



Instars and Stripes: the scavenging behavior and taphonomic contribution of the Striped skunk

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Abstract

Scavenging frequently plays a role in the taphonomy of human remains in outdoor contexts. Certain scavengers are known to scatter remains, while others affect a case simply by consuming tissues, which can affect the decomposition sequence and determination of the postmortem interval. Understanding the type and behavior of scavengers is thus a crucial part of analyzing remains found outdoors.

The research in this presentation was conducted at the Northern Michigan University Forensic Research Outdoor Station (FROST) in Marquette, MI. Common scavengers and carrion feeders of this area include coyotes, bears, grey and red foxes, eagles, gulls, and turkey vultures, though only red foxes and American striped skunks (*Mephitis mephitis*) have been observed during data collection activities at FROST.

Based on previous sightings of foxes and other small mammals in and around FROST, many of the animals captured on trail cameras within the facility are unremarkable (e.g., foxes, rabbits, squirrels, and birds). All footage of these animals appears to be incidental, as none of them have been observed penetrating the protective cages that cover all FROST donors to scavenge the human remains. The striped skunk represents the overwhelming majority of documented scavenger activity at FROST and has repeatedly managed to get inside the protective cages. The skunk appears to be the only active scavenger at FROST, and trail camera photos demonstrate the consumption of both human tissue and maggot masses when a skunk is present.

FROST researchers have noted two distinct feeding times, as a skunk is often recorded in the late evening and then again in the very early morning, with generally less activity in-between. They also appear to have a preference for scavenging the tissue of the limbs and face, similar to documented observations of raccoons.^{4,5} Scavenging of maggot masses is most commonly evidenced by clean-scraped dirt in areas where maggot masses have been observed, indicating that the skunks have scraped up and consumed the maggots. For several months, FROST was frequented by what appeared to be a single skunk, but since mid-July of 2019, five new skunks have been documented. These additional skunks are smaller than the original, suggesting a sharing of knowledge regarding a reliable food source from parent to offspring.

While skunks are known to be carrion feeders and have been observed by researchers during previous taphonomy studies, this is the first instance the authors are aware of when skunks not only represent the primary mammalian scavengers at a site, but also apparently display behavior indicating a transfer of knowledge of the human tissue as a food source.¹ These observations contribute to our understanding of the ways in which the scavenging activities of the American striped skunk affect human taphonomy.

Introduction

- Scavenging is an important part of understanding the taphonomy of human remains found in outdoor contexts, as it can alter the context of a scene via the scattering of remains or affect decomposition processes and PMI determination via tissue consumption.^{1,2}
- Scavenging of insects associated with the decomposition of human remains can also affect insect contributions to taphonomy and subsequent entomological analyses of PMI.²
- Knowledge of local scavenger guilds can inform death investigation and analyses of trauma, PMI, and original disposition of a set of remains.
- The research presented here details the results of an observational study conducted to understand the type and behavior of local scavengers present in the area of the Northern Michigan University Forensic Research Outdoor Station (FROST) in Marquette, MI, as well as how they affect the taphonomy and decomposition processes of human remains in outdoor contexts.

Materials & Methods



Example photos of skunks captured by trail cameras at FROST.

- The study site (FROST) is an outdoor taphonomy and decomposition facility, located on a bluff overlooking Lake Superior in Marquette, MI; the area is considered a humid continental climate zone, and FROST itself experiences large volumes of snow, markedly low temperatures, and several freeze-thaw cycles in a given year.
- Browning Strike Force 850 HD trail cameras were aimed at recently-placed donor remains and set to capture four-image bursts upon any detection of motion, 24 hours/day; images were downloaded regularly.
- Trail cameras were initially set up after scavenging activity was noted on two donors; following this, a camera was set up each time a new donor was placed at the facility to capture any scavenging activity that might take place.
- All downloaded images were analyzed and all appearances of animals recorded along with date and time.
- Observations for this study were documented from October 2018 through August 2019.
- Donor remains were assessed on a near-daily basis, and condition, Total Body Score (TBS)³, insect activity, and scavenging evidence were all recorded.

Observations

- Scavenging documented on or near five total donors:
 - 2 showed evidence of tissue scavenging only
 - 1 showed evidence of maggot scavenging only
 - 2 showed evidence of both tissue and maggot scavenging
- Donor condition at the time of scavenging ranged from early decomposition to desiccation



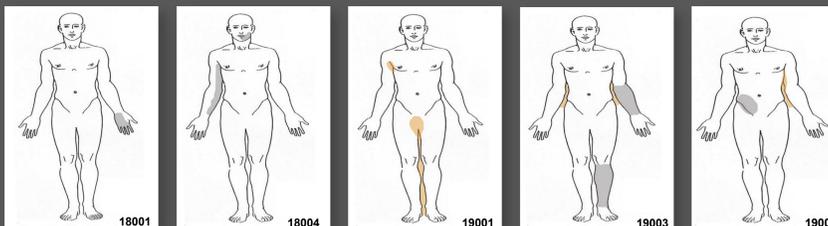
Examples of tissue scavenging; same donor, right arm – photos taken 12 days apart.



Example of scratch marks, lateral right torso.



Example of maggot scavenging; same donor, left axillary region – photos taken 16 days apart; note scraped appearance of dirt in bottom photo.



Areas of scavenging observed on 5 donors, colored to indicate consumption of tissue or maggots; ordered by time, with most recent donor on the far right.

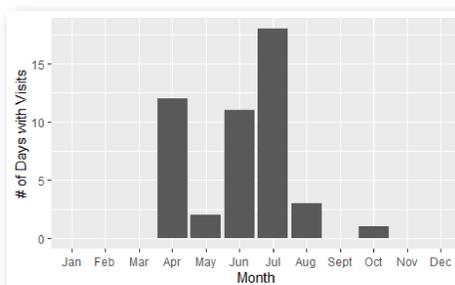
Legend:

- Tissue Scavenging (Grey)
- Maggot Mass Scavenging (Orange)

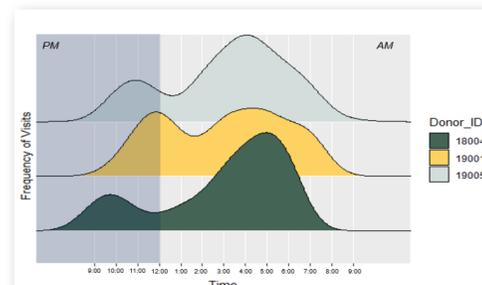
- Multiple skunks observed on two separate days in July:
 - July 18th – 6 total skunks
 - July 22nd – 3 total skunks
- One individual observed on July 19th
- No observations of skunks on July 20th, 21st



Photo showing multiple skunks captured on camera. Five total skunks can be seen in this photo.



Histogram showing the months in which skunks were observed, as well as the total number of days within each month that skunks were observed.



Visualization showing the overall frequency of skunk visits by time of day.

Discussion

- Skunks in this study consumed both tissue and maggots, but tissue consumption was observed first, prompting initial setup of trail cams; additionally, tissue consumption on second scavenged donor started and continued with no maggots present.
- Areas of tissue consumption included arms, face, and abdomen. This pattern is similar to observations of raccoon scavenging as presented by Steadman et al. (2016), where activity began with limbs and in some cases spread to the head and thorax.⁴
- The current study differs from previously documented behavior, in which skunks scavenged after raccoons had made openings; in this study, skunks created openings (limbs, face), only once taking advantage of a previous opening (incision made in abdomen as part of gut microbiome study).⁵
- The striped skunk acted as primary scavenger in this study, whereas previous studies have only documented skunks as secondary scavengers.⁵
 - This difference may be associated with the location of FROST being out of town, i.e. more rural than urban
 - The range of the striped skunk extends throughout most of the contiguous United States, as well as down into the northern region of Mexico and up into the longitudinal mid-range of Canada.⁶
 - FROST may be representative of the more isolated, less densely populated northern areas and the potentially different order of scavenging observed there
- While feeding periods corresponded with the nocturnal behavior displayed by skunks, a semi-bimodal distribution was observed when comparing frequency of visits with time of night.
 - There was a small concentration of visits between 8:00 pm and midnight, but the largest concentration occurred between midnight and 7:00 am.
- The presence of multiple skunks for two days in July is consistent with the reproductive and developmental timeline of the Striped skunk and suggests the sharing of knowledge from parent to offspring regarding a reliable food source.
- An apparent chase-off on July 22nd, in which one skunk approaches a second skunk feeding on the abdomen of a donor and is subsequently chased away from the donor and returns to roving in the grass for maggots, may suggest that tissue, when available, is preferred to maggots.
- While FROST has been able to document most scavenging behavior observed since human subject research began in July 2018, the low frequency of donor intake associated with a new program makes it difficult at this time to conduct studies on multiple donors in a similar state of decomposition.
 - This inconsistency makes it difficult to fully delineate scavenging patterns or preference for specific donors or states of decompositions, as have been documented in previous studies.^{4,5}

Conclusions

- Skunks may play larger role in scavenging and taphonomy than previously thought, particularly in more northern or rural areas.
- The pattern observed thus far suggests that scavenging skunks may show up in springtime, around April; the appearance of accompanying offspring in midsummer, around July, has also been noted and will be watched for.
- Future research will explore this pattern, as well as focus on identifying individuals by tail stripe pattern.
- As donor number and frequency of intake increases, research will be able to explore such aspects as donor and level of decomposition preference.



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