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A Comparison of the Effectiveness of Scent Lures on Attracting Mesopredators

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by

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Introduction

A mesopredator is a medium-sized middle trophic level predator such as a raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), or coyote (*Canis latrans*; Crooks and Soule 1999). Mesopredators have long been trapped for recreational, economic, or academic reasons. Throughout human history trapping has been used to capture animals for food and skins, as well as to prevent personal harm and property damage from predators. In order to increase the probability of success, scent lures are often used as an attractant (Geary 1984, Mills et al. 2010, Schlexer 2008).

A scent lure is typically a liquid or viscous substance that draws an animal in through its sense of smell (Schlexer 2008). A scent lure is unlike bait because it is not intended to be consumed. Ingredients used in scent lures are often a combination of several scents in order to fully maximize the potential of attracting a species. Ingredients include plants, plant extracts, animal musk, glands, and urines. These ingredients are usually supplemented with an oil base that lessens evaporation rates and acts as a preservative or antifreeze to increase length of use (Schlexer 2008). Lures exploit an animal's hunger or curiosity, and stimulate social or territorial responses (Wyshinski 2001).

Scent lures are usually used to attract mesopredators into control devices such as traps or snares in recreational trapping or scientific inquiry. Rather than using scent lures based on scientific evidence, trappers and researchers have selected lures based on traditional success from techniques and recipes passed down within families or outfitters (Geary 1984). Understanding the effectiveness of lures could help improve wildlife research efficiency, trapping success, and pest management. Validating lures through scientific trials – i.e. field deployment, present to captive animals – may help conserve limited research funds, as well as enable dependable results for predator surveys (Schlexer 2008).

Scent lures are commonly used to attract mesopredators into traps or snare for recreational or scientific trapping. For example, scent lures have been used to attract river otters (*Lutra canadensis*) and Everglades mink (*Mustela vison*) to estimate abundance (Humphrey and Zinn 1982), to estimate density and population size of grizzly bears (*Ursus arctos horribilis*; Romain-Bondi et al. 2004), and may be useful in estimating species distribution (Moruzzi et al. 2002). Generally speaking, a particular species is usually targeted for detection or trapping. It is thus important to have reliable information about the efficiency and specific attractivity of lures in order to avoid attracting non-target species that may be of conservation concern, hold aesthetic or economic value, or are otherwise undesirable to attract (Turkowski et al. 1983).

Therefore, determining specificity of targeted lures is important. Verifying scent lures through collecting scientific data is a current challenge. In order to address this issue, it is important that selection of attractant type and deployment be standardized for targeted species. This may allow for more targeted use of scent lures to attract specific species as well as avoid negative consequences (Schlexer 2008).

Research has been conducted to attempt to standardize lure use within government agencies and academic institutions. Standardization of lure type and quantity used can help to avoid attraction bias (Schlexer 2008). Studies have successfully determined the most effective standardized lures for Canada lynx (*Lynx canadensis*; McDaniel et al. 2000), raccoon dogs

(*Nyctereutes procyonoides*; Juslin 2011), and bears (*Ursus* sp.; Mowat and Strobeck 2000). The US Fish and Wildlife Service conducted field trials in order to standardize a lure for coyotes which resulted in the adoption of fatty acid scent use by the agency (Roughton 1982). While these studies address the efficiency of a specific olfactory attractant, they do not investigate its selectivity when targeting a species.

Selectivity of a scent lure implies how well a targeted species is drawn in while also not attracting non-target species. An array of lures are commercially available in order to attract a target species. Most of the selectivity of these lures has never been assessed, a majority of which are utilized based off of custom instead of scientific verification. Lure selectivity data may be used by trappers and wildlife researchers when choosing a lure that will minimize attraction of non-target species while maintaining the ability to achieve their objective. Therefore it is important and necessary to investigate and determine the selectivity of lures in order to benefit future carnivore surveys, recreation/commercial trapping, and wildlife damage management (Martin and Fagre 1988, McDaniel et al. 2000, Turkowski et al. 1983).

An efficient way to determine lure selectivity is to combine scent lures with remote trail cameras in order to record predator data. The cameras capture images when triggered by heat or movement within a certain distance. Trail cameras offer many advantages for wildlife research including definitive species identification, multiple species detection, and a permanent photo record, among others (Schlexer 2008, Texas A&M 2009). As a result, trail cameras provide specific and accurate information (Pietz and Granfors 2000). Combining trail cameras with an attractant is an effective method for detecting animal activity (Moruzzi et al. 2002). A scent lure is most desirable for use in detecting more than one animal over a length of time (Schlexer 2008).

This study used a combination of trail cameras with scent lures to investigate the effectiveness of two species-specific scent lures when compared to one all-purpose scent lure. The objective of this project was to evaluate effectiveness of attracting a target species and compare the results to a general all-purpose predator scent lure.

Target Species

The mesopredators that were tested for lure selectivity are based on three commonly harvested mesopredator furs in the state of Nebraska during the 2009-2010 harvest seasons: raccoon, red fox, and coyote (Wilson 2010). Each species is found throughout Nebraska, and is common in the southeast region where the research was conducted. These predators use similar habitat – fallow, brushy wooded areas near an open water source with high prey abundance (Jones 1964, Nowak et al. 2005).

The raccoon is an omnivorous procyonid found throughout North America. It is nocturnal and has an extremely diverse diet (Macdonald 1999). These mesopredators are among the most abundant in Nebraska and are also economically important to the state (Jones 1964, Nowak et al. 2005, Wilson 2010). Raccoons possess a keen sense of smell. They rely on olfactory cues from anal scent markings to establish home ranges and identify individuals (Zeveloff 2002). Raccoons are sometimes viewed as pests to crop fields and in urban areas (Nowak et al. 2005).

The red fox is a carnivore with its range stretching throughout North America (Macdonald 1999). Red foxes are broadly distributed and relatively common in the eastern part of Nebraska (Jones 1964). Red foxes prefer to live at the edge of open country, although they are also found deep in forested areas. Red foxes rely on their sense of smell to scavenge for food, as well as to sense urine markings that act as a social or territorial record (Henry 1977). They are often viewed as a nuisance animal by poultry farmers and small-game hunters (Rue 1981).

Coyotes are another canine common to North America. Coyotes are distributed statewide and are the most abundant canid in Nebraska. They are particularly successful on rough fallow land in eastern Nebraska (Jones 1964). Coyotes prefer open grassland, but also occupy deciduous and mixed coniferous forests. These animals also rely on their keen olfactory system to detect urine and feces scent markings, but rely more on visual cues when seeking out prey (Windberg 1996). Coyotes have long been viewed as pests for predation upon livestock and poultry (Jones 1964). They are an unprotected, open-season species in Nebraska.

These three mesopredator species were targeted in order to test for species-specific scent lure effectiveness. A commercial raccoon scent lure, canid scent lure, and all-purpose scent lure were used to draw these animals in to photo/scent trap stations. Since species-specific lures are sold with the intent to attract a desired animal, I predicted that species-specific lures will attract a higher proportion of its target species in comparison to those attracted to the all-purpose lure.

Materials and Methods

Research was conducted on a privately owned land managed for habitat quality in Nuckolls County, Nebraska, USA about 5 miles northwest of Angus, NE. The targeted species have been observed and harvested in and around this area. The study site is characterized by undulating grassy terrain, with woodlands along the west, south, and east sides. The Little Blue River runs through the south of the site which is surrounded by corn and bean fields on all sides. A GPS unit was used to map out the boundaries of the area. Random points were established within the site through the use of a GIS program (Fig. 1).

The grassland area consisted of mixed grass prairie including brome grasses (*Bromus* sp.) and bluestem grasses (*Andropogon* sp.). Forbs and woody plants were sporadically present as well. The wooded area consisted of oaks (*Quercus* sp.), maples (*Acer* sp.), elms (*Ulmus* sp.), and pines (*Pinus* sp.). Understory vegetation, bushes, and shrubs made up the rest of the plant community in the woods.

I used three types of commercial scent lures to attract targeted species: Blackie's Blend Brush Master Lure (general predator), Wildlife Research Center's Hard Core Coon Lure #1 (raccoon), and Carman's Canine Call Lure (red fox/coyote). A scent-neutralizing spray was used to cover any scent that may cause pollution of the test plots. Scent lures were deposited into small plastic lure capsules capable of holding 1 cubic centimeter each. This allowed for a constant amount of scent lure to be used each time new lures were set out. Each lure capsule was attached to a fiberglass post by fiber tape and secured with a hose clamp, creating a scent station. A fresh lure capsule was used during each location change.

Three Primos® TruthCam 35 Trail Cameras and six memory cards were used to capture images of animal visits at each plot. Cameras were alternated between habitat types – woodland and grassland – biweekly. Memory cards were also switched out each week in order to collect data. Every camera was designated a single lure type to be paired with that camera throughout the study. Each camera and scent station was placed at a randomly selected point within the study site. These cameras were mounted to a tree facing north, and fixed between 24-35 inches off the ground. When placed in grassland habitat the cameras were attached to T-posts rather than trees (Texas A&M 2009).

The camera and scent traps were placed at the random locations in the first habitat type (woodland) on a Sunday and left out for seven trap nights. The following Sunday, the traps were moved to three randomly chosen, previously unused locations in the second habitat type (grassland). Upon completion of the seven nights at the second habitat, the camera traps were moved back to the first habitat type but placed at three new randomly chosen, previously unused locations. This was done to create a one week on/one week off monitoring system of each habitat type. Field tests were performed from May 29th through August 6th, 2011.

To determine whether the different lures attracted more of the target species than expected by chance, I performed a chi-squared test for each lure. The results of the all-purpose scent lure were used for establishing baseline percentages of expected animals. Using these numbers, the results from the other lures were used to determine the chi^2 and p-values using the equation

$$x^2 = \sum \frac{(E - O)^2}{E}$$

where *E* is the expected number of visits by a target species and *O* is the observed number of visits by a target species.

Results

A total of 82 combined visits were captured at all lures over the course of the study. Out of the 82 observations, 30 were targeted species. In addition to the targeted species, a bobcat (*Lynx rufus)*, an opossum (*Didelphis virginiana*), a wild turkey (*Meleagris gallopavo*), and a large amount of white-tailed deer (*Odocoileus virginianus*) were also attracted to the lures.

Lures were substantially more effective in woods than in grass. Scent/photo traps accumulated 71 total visits in the woods compared to 11 total visits in the grassland (Fig. 2). Each grassland lure failed to attract any targeted species. In fact, the grassland locations yielded such minute results they are excluded from further analysis.

In the woodlands, the all-purpose lure received 25 total visits: 8 raccoons, 2 coyotes, and 15 deer (Table 1). The results of the all-purpose lure were used to estimate the expected percentage of raccoons, coyotes, and non-target animals (foxes were excluded since they were never observed). Using the chi square equation, an expected percentage of 32% raccoons, 8% coyotes, and 60% non-target animals became the comparative baseline. The percentages of species observed at the raccoon lure were 40% raccoons, 0% coyote, and 65% non-target species. For the canid lure, those observations were 42% raccoons, 4% coyotes, and 54% non-target species.

The raccoon lure received 20 total visits (8 raccoons, 13 deer) and the canid lure received 26 total visits (11 raccoons, 1 coyote, 10 deer, 1 opossum, 1 turkey, and 1 bobcat [Table 1]). Species specific lures were not better than the general species lure at attracting a targeted animal. Neither the raccoon lure nor the canid lure yielded results that were significantly different from the all-purpose scent lure (X^2=2.08, p=0.1492; X^2=1.59, p=0.208).

Discussion

The results of this study do not support the hypothesis of species-specific lures attracting a greater proportion of target species in comparison to an all-purpose scent lure. Species specific lures were equally or less effective at drawing in targeted species. Since species-specific lures are not necessarily more selective than a general predator lure, the process of choosing a lure can be made simpler. The wildlife researcher, manager, or enthusiast need only choose a lure that has a proven track record of attracting predators as a whole. A single lure may be all that is necessary to deploy. Avoiding the purchase of multiple lures could help minimize supply costs for long term studies.

The results of this study also suggest that scent lures do not draw predators into areas they are not already using. The species targeted prefer wooded habitat and crop fields. Mesopredators in the region could have been using the adjacent corn and bean fields for alternative cover and supplemental nutrition. This situation would decrease the likelihood of capturing a visit to the photo/scent traps in the grassland.

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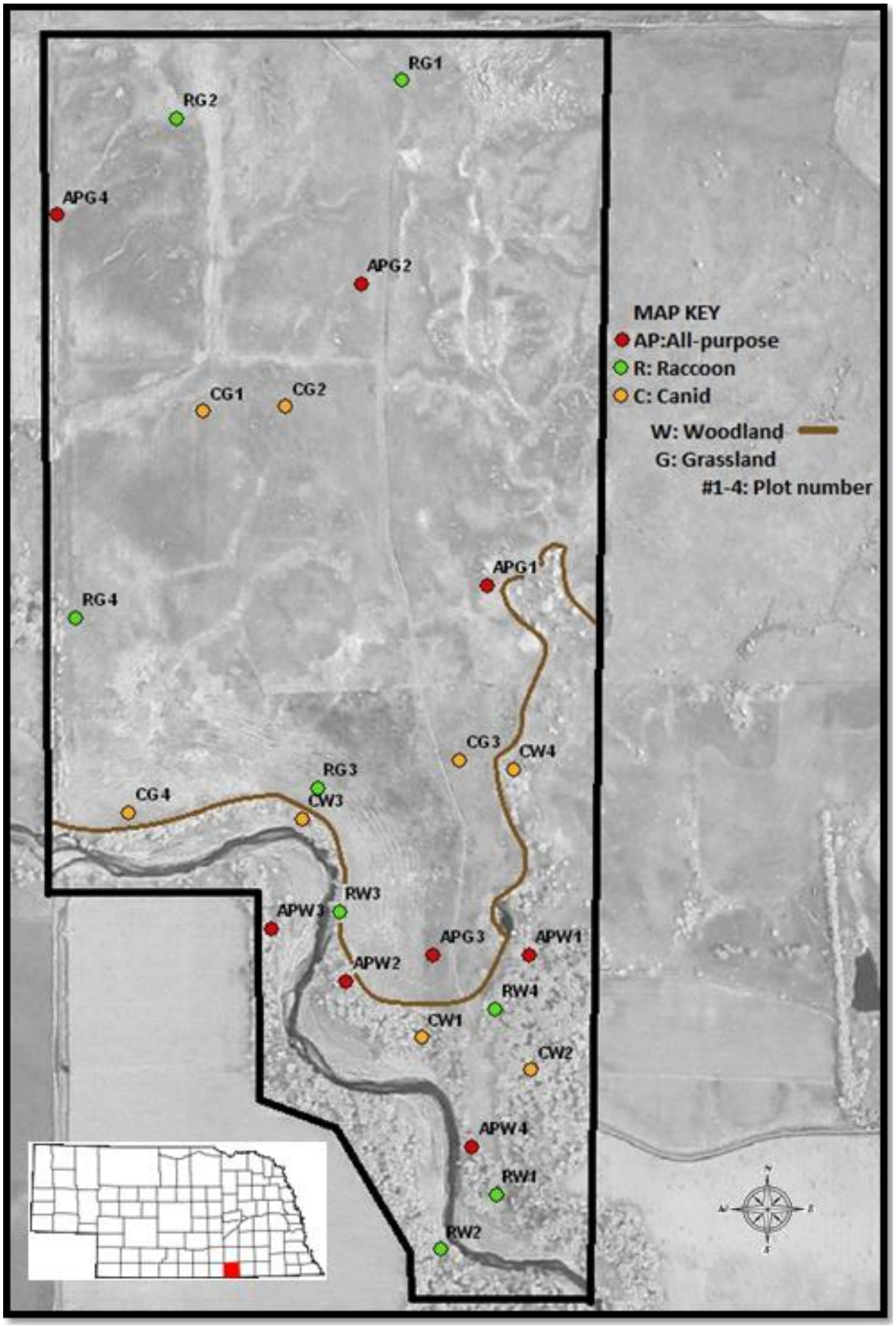
Figure 1 Map of study site in Nuckolls County, NE, USA, five miles NW of Angus, NE



Woodlands are south of the designated by brown outline. All other area is grassland. The Little Blue river meanders through, west to east. Lure and habitat are assigned symbols in the map key. All 3 lures were simultaneously posted in the same habitat during the same week number i.e. APW1, RW1, and CW1 were all placed in the woods during week 1, then switched to APG1, RG1, and CG1 in week 2. This move occurred every week until every plot shown was monitored.

Figure 2 Photo/Scent Trap Total Visits: All Lures

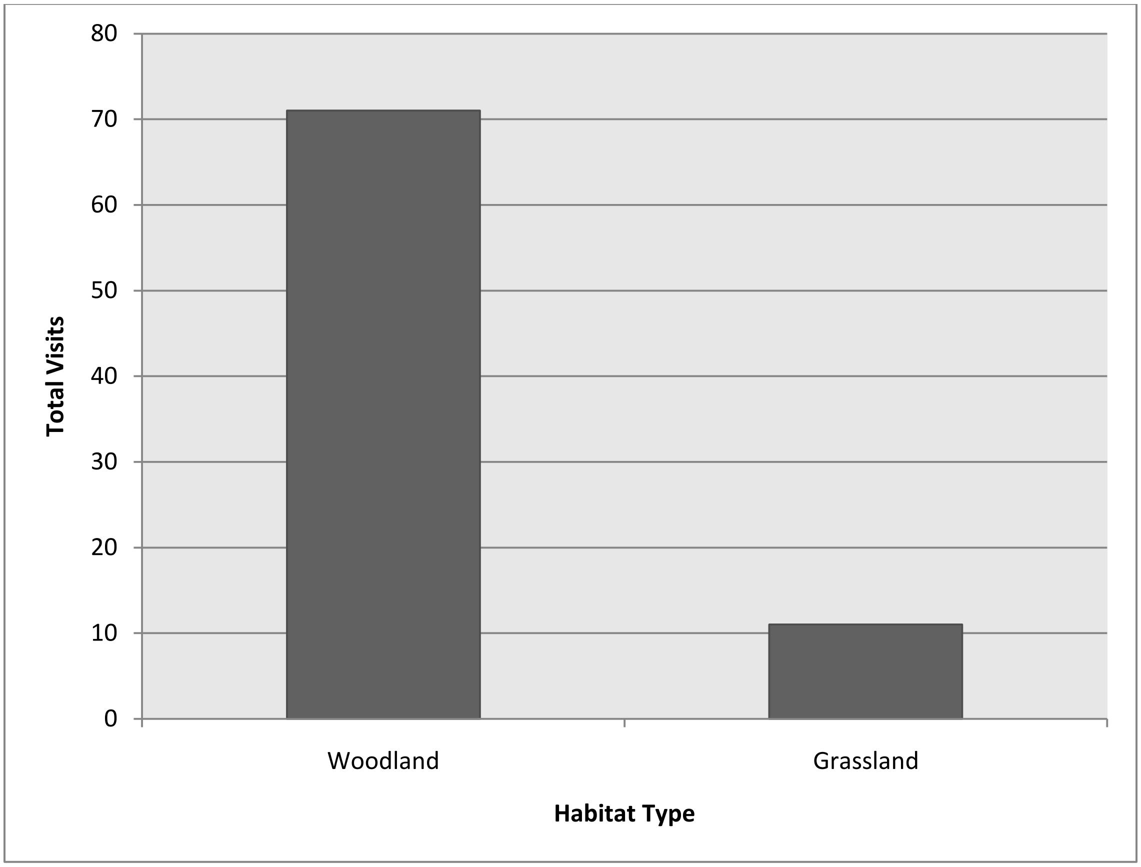


Table 1 Total photo/scent trap visits at each lure

	All-purpose Wood	All-purpose Grass	Raccoon Wood	Raccoon Grass	Canid Wood	Canid Grass
Raccoon	8	0	8	0	11	0
Coyote	2	0	0	0	1	0
Non-target	15[d]	3[d]	13[d]	5[d]	14[bdot]	3[d]
Total	25	3	20	5	26	3

Non-target species breakdown: b- bobcat, d- deer, o- opossum, t- wild turkey