STRATEGIES FOR ALLEVIATING VULTURE DAMAGE IN INDUSTRIAL PLANTS

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ABSTRACT: Since 1985, USDA-APHIS-Wildlife Services (WS) personnel have received complaints concerning black vultures (*Coragyps atratus*) and turkey vultures (*Cathartes aura*) roosting at industrial facilities along the Texas gulf coast. The structures associated with these facilities are difficult for bird control personnel to access, and remote vulture roosting sites limit the effectiveness of many commonly used bird damage control methods. Methods attempted since 1985 include: capture and relocation, exclusion, harassment and shooting. In 1994, WS entered into a cooperative vulture control agreement with three chemical plants located in southeast Texas. WS personnel have developed an effective vulture damage management strategy that is currently used at six industrial sites in Texas.

KEY WORDS: *Coragyps atratus*, *Cathartes aura*, roosting, disperse, trapping, tagging, relocation, shooting, exclusion, harassment, structure

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INTRODUCTION

The Texas Gulf Coast is home to numerous petrochemical refineries and industrial facilities. Vertebrate pest species cause extensive damage to these facilities and create human health and safety hazards. Vulture damage complaints at industrial facilities have increased in Texas.

In 1994, three chemical plants in southeast Texas contacted Wildlife Services (WS) and requested assistance with vulture damage control. The chemical plants reported extensive damage to structures and threats to human safety caused by black vultures (*Coragyps atratus*) and turkey vultures (*Cathartes aura*). Diseases and unsafe work areas associated with the accumulation of bird droppings concerned plant administrators responsible for employee health and safety standards. Vulture damage at the southeast Texas chemical plants was estimated at $450,000 for the period January 1994 through December 1997 (Anonymous 1997). Damage was related to clean-up, structure repair and other maintenance associated with the accumulation of droppings and feathers. Human health and safety concerns were related to the accumulation of droppings on walkways, stairs, handrails and other work areas. Several plant employees were hit by vulture droppings while working on plant structures.

The area supports a large population of resident and migratory vultures. Seasonal variations in the numbers of birds observed at each plant site have been reported by WS and plant personnel. WS personnel estimate that migrant birds increase the area's non-migrant winter vulture population by 300%. Estimated daily averages of 200 birds per plant site were reported by WS personnel when control work began in January 1994. Vultures are attracted to industrial facilities for several reasons. These sites offer an abundance of roosting and perching locations and the vultures are able to soar on thermals created by industrial operations. During cold weather industrial facilities also offer warm, sheltered areas for vultures to perch. The majority of the vultures have been observed congregating at the plants at sundown and leaving the roosting sites by mid-morning. Few vultures have been observed at the plant sites during mid-day hours.

DAMAGE SITES AND METHODS

The plant sites are located on coastal prairie within the Gulf Prairies and Marsh area of Texas. Climax vegetation is largely tall grass prairie, however, much of the area has been invaded by trees and brush such as mesquite (*Prosopis glandulosa*), oaks (*Quercus* spp.) and pricklypear (*Opuntia* spp.). Major agricultural operations include raising cotton, sorghum, corn and cattle.

The production unit areas at the three plants varied in size. Plant #3 production operations covered the largest area and had the largest number of structures, while plant #2 covered the smallest area and had the smallest number of structures (Table 1). Prior to 1994, plant personnel were primarily responsible for exclusion and harassment efforts, while WS personnel conducted other control work involving shooting and harassing.

Pyrotechnics, Mylar® tape and human effigies have been used to harass vultures at the plant sites. Screamers and cracker shells launched from pistols and shotguns respectively, have been used to deter birds from roosts and perches on plant structures. These techniques have been used exclusively, by plant personnel.

Exclusion techniques used were: netting and porcupine wire (Nixalite®). Plant managers at plants #1 and #3 used netting and porcupine wire in attempts to exclude vultures from roosting areas. Netting was draped over roosting areas and porcupine wire was placed on surfaces commonly used by vultures.

Beginning August 8, 1994, WS personnel captured, tagged and relocated vultures in efforts to reduce vulture damage at plant sites. Tagging and relocation was done under a federal bird banding permit. Vultures were tagged to determine if relocated birds would return to the plant sites. Live traps were placed at several locations on each plant site. The traps were baited with carrion, and decoy birds were used to increase trap effectiveness. Traps were shaded and equipped with water containers.

Vultures were tagged on the right wing with a colored tag and numbered livestock tag. The colored tag served

Table 1. Description of Plants

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Plant Site	Unit Area	Number of Columns	Average Column Height	Average Distance Between Columns
1	6 ha	10	70 m	100 m
2	1 ha	3	60 m	50 m
3	8 ha	15	90 m	50 m

to identify the birds from long distances, while the numbered tag provided specific information, including capture site, capture date, release site, and tag applicator. The tags were placed on the patagium of the right wing (Coleman et al. 1985). Three tag colors were used to distinguish plant sites. Tag colors were applied as follows: blue (plant #1), pink (plant #2), yellow (plant #3).

Vultures were transported in a kennel-type trailer that provided sufficient ventilation and shading. Ventilation was important during the spring and summer months, in order to reduce stress associated with heat. After receiving park and refuge manager's approval, vultures were released at State Parks and National Wildlife Refuges in central and southeast Texas. Distances between release and capture sites averaged 190 km.

Beginning December 1, 1994, the manager at plant #2 agreed to allow WS personnel to use shooting and pyrotechnics as a control method. The manager for plant #3 agreed to allow shooting and pyrotechnics beginning February 19, 1996, and the plant #1 manager agreed December 1, 1996. Air rifles (.22 cal.) and rimfire rifles (.22 cal.) with scopes were used to shoot birds roosting or perching on remote structures. Shooting was used as a positive reinforcement of pyrotechnics. Frequently, birds were roosting in remote locations and personnel shot from catwalks, ladders and platforms to minimize shooting distances.

RESULTS

Mylar® tape and human effigies used by plant personnel to deter vultures from plant structures were ineffective. Pyrotechnics, when used exclusively, were also ineffective because vultures quickly became conditioned and could not be deterred from remote structures. Distances between structures and the total area of each plant site were factors that influenced the effectiveness of harassment. The greater the distance between the structures, the more difficult it was to remove the birds from the area because the vultures simply moved from one end of the plant site to the other. Structure height also influenced the success of the harassment methods; the higher the structure the more difficult the vultures were to remove.

Attempts to exclude vultures from plant structures have not reduced damage or vulture numbers. Netting and porcupine wire excluded vultures from some areas, but they quickly relocated to areas where the materials could not be used due to safety considerations or installation problems.

WS personnel live trapped 3,027 vultures between August 8, 1994 and May 15, 1996. Trapping results and associated mortality are reported in Table 2. The results indicate that live trapping is an effective capture method. However, trapping had little effect on the numbers of vultures that continued to roost at plant sites. WS personnel did not observe trapping related decreases in vulture numbers at plant sites; observed decreases were the result of seasonal changes.

Flock composition varied between plant sites. Ninety-five percent of the vultures captured at plant #1 and plant #2 were black vultures. Five percent of the vultures captured at these two plants were turkey vultures, as compared to 51% black vultures and 49% turkey vultures captured at plant #3. It is possible that black vultures were more attracted to the habitat surrounding plant sites #1 and #2. This habitat held higher numbers of white-tailed deer (*Odocoileus virginianus*) and cattle. Black vultures are attracted to large carrion; according to Paterson (1984), larger carcasses are preferred by the more gregarious black vultures and smaller carcasses are preferred by turkey vultures. Plant site #3 was primarily surrounded by farmland.

Since December 1, 1994, shooting has been the primary control method at plant #2. On day 3, after shooting began, all vultures abandoned the plant site and did not return for four months. Twenty-five vultures were shot during the three day period. The vultures were shot with a .22 cal. rifle. Since the initial shooting project at plant #2, WS personnel have worked a yearly average of six days during the fall and winter months to move vultures from the site. A total of 49 vultures have been removed from plant #2 since completion of the initial shooting effort.

Shooting began at plant #3 on February 18, 1996. After four days of shooting, vultures abandoned the site for 12 months. Five vultures were shot during the four day period. Vultures returned to plant #3 in February 1997, and after three days of shooting the vultures deserted the site. No vultures were taken during these three days. Since February 1997, no vultures have returned to plant #3.

Shooting began at plant #1 on March 24, 1997. After 14 days of shooting, vultures abandoned the site and did not return for 10 weeks. Forty-five vultures were shot during the 14 day period. The vultures were shot with a .22 cal. air rifle. Since the initial shooting effort, 27 vultures have been removed.

Table 2. Number of vultures captured at plant sites, August 1994 to May 1996.

Vultures Captured	Plant #1	Plant #2	Plant #3	Total
Total tagged vultures	554	1546	487	2587
Total black vultures	536	1494	247	2277
Total turkey vultures	18	52	240	310
Recaptured black vultures	10	61	13	84
Recaptured turkey vultures	1	0	21	22
Associated Mortality	104	133	87	324

CONCLUSION

Commonly used bird control methods such as exclusion and harassment had limited application for vulture control at these industrial facilities. Maintenance requirements, safety concerns and inaccessible roosting areas can limit the use and effectiveness of the control methods. Vultures were easily captured in live traps; however, capture and relocation did not reduce vulture numbers or reduce damage at the plant sites. In central and southeast Texas, where vultures were relocated, complaints concerning vulture damage increased. WS personnel received several calls from individuals who complained about damage caused by released vultures. Refuge and State Park managers refused to accept additional birds after large numbers of vultures began to congregate at recreation areas. One State Park manager requested assistance with vulture damage control after vultures were released at the park.

The .22 cal. rimfire rifle increased the effective shooting range and performed better under adverse conditions (high wind, rain). A .22 cal. air rifle has been used in situations where there was a potential risk of igniting flammable products or damaging equipment. The presence of plant personnel in some areas also dictated the use of the .22 cal. air rifle. The author's efforts and observations suggest that shooting used in conjunction with pyrotechnics may be the most effective control strategy for reducing vulture damage at some industrial sites.

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