



Adapting in an Urbanized Landscape

Benefits and Costs Through the Lens of the Black Vulture

Article by EVAN P. TANNER, ASHLEY M. TANNER, MICHAEL A. KALISEK,
CLAYTON D. HILTON and CHRISTINE HOSKINSON



Photo by Jeremy Baumgardt

A black vulture in South Texas.

Approximately 75 percent of the planet's surface is experiencing some measurable form of pressure caused by human impacts. That's not surprising given that it's estimated the global human population exceeded 8 billion as of November 2022.

Moreover, the global economy grew by 71 percent from 2000-2015. Although the global human economy is becoming increasingly more efficient in its use of natural resources, these economic ac-

tivities are largely around urban centers, agricultural lands, and the infrastructure required to support these systems.

Texas is not exempt from this trend. Over a 10-year period, the state's population grew by an estimated 21 percent and five of the country's fastest growing cities are in Texas.

Human influences on animal behavior are widespread and well documented. Wildlife have been shown to alter movement patterns, the timing and distribution

of activities, foraging behavior, communication signals, vigilance behavior, and even breeding and parental care strategies.

Indeed, given these increasing pressures, wildlife located within that 75 percent of impacted landscapes are forced to adapt to changes if they are to persist.

Ultimately, these shifts in behaviors are strategies that animals enact to ensure population persistence, but not all species are equally efficient at adaptation. Undoubtedly, there are winners and losers when adapting to human pressures.

For instance, the black vulture, which is an obligate scavenger, a species that primarily feeds on dead animals, has adapted well to areas that have increasingly become impacted by human activities. As a result, its distribution has expanded and its population has grown. To achieve this success, the black vulture has benefited from multiple strategies in behavioral adaptations across human-impacted landscapes.

Obvious strategies are linked to their dietary preference for carrion. In the United States, roadkill continues to be one of the leading sources of vertebrate mortality. Though this mortality source has been a cause of concern for many species of conservation interest, it represents a significant food source for scavengers such as the black vulture.

Additionally, the black vultures' foraging behavior lends itself well to urban environments. Unlike turkey vultures,

Sponsored by JOHN AND LAURIE SAUNDERS



which are solitary foragers, black vultures forage in large groups. Black vultures lack the turkey vultures' keen sense of smell, and instead primarily rely on sight to find food.

This means that individuals rely on other black vulture queues to find their next meal, so they are gregarious and remain part of a group after their meals when it's time to rest. If you've recently driven by a communication tower near dusk or in the early morning, you know exactly how urban structures are benefiting these large communal roosts.

It's common to find a colony of roosting black vultures that exceed 400 individuals on a tower, spending the night as they prepare for their next group outing to feeding grounds. The presence of artificial roosts such as these has undoubtedly led to drastic increases in the distribution of these vultures over recent decades, much to the dismay of the companies that own and operate the towers.

Beyond food and roosting resources, black vultures benefit from urban environments in less obvious adaptations. Urban infrastructures can influence flight conditions in beneficial ways by promoting thermal updrafts. Moreover, tall man-made structures undoubtedly provide perching opportunities that mitigate predation risk from ground predators. And finally, increasing evidence highlights adaptive nesting behavior of this species in urban environments.

It's clear to see why black vultures frequent these urban landscapes. But what is the cost? Human-wildlife conflicts with this species associated with property damage means many consider them a nuisance species. Vehicle collisions are a source of human-induced mortality for this species, particularly if the vultures are attracted to roadsides to take advantage of roadkill.

Moreover, mortality associated with aircraft collisions has increased as the birds continue to expand near urban centers with airports. In fact, black vultures were reported to cause an estimated \$123.1 million in damages to civil and military aviation from 2010 to 2019, and were reported as the fourth most common avian collision by the U. S. Air Force in 2014.

YOU ARE WHAT YOU EAT

Despite the direct challenges that this species experiences when interacting with the urban landscape, it's their dietary preference that provides insight into unseen challenges that wildlife may face when living in an increasingly urbanized world. Because they are scavengers, the black vulture occupies a position on the food web in which they inhabit a range of vegetation types, interact directly or indirectly with most other species, and come in contact with ever-increasing areas of human interaction.

These interactions make the black vulture a perfect species to assess environmental contaminants and human-related stressors that may be acting on the ecological community as a whole. Concerns about heavy metal accumulation, lead poisoning, and even presence of antibiotic resistant strains of bacteria are just a few examples of possible contaminants and human-related stressors that may be present in a food web due to increasing human presence.



Photo by Tristan Lozano

Black and turkey vultures arrive on a communication tower in Kingsville, Texas, to roost for the evening. Surveys estimate that towers like these can host more than 400 vultures in a single evening.



Photo by Alex Meza

Undergraduate students assisting with a black vulture capture in South Texas. Hoods are placed on the birds' heads to reduce stress during handling.



Because of these concerns, scientists and students at the Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville, in partnership with USDA Wildlife Services, are conducting research assessing the presence of environmental contaminants in black vulture populations in South Texas. South Texas presents a great opportunity to assess the presence of such contaminants due to its geographic location.

The black vulture is partially migratory, meaning some individuals migrate each year while others remain in the same area year-round without migratory behavior. South Texas is within the Central Flyway of North America, meaning migrating black vultures will frequent this region during spring and fall migration. Because of this, we are able to take samples from both resident and migrating birds to assess how variation in these environmental contaminants is driven by the time of year.

Since the spring of 2021, we have captured and sampled 71 black vultures to assess the presence of lead in the blood and antibiotic resistant strains of bacteria. Early results indicate that antibiotic resistant strains of bacteria are common within this species, with up to 13 different types of antibiotics being ineffective against bacteria such as Salmonella. Moreover, lead presence was detected in all birds, and approximately 32 percent of vultures had lead levels that are above critical levels for similar large raptor species such as the California condor and golden eagle.

So, what does this mean? Well, for black vultures specifically, it's difficult to determine if the presence of such contaminants have any population-level effects on the species. Vultures clearly have powerful digestive and immune systems, given the funda-



Two black vulture fledglings that successfully hatched from a nest located on the Texas A&M University-Kingsville campus. Successful nesting attempts in urban environments like this are becoming a common adaptive strategy for this species.

mental role they play in removing carrion from the landscape without succumbing to illnesses that would sicken animals not adapted to this diet.

However, these data do inform us on what contaminants are present in the food web in South Texas and can act as a warning system to guide monitoring strategies. These contaminants could be of concern depending on the species assessed and where they exist in the food web.

For instance, recent research demonstrated that the presence of lead in bald and golden eagles had significantly negative effects on population persistence within North America. Moreover, presence of antibiotic-resistant strains of bacteria in the food web produce health concerns for domestic animals and humans. Though the development of antibiotic resistance in bacteria is partially a result of human practices, species such as black vultures can act as reservoirs for these resistant strains if they frequent urban areas.

It's clear that black vultures allow us to peer into the unseen challenges that wildlife faces when inhabiting an increasingly urban landscape that contain environmental contaminants. However, detecting these contaminants is only the first step.

More research is needed to understand what specific sources facilitate the presence of these contaminants in black vultures (i.e., roadside foraging opportunities, landfills, etc.). Moreover, insight into the movement behavior of this species would allow us to understand spatial patterns in environmental contaminants and better assess how vulture movements may influence concerns of human-wildlife interactions with regard to human health concerns.

Balancing human-wildlife conflict with conservation goals for black vultures will continue to be a challenge given this species' highly adaptive behavior in urban landscapes. Despite these challenges, black vultures still play a critical role in ecosystems and are an important link in the complex food web within urban landscapes. Given the alarming rate of population declines in other species of vultures throughout the world such as Old World vultures in Africa, conservation efforts of our New World vultures, black and turkey vultures, are more important than ever and may shed light onto possible mechanisms for conservation success for declining species elsewhere. 🐾

RENEW TODAY
to receive your
NEW Membership
Decal!

TEXAS WILDLIFE ASSOCIATION
MEMBER

Texas Wildlife Association
6644 FM 1102
New Braunfels, TX 78132
www.texas-wildlife.org
(210) 826-2904 • FAX (210) 826-4933
(800) 839-9453 (TEX-WILD)