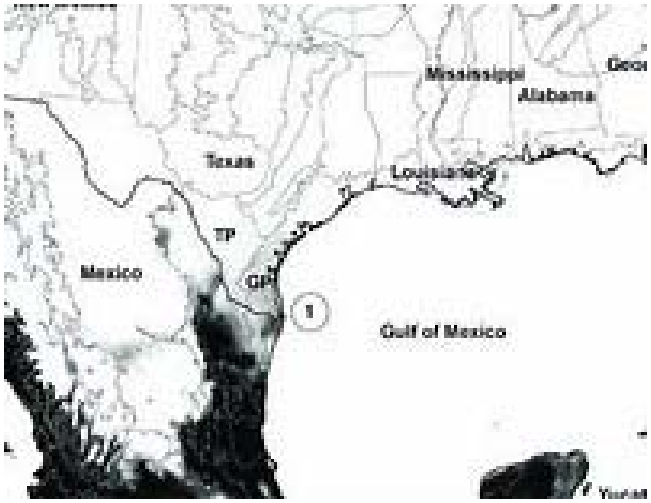
Vampire Bats

PREPARING FOR RANGE EXPANSION INTO THE US

MICHAEL J. BODENCHUK, STATE DIRECTOR, TEXAS WILDLIFE SERVICES

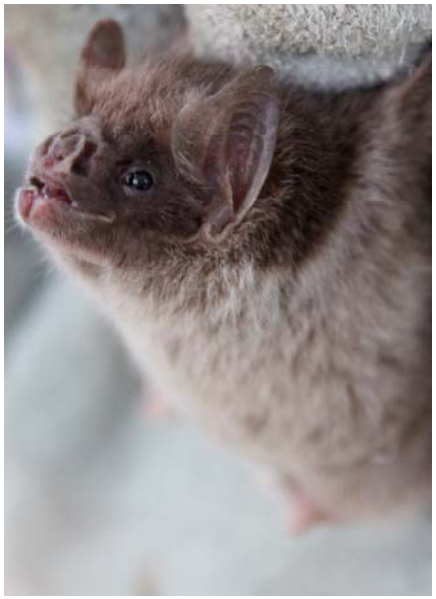
Vampire Bat Range Expansion



- Climate Models predict South Texas and parts of Arizona as suitable habitat due to climate change.
- Mexican experience indicates range expansion northwards at about 50 miles per year.
- Vampire bat strain rabies cases within 25 km of Texas border in Tamulipas.
- AZ also at risk from expansion in the west

Vampire Bat Issues

- Rabies in Livestock
- Exposure to people via livestock interactions
- Associated costs with livestock losses and PEP
- WE WILL NOT BE MANAGING THE BAT- ONLY THE ASSOCIATED RABIES



Costs

Economic Impact of the Potential Spread of Vampire Bats into South Texas

Aaron Anderson
USDA WS National Wildlife Research Center, Fort Collins, Colorado
Steven S. Shwiff
Texas A&M University, Commerce, Texas
Stephanie A. Shwiff
USDA WS National Wildlife Research Center, Fort Collins, Colorado

ABSTRACT: Rabies transmitted by the common vampire bat is a major public health concern in subtropical and tropical areas of Latin America, and there is some concern that the species will eventually spread into south Texas. The objective of this study was to estimate the total economic impact of the potential spread of vampire bats into south Texas. Data on livestock populations and values in the relevant counties was combined with expected mortality rates to calculate livestock losses. An IMPLAN model of the regional economy was then used to estimate the secondary impacts experienced by other businesses in the region. These impacts were combined with estimates of increased expenditures on post-exposure prophylaxis and animal tests to derive the total economic impact. We estimated the total economic impact would be $7 million to $9.2 million annually if vampire bats spread to south Texas.

KEY WORDS: cattle, *Desmodus rotundus*, disease, economics, livestock, rabies, Texas, vampire bat

Proc. 26th Vertebr. Pest Conf. (R. M. Timm and J. M. O'Brien, Eds.)
Published at Univ. of Calif., Davis. 2014. Pp. 305-309.

INTRODUCTION

Rabies transmitted by the common vampire bat (*Desmodus rotundus*) is a major public health concern in subtropical and tropical areas of Latin America (World Health Organization 2005). Infected vampire bats can transmit rabies to domestic mammals and humans through their haematophagous behavior (Turner 1975). In this region of the world, although transmission of rabies from bats to humans is less common than transmission by feral dogs (Schneider et al. 2005), vampire bats have been the main vector species to spread rabies to livestock (Acha and Málaga Alba 1988, World Health Organization 2005, World Health Organization 2007).

In Mexico, the common vampire bat has a vast range and is abundant in local concentrations (Lord 1988). The expansion of villages and livestock range and the subsequent construction of wells, buildings, tunnels, and mines have opened areas as roosts that were previously unavailable, resulting in an increase in the transmission of rabies to livestock and humans (Flores-Crespo and Arellano-Sota 1991). The damage caused by vampire bat-transmitted rabies to cattle (e.g., damaged hides, weight loss, decreased milk production, death) and humans (post-exposure prophylaxis, death) have economic consequences for cattle producers and communities in the rabies endemic region of Mexico (Acha and Málaga Alba 1988). Anderson et al. (2014) conducted a benefit-cost analysis of a management program in Mexico to reduce the economic consequences of vampire bat-transmitted rabies. Though it was determined that the net benefit of such a program was positive, the study highlighted the high costs associated with vampire bat-transmitted rabies and its control.

The vampire bat is currently found in Mexico as far north as the states of Sonora and Tamaulipas. However, there is some evidence (e.g., Mistry and Moreno 2008) that future range expansion may extend into south Texas over the coming decades as the climate in that region warms. This concerns ranchers, whose livestock may become susceptible to rabies transmitted by vampire bats. In addition to livestock losses, there are other negative impacts of this potential expansion of vampire bats' range. It is likely that use of post-exposure prophylaxis (PEP) and animal tests (AT) will increase. Shwiff et al. (2007) estimates the cost of PEP at $3,816 per person, implying that even small increases in PEP rates will lead to significant economic impacts. These direct economic impacts (livestock losses, PEP and AT costs) are not the only economic impacts. When livestock producers lose revenue and resources are diverted to PEP and AT, other businesses in the region suffer. A complete estimate of the economic impact of the spread of vampire bats into south Texas should account for these secondary impacts.

The purpose of this study was to estimate the total economic impact of the potential spread of vampire bats into south Texas. Data on livestock populations and values in the relevant counties was combined with expected mortality rates to calculate livestock losses. An IMPLAN model of the regional economy was then used to estimate the secondary impacts experienced by other businesses in the region. These impacts were combined with estimates of increased expenditures on PEP and AT to derive the total economic impact of vampire bats in south Texas.

METHODS

There are three types of regional economic impacts to be measured: direct, indirect, and induced. All of these can be measured in terms of income loss and employment loss. Measurement in terms of income loss gives the regional equivalent of gross domestic product (GDP).

One type of direct economic impact is the impact on

- Anderson et al. (2014) estimated costs from predicted animal deaths, increased animal testing, PEP between $7M and $9.2M annually.
- Estimate does not include livestock vaccinations or any government costs associated with management

Current Plan

- Training
- Surveillance
- Outreach

Training

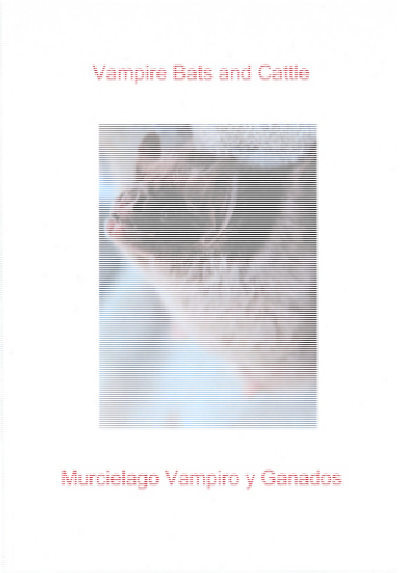
- Biology and Habitat
- Signs and symptoms of disease
- Methods of capture
- Methods of management
  - Trapping
  - Vampricide application

Surveillance

- Historically, rabid animals are discovered before bats are located
- 1 case on VB Rabies in TX already
- Cases in MX indicate close proximity
- Cattle Sale Barn Inspections
- On Ranch Inspections
- Trapping around livestock
- Epidemiological Investigations of suspect livestock deaths

Outreach

- Ranchers on both sides of the International Border
- Livestock workers (Veterinarians, Tick Riders, sale barn employees)
- Wildlife Officials (FWS-Refuges, TPWD, AZ G&F)
- DVD provided to more than 1200 households



Emerging Issues

- Vaccines
- Utilize colony and grooming behaviors to deliver a vaccine.
- Initiate discussions about vaccination programs for livestock.

Emerging Issues

Therya Advance Access published April 21, 2019

Therya, 2019 Vol. 10(2): XXX-XXX DOI: 10.12933/therya-19-XXX ISSN 2007-3364

Wild pig (*Sus scrofa*) as prey of the Common Vampire Bat (*Desmodus rotundus*)

Edwin L. Hernández-Pérez[1*], Guillermo Castillo-Vela[1], Gabriela García-Morales[1,2], Mario Sandoval Lugo[1] and Rocío Reyna-Hurtado[1]

[1]Departamento de Conservación de la Biodiversidad, El Colegio de la Frontera Sur, Unidad Campeche. Av. Rancho, Polígono 2A, CP 24500, Ciudad Industrial Lerma. Campeche, México. Email: e.hperez@ecosur.com; [2]CUMBRE, Conacyt-Ecosur, Departamento de Conservación de la Biodiversidad, El Colegio de la Frontera Sur, Unidad Campeche. Av. Rancho, Polígono 2A, CP 24500, Ciudad Industrial Lerma. Campeche, México. Email: gabrielagarciamorales@gmail.com (GGM)

[3]Colegio de Postgraduados, Campus Puebla. Carretera federal México-Puebla km. 125.5. Boulevard Forjadores, CP. 72760, Puebla. Puebla, México. Email: sanvicentemauro@yahoo.com (MSL)

*Corresponding author

The common vampire bat (*Desmodus rotundus*), is the hematophagous bat with the broadest distribution and the only one that preys on wild mammals. However, when the abundance of domestic species increases, *D. rotundus* tends to feed on horses, domestic pigs, and poultry. The presence of Wild pigs in Laguna de Términos, Campeche, represents an increase in prey availability, a factor that fosters the growth of bat populations in the region. Records were obtained with camera traps in the area of influence of the Laguna de Términos Flora and Fauna Protection Area, Campeche. Camera traps were placed on trees at the edge of trails for the recording of Wild pigs (*Sus scrofa*) and collared peccaries (*Pecari tajacu*). The photo-trapping period ranged from January 25 to August 16, 2018 with a sampling effort of 1,428 trap-days. We recorded 18 species of mammals in the five locations studied. Predation of the common vampire bat on Wild pigs was recorded in a single camera trap located in an oil palm plantation (*Elaeis guineensis*) surrounded by livestock areas and secondary forest fragments. Wild pigs were the only species recorded as being attacked by the common vampire bat. Of all separate records of Wild pigs, 11.7 % (n = 22) corresponded to photographs and videos of interactions between Wild pigs and bats. Vampire bat attacks were recorded between 20:00 and 5:00 h, with a peak of activity around 23:21 h. The increased availability of Wild pigs, together with changes in land use, seemingly foster the growth and expansion of vampire bat populations and, therefore, contribute to a higher incidence of attacks on domestic species. In addition to the negative ecological effects, the presence of Wild pigs involves increasingly important epidemiological implications. Studies on the interaction between common vampire bats and Wild pigs are necessary to assess the risk of disease transmission in the region.

El murciélago vampiro (*Desmodus rotundus*) es la especie de murciélago hematófago que tiene la mayor área de distribución y la única que se alimenta típicamente de mamíferos silvestres. Sin embargo, si la oferta de especies domésticas aumenta, *D. rotundus* tiende a volverse más caballos, cerdos y aves de corral. La introducción de especies exóticas que ha resultado en la presencia de los cerdos asilvestrados en el área de Laguna de Términos, Campeche, podría estar detonando un aumento en la disponibilidad de presas y un incremento de las poblaciones del murciélago vampiro en la región. Los principales efectos negativos de la presencia de murciélagos vampiro están ligados al incremento en el riesgo en la transmisión de enfermedades como la rabia. Los registros fueron obtenidos con cámaras trampa en la zona de influencia del Área de Protección de Flora y Fauna Laguna de Términos. Las cámaras trampa fueron colocadas en árboles a un costado de brechas para el registro de cerdos asilvestrados (*Sus scrofa*) y pecaríes de collar (*Pecari tajacu*). El periodo de fototrampeo fue del 25 de enero al 16 de agosto de 2018 con un esfuerzo de muestreo de 1 428 días trampa. Se registraron 18 especies de mamíferos en las cinco localidades estudiadas. Los eventos de depredación del murciélago vampiro sobre los cerdos asilvestrados ocurrieron en una sola cámara trampa, ubicada en una plantación de palma de aceite (*Elaeis guineensis*) rodeada por áreas de ganadería y fragmentos de selva secundaria. Los cerdos asilvestrados fueron los únicos registrados como atacados por el murciélago vampiro. El 11.7 % (n = 22) del total de los registros independientes de cerdos asilvestrados, corresponden a series de fotografías y videos de la interacción cerdos asilvestrados-murciélago. Los ataques de los vampiros se registraron entre las 20:00 y las 05:00 h, con un pico de mayor actividad alrededor de las 23:21 h. El incremento en la disponibilidad de cerdos asilvestrados, en conjunto con cambios en el uso de suelo, podrían detonar el aumento y expansión de las poblaciones de vampiros y, por ende, una mayor incidencia de ataques a especies domésticas. Es necesario estudiar la interacción cerdos asilvestrados-vampiros para conocer los efectos en problemas emergentes como la transmisión de enfermedades en la región.

Key words: Campeche; ecological interaction; exotic species; south of Mexico; zoonotic diseases.

Introduction

Hematophagous bats are endemic to Latin America and are represented by three species: *Desmodus rotundus*, *Diaemus youngi*, and *Diphylla ecaudata*. The common vampire bat (*D. rotundus*, hereinafter referred to as vampire bat) is the most widely distributed blood-sucking species in America (Barquez et al. 2018) and the only one that preys on wild mammals (Sánchez-Cordero et al. 2011; López-Roig and Mandujano Rodríguez 2016; Pignaton Gnocchi and Srbek-Araujo 2017). However, when the availability of domestic species increases, the vampire bat tends to feed on them more frequently, with an apparent preference for horses, bovines, and poultry (Mayhe 2014; Bobrowiec et al. 2015).

Changes in the availability and abundance of wild species, coupled with the intensification and expansion of livestock rising, have contributed to the modification of the

- Feral Swine as food source
- Venezuela and Brazil-trail camera photos
- Mexico-22 of 188 pig photos (11.7%) show active vampire bat interaction
- Potentially alters the surveillance protocols and patterns
- Forces reconsideration of outreach-need to reach hunters?