for a species that has resisted other scare tactics during nesting. We did attempt to use the Helikite on a second building, but structures on the roof caused the Helikite to become tangled or damaged at such a frequent rate that it was not possible to evaluate its efficacy.

For both loafing and nesting gulls, the effective area of Helikites left deployed for up to 2 weeks appeared limited to the circular area under the Helikite as defined by the height of the Helikite. When a Helikite was first deployed on a roof, all gulls on the roof left for at least 30 minutes. When the Helikite was deployed in a previous probe at the EC landfill, all gulls within 1 ha of the Helikite flushed when the Helikite approached them. In a probe using Helikites in sweetcorn fields, we noted similar behavior. Red-winged blackbirds (*Agelaius phoenicus*) and starlings (*Sturnus vulgaris*) did not come into corn under a Helikite but did attack corn in view of several Helikites (Seamans, pers. observ.).

Daily maintenance of deployed Helikites was necessary. Wind over 32 km/h force the Helikite to the ground. Helikites on rooftops were vulnerable to tangling on vents or expansion joints and could be damaged by abrasion when forced onto the gravel roof cover. At the EC landfill, the Helikite was likely to become waterlogged if it landed in the pond or damaged if it was forced to the ground and hit sharp objects. Under these conditions, the helium in the balloon had to be restored at least once per week.

On three occasions gulls became entangled in the lines holding Helikites in place. Two gulls died after becoming tangled and one was released unharmed. The tangling of gulls may enhance the effect of Helikites, but due to the stress on the captured gull, it would be unethical to encourage tangling or to leave a bird tangled in the Helikite line.

We conclude that Helikites can have a deterrent effect on loafing and nesting gulls. Further experiments are necessary to better define the efficacy of Helikites on loafing, nesting and feeding areas. Also needed is an evaluation of Helikites at different heights above the ground, determination of species-specific responses, habituation rates for various species, and the total area influenced by Helikites.

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