Hot sauce as a bobcat deterrent to prevent livestock depredation

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Livestock loss due to predators is a constant challenge in agricultural and conservation fields. Predators accounted for 24.3% of goat deaths during 2015 (USDA, 2015), 28.1% of sheep deaths during 2014 and 2.4% of cow death deaths during 2015 (USDA, 2015). The number of deaths can vary depending on state and kind of operation, but any deaths contribute to tension in the human-wildlife conflict. Bobcats(*Lynx rufus*) account for a small percentage of larger livestock deaths such as sheep, goats and cattle (Nealeet al. 1998) but can contribute to the death of lambs, goat kids, rabbits and chickens, as well as companion animals (Gese, Keenan and Kitchen, n.d.). Commonly used predator deterrents such as fox-lights, noise emitters and electric fencing will deter bobcats from predating on livestock, however, reports of home-made deterrents across the world remain untested. These include reports of using chili peppers or hot sauces to deter lions (*Panthera leo*) and mountain lions (*Puma concolor*). Therefore, a small-scale study, looking into the effect that hot sauces have on bobcat presence was conducted.

Methods

A 193-acre farm was chosen in the Western Sierra Nevada foothills. The farm includes interior California chaparral and woodland habitat as well as grassland. There are a few ephemeral streams and a few man-made water sources. The farm currently has a mixture of sheep, goat, rabbit and chicken pens. Apart from fencing and some herding dogs there were no other predator deterrents present and the owners reported approximately 10-12 predations in the year 2019, 7 of which were believed to be caused by bobcats.

Ten camera traps were placed along game trails and at water sources, at 100 m intervals. At the end of the third week, 5 randomized camera traps had scent applied on their location and 5 acted as untreated controls. The camera traps were left out for an additional 8 weeks where the scent was refreshed or changed every week. Once that treatment was completed the camera traps were left for another 3 weeks to see if activity returned to baseline.

Scent bomb lures saturated with hot sauces were placed above or as close as possible to the camera trap, out of reach of bobcats to prevent any accidental exposure to hot sauce and potential habituation. Four commercially available hot sauces were used in the following order: Sriracha, Tapatio Salsa Picante, 100% Pain Hot Sauce and Da Bomb, Beyond Insanity. The control camera traps had scent bomb lures with no scent.

Bobcat presence was counted as the total number of bobcat captures on a camera trap. Unless physical variations demonstrated differently, all bobcat captures that were within 5 minutes of each other were considered the same animal and therefore counted only once.

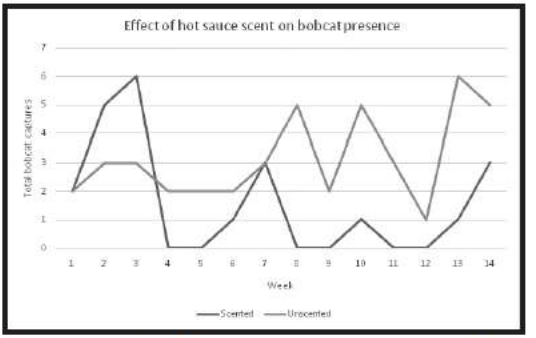

Figure 1. The effect of hot sauce scent on bobcat presence. Sriracha sauce was applied at Week 4, Tapatio Salsa Picante on week 6, 100% Pain on week 8 and Da Bomb on week 10 with scenting stopping at week 12.

Analysis and Results

This experiment examined whether hot sauce could influence bobcat presence and if so to what degree. Figure 1 shows the overall results of bobcat presence. After the application of hot sauce, total bobcat presence on scented cameras fluctuated between 0 and 1 with an odd week of 3 captures recorded. This was likely due to hot sauce Tapatio Salsa Picante not having as powerful of an odor as the rest. At the end of week 12, bobcat presence on the scented cameras began rising again, indicating that the presence of the hot sauce scent likely kept the bobcats away from those sites.

Future research

The experiment's results merit further research into how effective hot sauces can be in deterring bobcats. The hot sauces in the experiment were alternated to prevent habituation so the next steps include investigating the effectiveness of hot sauces across the Scoville Heat Units spectrum without alternating hot sauces, investigating the effectiveness of concentrated pepper essence as well as the time it takes for bobcats to become habituated to each smell.

Once that research concludes, further examination into the practical applications of hot sauces should be investigated such as whether hot sauces can act as a deterrent for other felid species, other mammal predators as well as whether they can work in a multi-predator landscape where some species such as American black bears (*Ursus americanus*) and Grizzly bears (*Ursus arctos horribilis*) have been recorded to be attracted to capsicum.

Data Paper

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SNAPSHOT USA 2019: a coordinated national camera trap survey of the United States

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Abstract. With the accelerating pace of global change, it is imperative that we obtain rapid inventories of the status and distribution of wildlife for ecological inferences and conservation planning. To address this challenge, we launched the SNAPSHOT USA project, a collaborative survey of terrestrial wildlife populations using camera traps across the United States. For our first annual survey, we compiled data across all 50 states during a 14-week period (17 August–24 November of 2019). We sampled wildlife at 1,509 camera trap sites from 110 camera trap arrays covering 12 different ecoregions across four development zones. This effort resulted in 166,036 unique detections of 83 species of mammals and 17 species of birds. All images were processed through the Smithsonian's eMammal camera trap data repository and included an expert review phase to ensure taxonomic accuracy of data, resulting in each picture being reviewed at least twice. The results represent a timely and standardized camera trap

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survey of the United States. All of the 2019 survey data are made available herein. We are currently repeating surveys in fall 2020, opening up the opportunity to other institutions and cooperators to expand coverage of all the urban–wild gradients and ecophysiographic regions of the country. Future data will be available as the database is updated at eMammal.si.edu/snapshot-usa, as will future data paper submissions. These data will be useful for local and macroecological research including the examination of community assembly, effects of environmental and anthropogenic landscape variables, effects of fragmentation and extinction debt dynamics, as well as species-specific population dynamics and conservation action plans. There are no copyright restrictions; please cite this paper when using the data for publication.

Key words: biodiversity; biogeography; camera traps; carnivora; Cetartiodactyla; Cingulata; Didelphimorphia; Lagomorpha; mammals; occupancy modeling; Rodentia; species distribution modeling.

The complete data set is available as Supporting Information at: http://onlinelibrary.wiley.com/doi/10.1002/ecy.3353/suppinfo.

Open Research

Associated data are also available at Smithsonian's eMammal Data Repository, as described in the Supporting Information Metadata S1 document.

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DATA PAPER

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Abstract

Managing wildlife populations in the face of global change requires regular data on the abundance and distribution of wild animals, but acquiring these over appropriate spatial scales in a sustainable way has proven challenging. Here we present the data from Snapshot USA 2020, a second annual national mammal survey of the USA. This project involved 152 scientists setting camera traps in a standardized protocol at 1485 locations across 103 arrays in 43 states for a total of 52,710 trap-nights of survey effort. Most (58) of these arrays were also sampled during the same months (September and October) in 2019, providing a direct comparison of animal populations in 2 years that includes data from both during and before the COVID-19 pandemic. All data were managed by the eMammal system, with all species identifications checked by at least two reviewers. In total, we recorded 117,415 detections of 78 species of wild mammals, 9236 detections of at least 43 species of birds, 15,851 detections of six domestic animals and 23,825 detections of humans or their vehicles. Spatial differences across arrays explained more variation in

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the relative abundance than temporal variation across years for all 38 species modeled, although there are examples of significant site-level differences among years for many species. Temporal results show how species allocate their time and can be used to study species interactions, including between humans and wildlife. These data provide a snapshot of the mammal community of the USA for 2020 and will be useful for exploring the drivers of spatial and temporal changes in relative abundance and distribution, and the impacts of species interactions on daily activity patterns. There are no copyright restrictions, and please cite this paper when using these data, or a subset of these data, for publication.

KEYWORDS

biodiversity, biogeography, camera traps, Carnivora, Cetartiodactyla, Didelphimorphia, Lagomorpha, mammals, occupancy modeling, species distribution modeling

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The complete data set is available as Supporting Information (Data S1). Associated data are also available at the Smithsonian's eMammal data repository https://emammal.si.edu/analysis/data-download by choosing North America in the map and then selecting the project: Snapshot USA – 2020.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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