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# Use of Vulture Carcasses and Effigies to Reduce Vulture Damage to Property and Agriculture

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**Abstract:** As land-use patterns change and urban populations surge into previously undeveloped areas, wildlife conflicts inevitably increase. Of increasing concern are problems associated with black (*Coragyps atratus*) and turkey vultures (*Cathartes aura*), two species that have shown the capacity to adapt readily to human activities. Previously, we demonstrated that roosting vultures can be successfully dispersed from communication and broadcast towers by hanging a vulture carcass or taxidermic effigy in the structure. Here, we extend that method to situations where vultures are affecting residential property and agricultural resources. At 4 of 8 study sites where vulture damage to property was a concern, damage was eliminated by hanging a carcass or effigy in trees where the vultures roosted. At the other 4 sites, where the roost was inaccessible, vulture damage ceased after carcasses or effigies were hung on or near the property directly affected by the birds. After vulture activity had been reduced, the effigies or carcasses at 4 of the 8 sites were replaced by Canada goose (*Branta canadensis*) decoys painted to resemble vultures. Vulture activity continued to be suppressed at those locations. At 1 of 2 study sites where depredation to livestock was a concern, vulture activity at a pig breeding facility was reduced 90% after a taxidermic effigy was installed overhead. At the other site, where depredation of cattle and calves by vultures was a concern, a nearby roost of 800 birds was dispersed using effigies; the effect upon depredation has yet to be determined. Our investigation to date has found the hanging of vulture carcasses, taxidermic effigies, and decoy effigies to be effective for the management of vulture problems in a variety of situations. This nonlethal vulture management approach will not be appropriate or effective in every case, but its use should be considered, particularly where roost dispersal is desired.

**Key Words:** *Cathartes aura*, *Coragyps atratus*, effigy, roost dispersal, vultures

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## INTRODUCTION

In the eastern and southern United States, turkey vulture (*Cathartes aura*) and black vulture (*Coragyps atratus*) populations are increasing. For example, data from the Breeding Bird Survey for the period 1980-2000 reveals that the turkey vulture population east of the Mississippi River has increased at an average annual rate of 4.2% and black vultures have increased 1.2% annually (Sauer et al. 2001). Results from Christmas Bird Counts have revealed similar trends during the past 10 years (Avery, unpubl. data).

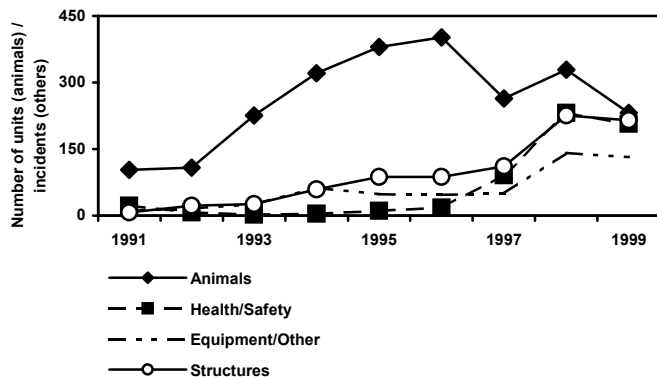
The increase in numbers of vultures coupled with development of the landscape to accommodate an expanding human population has inevitably lead to increasing conflicts between people and vultures. Vulture-caused resource losses reported to USDA APHIS Wildlife Services program markedly increased over the period from 1991 to 1999 (Figure 1). For example, during this period reports of threats to human health and safety, including aircraft collisions and exposure to feces, increased an average of 94% per year. Damage to structures such as residential and non-residential buildings, boat docks and marinas, electrical utilities, and communication towers increased 67% per year. Damage to equipment and other property including machinery, vehicles, and watercraft increased 51%. The aforementioned losses usually result from activity at or near evening roosting sites, or they occur at loafing sites, areas occupied between roosting and foraging activities. Damage occurs directly as vultures tear apart rubber, plastic, and vinyl materials and indirectly through accumulation of feces, pellets, and

accompanying odor. Additionally, damage to and depredation of livestock (cattle, goats, sheep, fowl, swine), zoo animals, and pets constitutes a large portion of the losses reported and has increased an average of 18% annually.

Development of methods to resolve nuisance and damage problems caused by vultures has not kept pace with the occurrence of the problems. The most frequently used means to disperse problem vulture roosts is harassment with pyrotechnics or other noisemakers. These activities can be disruptive not only to the birds but also to residents of the neighborhood, and local ordinances often restrict the use of pyrotechnics. Recent studies of low-powered lasers as avian dispersal tools have been promising (Blackwell et al. 2002). Advantages of lasers include safety, lack of noise, and long range. Glahn et al. (2000) demonstrated that lasers were just as effective as pyrotechnics for dispersing double-crested cormorant (*Phalacrocorax auritus*) roosts, but as with pyrotechnics, cormorants reoccupied the study roosts within 1 week. Preliminary studies with vultures have shown that both species are readily frightened by laser light, but additional study is needed to determine the long-term effectiveness of this method for vulture roost dispersal.

Recently we have investigated another promising approach to vulture roost dispersal— the use of vulture carcasses and effigies. This is not a new idea; fact sheets on vulture management prepared and distributed by Wildlife Services state offices in Virginia and in Maryland mention that suspending vulture carcasses near a roost will help disperse the vultures. Prior to the start of our research,

however, published data evaluating the carcass/effigy technique were nonexistent. We quantified responses of vultures roosting on broadcast and communication towers to vulture carcasses, taxidermically-prepared vulture mounts, and a plastic goose decoy painted to resemble a vulture (Avery et al. 2002). In this paper, we present results on the use of this roost management method for problem situations in residential and agricultural areas.



**Figure 1. Resource losses reported to Wildlife Services attributed to vultures, 1991-1999.**

## METHODS

Study sites were not determined randomly. Rather, we selected sites based on requests for assistance from affected parties. Each situation had unique aspects and therefore true replication is absent. Our evaluation is best viewed as a series of case histories with the preponderance of evidence deciding the effectiveness of the treatments. These histories are subdivided into one of two categories: (1) locations where we installed carcasses or effigies in the roost or (2) locations where we installed carcasses or effigies at the site where the birds were causing damage.

At all sites vulture carcasses or effigies were suspended upside down using polyester twine with a fishing swivel at the point of effigy attachment to allow it to twist freely in the wind. Carcasses and taxidermically prepared mounts were attached by a loop of line tied to both legs just above the feet. Vulture mounts were prepared with one or both wings outstretched and were coated with a silicone water repellent to increase longevity. Goose decoys (Canada goose model, "Goose Magnet – Trumotion Wind Actuated Decoy," by Winfield Rose Ltd.) were spray-painted to resemble either black or turkey vultures. Since the decoys are not equipped with legs, the swivel was either attached directly to the tail or was attached to a loop of rope passed through the body of the decoy.

Effigies were suspended from convenient and prominently located attachment points in each roost. When a tall support structure was available, we attached an angled

section of pipe or conduit to the structure and attached the effigy to the end. At sites where effigies were installed in the tops of tall trees, we used a compound bow equipped with a fishing rig to shoot the support line over a chosen attachment point. With each installation, a length of line between the hanging point and the effigy attachment point was let out to allow for best effigy visibility and movement yet short enough not to become entangled in the support structure. Additionally, sufficient line was left at ground level to allow effigies to be lowered for maintenance or replacement.

## Carcasses or Effigies Installed in Roost

These sites include 2 residential communities and 1 home site/cemetery where vultures caused damage to property, 1 pecan orchard where roosting birds damaged trees, and 1 cattle ranch where a nearby roost was suspected of aggravating a depredation problem.

## Bull Pond

The vulture roost is on a point of land protruding into Bull Pond Lake (Putnam County, Florida) about 200 m from several lakeside properties. This roost has been a source of birds causing damage to the properties for the past couple of years. The roost is mostly bay trees (*Persea* spp.) with a scattering of pines (*Pinus* spp.) and cypress (*Taxodium distichum*). The birds generally roosted toward the interior of the peninsula, which is about 300 m long and varies in width from 30 to 100 meters. The birds' daily routine was to leave the roost soon after sunrise and fly to the lakeside properties where the vultures loafed 2-3 hrs and damaged screens, roof shingles, boat cushions, and other property.

One property owner had a U.S. Fish and Wildlife Service depredation permit to shoot up to 15 birds. Several birds were shot over a period of days, but vultures continued to arrive. On 8, 9, and 13 November, we recorded vultures leaving the roost between 0600-0730 hrs. After the count on 13 November, we suspended a black vulture carcass in one of the roost trees. The carcass hung below the tops of the trees and was not visible from outside the roost. Through 22 November, we continued to record birds leaving the roost each morning.

## Live Oak Acres

This is a residential community in Gainesville, Florida. Woods border the north and east sides of the community and there are numerous trees scattered among the 15-20 houses. Dozens of vultures began roosting in trees on the north end of the community in November 2000. During periods of loafing these birds caused damage to adjacent property by tearing up toys, lawn furniture, screen enclosures, roof shingles, and other objects. Furthermore, the odor from the accumulated excrement was noticeably foul.

Starting on 13 December, we recorded numbers of vultures in the roost for 90 min during the period 0700-0900 hrs. On 20 December, we suspended a turkey vulture carcass near the top of one of the main snags used by the birds. We removed the carcass on 2 January and continued to monitor the roost through 19 January.

### ***Old Fields, West Virginia***

This roost, consisting of 20-50 vultures, had existed for >10 years. Various methods, including mylar ribbons, removal of snags, and pyrotechnics, had been tried with little success. In addition to being a nuisance to the homeowners, the vultures caused problems at a nearby cemetery by perching and defecating on the headstones. The site is in wooded mountains just at the edge of a small valley. There is nothing remarkable about the site that would explain the vultures' apparent preference for roosting at this location. On 29 May 2001, one of the 20 turkey vultures at the roost was shot. The next day, the carcass was suspended from a prominent branch on a tree within the roost. There were 20-30 birds in the roost at that time. Residents and local authorities monitored the number of vultures in the roost thereafter.

### ***New Mexico Pecan Orchard***

The 12-ha pecan orchard is located in Lovington, New Mexico, near the Texas border. There are few roost sites for turkey vultures in this part of southeastern New Mexico except in the small towns where trees and towers are used for roosting. Thus, the pecan orchard provides vultures with the most attractive roosting opportunity in the Lovington area. The surrounding landscape is arid and virtually treeless. In the orchard, the vultures caused considerable damage by breaking branches on the pecan trees. To harass the birds, the owners have used pyrotechnics and propane cannons in the evening since up to 1,500 birds started roosting in the orchard about 4 years ago. The vultures occupy the orchard roost only between late spring and early fall. The owners are able to limit the numbers of vultures roosting in the orchard to 50 or less through harassment, but this activity requires 3-4 hrs daily and the noise is a nuisance to neighbors.

Because there were no adequate trees within the orchard from which to hang a vulture carcass, the owner of the orchard built 4 self-supporting steel masts approximately 9 m tall. These were fashioned out of pieces of pipe and were tall enough so that the vulture carcass was suspended at or above the tops of the pecan trees. We placed the masts each with one carcass in open areas of the orchard where trees had been removed and close to trees used by the birds.

### ***Okeechobee Cattle Ranch***

This cattle ranch with 1,000 head is a 2,800-ha property in Okeechobee County, Florida. At the time of our first visit, the cattle herd was recently established. The ranch manager attributed 20 cow/calf deaths per year to black vultures including depredation of newborn calves, depredation of incapacitated calving cows, and trampling of calves by cows charging at vultures. He suspected the problem was aggravated by the presence of a roost beyond the north end of the property, as damage was greatest in pastures adjacent to the roost. The manager obtained a permit to take 25 vultures per year but felt that the problem would best be solved by dispersing the roost. Several hundred black and turkey vultures occupy the roost year-round.

Investigation of the roost found vulture activity to be centered in several clusters of sabal palm (*Sabal palmetto*) and oak (*Quercus* spp.) tree islands within a 4.5-ha area. Vultures roosted in the tops of palm trees, on palm snags, and in the tops of oak trees, many of which suffered various degrees of defoliation. Vulture activity in both the morning and late afternoon was concentrated along the banks of a canal running along one side of the roost. Due to the lack of a prominent tree or structure from which to suspend the effigy, we designed and installed a 13.8-m guyed aluminum mast in the center of the roost. From this we suspended one taxidermic mount above the tree line. We also suspended one taxidermic mount in a large oak tree and one painted decoy effigy in a second large oak tree. One month later, the mast-mounted effigy was replaced with a painted decoy. Effectiveness of the techniques was determined by counting the number of birds exiting the roost from sunrise until only a few or no birds were visible in the roost.

### ***Effigies Installed at Site of Damage***

These sites include 3 rural home sites and a fish research facility where vultures caused damage to property, and a pig breeding farm where vultures depredated newborn piglets.

### ***Lake Butler Residence***

This residence in rural Baker County, Florida is adjacent to a 0.2-ha catfish pond and approximately 1 km from a low-lying wooded area. The owners reported up to 75 vultures in their yard and on their roof and deck, which resulted in damage to roof shingles and the TV antenna. We visited the site on 28 February 2001 and assessed vulture activity from 0700-0900 hrs. We found vultures roosting in the nearby wooded area and flying to the rooftop and pond in the early morning hours. We installed a taxidermic vulture effigy in a pine tree 15 m from the house. We monitored vulture activity during 2-hr, early morning counts over the next 3 weeks. The effigy was removed on 10 April.

### ***Hague Residence***

This residence is located in a rural part of Alachua County, approximately 8 km north of Hague, Florida. The owner reported that numerous vultures roosted in adjacent wooded areas and arrived each morning at his home, where they perched in the yard and on the fence and roof. Harassment with water hoses and pyrotechnics had not solved their problem. We conducted 6 baseline counts of vultures at the house during 18-29 May 2001. We counted birds for 1 hr, ending at approximately 0900 hrs. After the count on 29 May, we installed a taxidermic black vulture effigy adjacent to the house. The effigy was suspended 6 m above the ground from an extension arm attached to the owner's tower-style TV antenna. We counted vultures at the site on 11 days, continuing through 25 June. We then replaced the effigy with a commercial goose decoy painted to resemble a vulture. We continued to monitor the site until 1 August.

### **Gainesville Residence**

This residence is located on the edge of a small lake in a sparsely populated and heavily wooded area south of Gainesville, Florida. The owner reported that vultures roosted in a state park on the opposite side of the lake, arriving at the property in the morning, where they perched on the roof, patio, TV antenna, and children's playset and loafed on the boat dock and beach at the lake's edge. We conducted a number of pretreatment counts to establish a baseline number. We installed a plastic goose decoy painted to resemble a turkey vulture to an extension arm attached to the tower-style TV antenna. Additionally, we later suspended a turkey vulture taxidermic mount from a large oak tree near the water's edge. The owner submitted periodic reports of vulture activity at the property.

### **United States Geological Survey Facility**

The USGS Caribbean Science Center is located on the northwest corner of Gainesville. It consists of a main office and laboratory building, several garages and outbuildings, and 4 ha of fish holding ponds. In November 2001 vultures began to use the facility as a day roost and loafing area. Personnel estimated 80-120 birds, mostly black vultures, on the site at any given time. Typically, the vultures started to arrive around 0830 hrs and perched on netted fish ponds, storage sheds, a water tower, and adjacent trees. The birds damaged nets on the ponds, boat and tractor seat cushions, and other exposed equipment and fouled the site with excrement. On 19 December we made a site visit and counted 100 vultures. On 21 December we suspended a taxidermic turkey vulture effigy from the top of a 7-m pole that was clamped to the side of one of the netted ponds used by the vultures. On 9 January 2002 we replaced the effigy with a modified goose decoy and monitored vulture activity regularly through February.

### **Waldo Pig Breeding Facility**

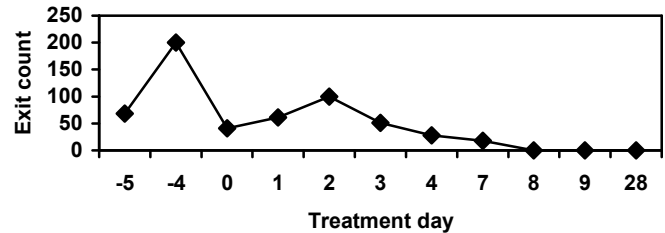
The site in Waldo, Florida consists of several pens on approximately 0.2 ha. The pens are adjacent to a vacant property with numerous snags that create ideal perching opportunities for vultures. The pens were not enclosed and were accessible to vultures. In early December 2000, the owner reported that 10-15 newly born piglets had been killed by black vultures. We monitored vulture activity at the site from 12 December 2000 through 8 February 2001. We counted vultures in the morning (0900-1100 hrs) several times each week. After the count on 2 January, we suspended a turkey vulture taxidermic effigy from a snag adjacent to the pig pens. We removed the effigy on 24 January.

## **RESULTS**

### **Carcasses or Effigies Installed in Roost**

#### **Bull Pond**

There was no discernible reaction by vultures to the hanging carcass for the first 3 days (Figure 2). Thereafter, numbers of birds declined to zero by the eighth day post-treatment. Over 5 months later, birds had not returned even though the carcass had deteriorated weeks before.



**Figure 2. Vultures observed exiting the Bull Pond roost during 1.5-hr early morning counts before and after installation (day 0 after count) of a black vulture carcass in a roost tree.**

#### **Live Oak Acres**

There was an immediate decline in vulture use of the roost following installation of the vulture carcass. After 3 days, the roost was virtually empty and the residents were no longer troubled by the birds. When we removed the carcass, some vultures occupied the roost temporarily, but by the end of the 3-week post-treatment period, no vultures remained.

#### **Old Fields, West Virginia**

During the evening (1830-2030 hrs) following installation of the carcass, no birds landed in the roost. Periodic reports since then have consistently indicated no reoccupation of the roost.

#### **New Mexico Pecan Orchard**

Immediately before the masts were erected in the orchard, 200 turkey vultures roosted there. Two days later, after 2 of the masts were in place, 32 vultures were counted. Vulture numbers declined further when the third and fourth masts were erected and carcasses installed. Follow-up counts a month after the study was initiated indicated occasional use of the orchard by small groups (10-15) of birds.

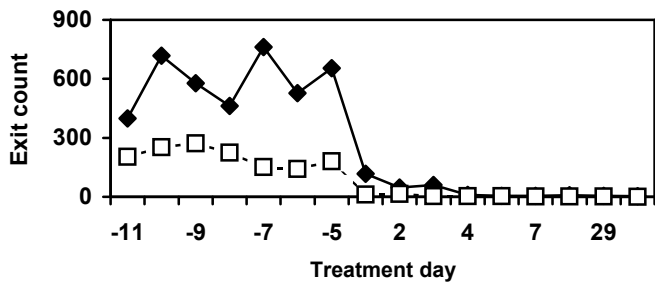
#### **Okeechobee Cattle Ranch**

Prior to the installation of the effigies, exit counts of vultures averaged 789 birds ( $n=6$ , 74% black vultures; Figure 3). On the morning after installation, the exit count declined over 80% to 128 birds. By day 2 it declined to 62, and by day 4 the number declined to 12 and remained below that number through day 7. One month later, the exit count was 7 birds. At that time the mast-installed taxidermic effigy was replaced with a painted decoy effigy. Over 2 weeks later, bird activity remained suppressed with only 4 birds counted (all black vultures). Whether or not the dispersal of the roost will reduce the number of cattle/calf depredation events at the ranch remains to be seen.

### **Effigies Installed at Site of Damage**

#### **Lake Butler Residence**

Our initial baseline count revealed 22 vultures on the roof of the house. After installation of the taxidermic effigy, the number of vultures using the roof initially remained about the same but soon declined to zero (Figure 4). Thereafter, we continued to observe numerous vultures in the immediate



**Figure 3. Black vultures (solid line) and turkey vultures (dashed line) exiting the cattle ranch roost during early morning counts before and after installation of turkey vulture taxidermic effigy (day 0). Effigy was replaced with a painted goose decoy on day 29.**

vicinity of the house, but we recorded only occasional incursions on the structure. After replacing the taxidermic mount with a painted goose decoy on treatment day 21, there continued to be no further reports of vulture use of the house through day 40, when the decoy effigy was removed. No vulture activity was observed through day 70.

**Hague Residence**

After installation of the vulture taxidermic effigy, vultures were virtually absent from the property (Figure 5). Vultures did not return after we replaced the taxidermic effigy with a painted goose decoy.

**Gainesville Residence**

After installation of the painted goose decoy, vulture activity declined for a brief period. Soon it returned to pretreatment levels. After installation of the taxidermic effigy, vultures abandoned the site. About 2 months later, the owner reported that birds had returned in record numbers. Upon investigation, we found that a tree branch and large clump of Spanish moss had fallen on the effigy. We promptly cleaned off the effigy and the birds left and have not returned.

**USGS Facility**

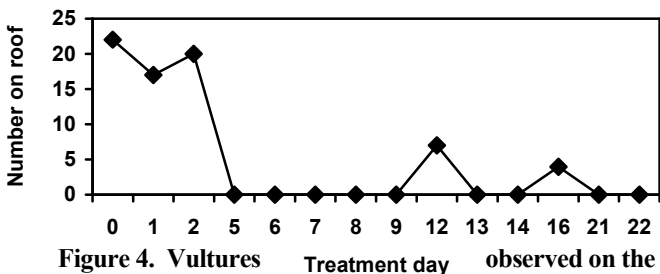
Personnel at the site reported a steady decline in vulture activity following installation of the taxidermic effigy (T. Gross, pers. comm.). By 31 December no vultures were seen on the site. The effigy was replaced with a painted goose decoy on 9 January. On 14 dates following installation of the modified goose decoy, vultures were on the site twice. On 18 January during a 90-min observation period, 50 vultures landed at a drawn-down pond, presumably attracted by newly-exposed food, and 21 others landed in nearby trees. On 25 January during a 60-min observation period, we counted 57 vultures on the ground feeding on dead fish. Otherwise, the only vultures observed were flying over the site.

**Waldo Pig Breeding Facility**

Numbers of vultures at the facility declined during the pretreatment period, and they continued to decline after we installed the turkey vulture taxidermic effigy (Figure 6). Vulture numbers increased on a day when the effigy became tangled in the tree. There were no further predation incidents and vultures were not observed at the site even after the effigy was removed.

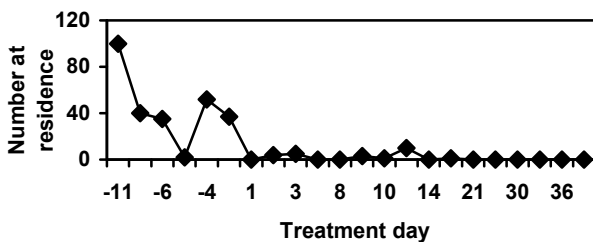
**DISCUSSION**

At each of 6 study sites, the vulture roost dispersed 1-3 days after the stimulus was suspended in the tower roost structure. It is clear from these case histories that the use of vulture carcasses, taxidermic mounts, and artificial decoys can greatly reduce or eliminate vulture numbers at various types of night roosts and daytime loafing sites. Dispersal of vultures from such sites has reduced or eliminated the associated nuisance, property damage, and depredation problems. From our observations, the effect on the vultures



**Figure 4. Vultures observed on the roof of a Lake Butler residence during 2-hr early morning counts before (day 0) and after installation of a black vulture taxidermic effigy in a nearby tree. Effigy was replaced with a painted goose decoy on day 21.**

**Figure 5. Vultures observed using Hague property during 1-hr early morning counts before and after installation**



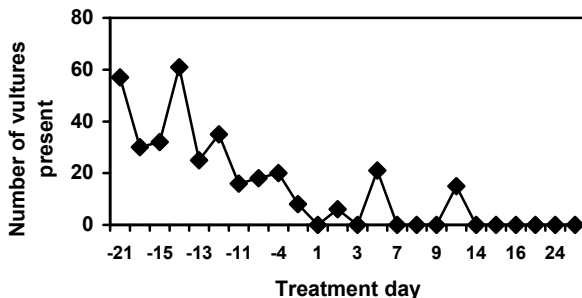
**(day 0) of a turkey vulture taxidermic effigy adjacent to the house. Effigy was replaced with a painted goose decoy on day 28.**

is rapid and durable, provided the carcass or effigy is suspended free from obstructions to visibility and movement.

Carcasses and taxidermic mounts were found to be equally effective for both species of vultures, regardless of the species used. What we do not know is why vulture effigies are so effective. It is tempting to speculate that the vultures recognize the taxidermic effigy as a dead roostmate and, not wanting to befall a similar fate, leave the area. This is a fanciful, anthropomorphic notion that fails to account for observed vulture behaviors. First, vultures are not averse to eating dead conspecifics. Second, if an effigy is not installed properly, and if vultures can reach it, they will attack the effigy and try to pull it apart (Tillman, unpubl. data).

Thus far, we have been unable to conduct necessary experiments to isolate factors that are responsible for the observed avoidance responses of the vultures. Previously, we have argued that visual characteristics of the stimuli are most important (Avery et al. 2002). Features such as color, orientation, and posture of the effigy need to be examined so that a more effective artificial effigy can be designed. The goose decoys that we have used to date are moderately successful, but they are not as reliable as an actual vulture carcass or taxidermic mount.

Some wildlife managers view dispersal of a roost as simply moving the problem from one place to another without actually solving anything. We have not yet encountered that attitude among the various cooperators where problem vultures have been dispersed. The birds need to go somewhere, and it is conceivable that in some cases the birds will contribute to a problem elsewhere. At this time, we have not attempted to determine the fate of vultures from a dispersed roost. This would be a worthwhile objective for future research.



**Figure 6. Vultures using the Waldo pig breeding facility during early morning counts before and after installation (day 0) of a turkey vulture taxidermic effigy in a tree over the pens. The effigy was removed on day 22.**

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