

Turkey Vultures Use Anthropogenic Thermals to Extend Their Daily Activity Period

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ABSTRACT—We describe predictable nocturnal soaring flight in Turkey Vultures (*Cathartes aura*) feeding at a landfill in eastern Pennsylvania. Birds feeding at the landfill returned to their roosts each evening by gaining altitude while soaring in thermals above flared methane vents at the site. Our results highlight behavioral plasticity in this species, which, in part, may explain why Turkey Vultures are so com-

mon throughout much of their extensive range. *Received 5 December 2005. Accepted 3 May 2006.*

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Turkey Vultures (*Cathartes aura*) are energy minimizers like most avian scavengers (*sensu* Schoener 1971, Ruxton and Houston 2002). Individuals at rest maintain low metabolic rates for their body mass and reduce their core body temperature at night in apparent efforts to conserve energy (Heath 1962, Wasser 1986). Turkey Vultures in flight usually soar and glide when flying between roosts and previously located food, when searching

for new sources of food, and during migration (Pennycuik 1972, Mundy et al. 1992, Kirk and Mossman 1998, Ferland-Raymond et al. 2005). At times, the species engages in intermittent flapping flight, particularly when departing from and descending into their roosts. This behavior is generally rare except when updrafts are unpredictable or weak. Our observations, assisted by radio tracking, indicate that lack of sufficient assisted lift can ground individuals several days or more (JTM, pers. obs.). Turkey Vultures have long been known as "late risers" (Ludlow Griscom in Bent 1937) that usually restrict their daily activities to mid morning to late afternoon when thermal- and slope-soaring are possible (Kirk and Mossman 1998).

Anecdotal and possibly disturbance-induced nocturnal flight has been reported in the species (Tabor and McAllister 1988) but regular nocturnal flight is unknown. Here, we report regular nocturnal flight in Turkey Vultures returning to their roosts in the evening after soaring in anthropogenic thermals created by flared methane at a landfill in eastern Pennsylvania.

METHODS

We watched Turkey Vultures on 120 non-rainy days from 12 July to 5 November 2004, and from 20 June to 17 July 2005, at a 45-ha Waste Management, Inc. landfill in Pen Argyl, Northampton County, Pennsylvania (40° 52' N, 75° 15' W). Birds were observed continually from 0730 to 2315 hrs EST, with a 3-hr break from 1300 to 1600 hrs EST. Observations were from an unused hilltop on landfill property, with the farthest roost being ~300 m. Adequate artificial lighting at the site permitted nocturnal observation without special equipment. Prior to the observations detailed here, we observed vultures at three communal roosts near the landfill for 20 days in June 2004 and for 47 days in July and August 2003. Our roost-site observations, which were conducted from dawn until dusk, and included both unmarked individuals and radio-marked birds, are used here to establish a temporal baseline for vulture behavior in the area.

Methane is vented at two sites at the landfill. One site, the "big flare," consists of a group of three 10-m-high vent pipes. The other site, the "little flare," consists of a single

10-m vent pipe. At both sites methane is flared continuously, around-the-clock, 365 days a year.

OBSERVATIONS

Between 30 and 90 Turkey Vultures fed at the landfill daily. On more than 70% of the days, 10 to 15 individuals fed until 2100 to 2300 hrs EST or approximately 90 to 210 min after local sunset. We do not know whether the late-feeding birds were the same individuals each day, or whether a larger subset of the population engaged in late feeding on an occasional basis. Vultures that fed in farmlands, woodlands, and suburban areas near the landfill returned to their roosts before 2000 hrs EST or, at most, 30 min after the local sunset.

Turkey Vultures that left the landfill used both natural thermals and anthropogenic thermals at the methane vents throughout the day to gain lift before departing the site. When natural thermals were no longer available after sunset, vultures that left the landfill initially approached the vents in flapping flight, and then circle-soared to approximately 100–200 m in thermals above the vents before gliding in the direction of nearby roosts. On most days, 10 to 30 vultures arrived at the landfill before 0800 hrs EST, soared above the vents for several minutes, and then departed, presumably for more distant feeding sites.

Turkey Vultures feeding at the site roosted in three communal roosts within 4 km of the landfill. Two of the roosts contained 30–50 Turkey Vultures and 5–10 Black Vultures (*Coragyps atratus*). A third roost contained 10–15 Turkey Vultures. Black Vultures at times fed at the landfill but none remained as late in the day as Turkey Vultures, and none soared in thermals above the vents.

DISCUSSION

Thermals created by flared methane appeared to be considerably stronger and hotter than nearby "natural" thermals. Vultures soaring above the vents ascended more rapidly than those soaring in nearby natural thermals, and many appeared to have difficulty maintaining level flight while doing so. Most of the birds that flew within vent thermals did so intermittently, and rather than circle-soaring radially about the center of the thermal while ascending constantly, circle-soared tan-

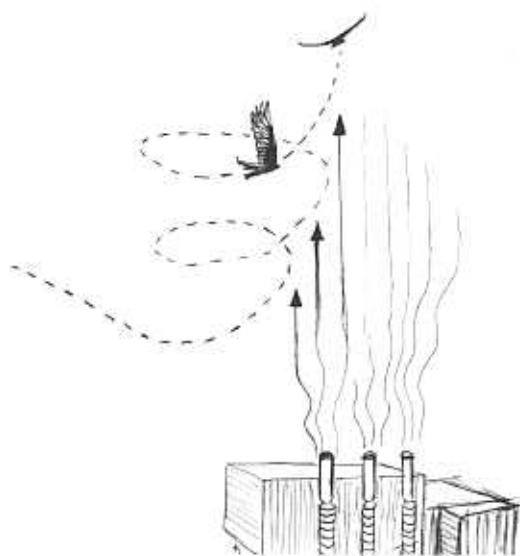


FIG. 1. The "big flare," the main methane vent facility at the Waste Management, Inc. landfill in Pen Argyl, Pennsylvania. Vultures soaring with the thermal created by the flared methane at the vents do so tangentially, rather than radially.

gentially within the thermal for brief periods and then circle-glided outside the thermal for longer periods (Fig. 1). We believe that individuals did so because they were not able to soar continually within the vents. Workers at the site reported finding Turkey Vulture carcasses at and near the bases of the vents, suggesting that in addition to providing soaring opportunities for vultures, the anthropogenic thermals at the vents also killed them, most likely either by scorching or suffocating individuals. Thus, the vents may have created an "ecological trap" for the birds that used them (Schlaepfer et al. 2002).

That Turkey Vultures, but not Black Vultures, soar in vent thermals at this site may be due several factors. First, many vultures that roosted nearby searched for carrion in the surrounding landscape rather than for food refuse at the landfill, suggesting that food was limited at the landfill. We tested this hypothesis by placing a road-killed white-tailed deer (*Odocoileus virginianus*), a road-killed common raccoon (*Procyon lotor*), and a butchered chicken (*Gallus domesticus*) at visible locations at the site to examine the extent of competition for food. Up to six Black and Turkey vultures fed upon the chicken simultaneously,

and up to 14 individuals fed simultaneously upon the deer. Black Vultures dominated Turkey Vultures at feeding sites, suggesting the former may be able consume sufficient food without prolonging the length of their feeding day. Second, Turkey Vultures typically hold their wings in a pronounced dihedral when flying low over the landscape, a self-righting aerodynamic "design" that stabilizes their flight in turbulent air (Mueller 1972), whereas Black Vultures do not. The relatively turbulent nature of thermals above the vents may have precluded their use by Black Vultures.

That Turkey Vultures are able to lengthen their daily activity periods via use of anthropogenic thermals suggests considerable behavioral flexibility in the species. This may help explain its large range and relative abundance.

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