

## The Distribution of Medium Size Mammals by Different Habitat.

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Field Research

### Abstract:

This research focuses on the distribution of medium size mammals in different habitats on a four hundred acre plot of land in Western Wisconsin. This study site provided a diversity of different habitats to be studied. This research was conducted to document which medium size mammals would be present in a large habitat. It was also done to see the mammals' distribution in different habitats.

Track boxes were used to determine the distribution of the mammals. This study failed to notice a significant difference in both the abundance of different mammals and their presence in the different habitats, although further research might find that there is a significant difference. Data collected during this study suggests that feral cats may have an impact on native mammal populations.

### Introduction:

Mammal surveys have many purposes. They not only indicate what types of mammals are where, they can give clues as to what else is going on in that ecosystem. The cliché 'the circle of life' fits quite well in this case. All the different elements of an ecosystem depend on one another and if one of those elements gets taken away, the circle gets broken. This can have many different effects, such as an overpopulation of a resource that was used by the mammals. It can also result in the reduction of those resources. Many plants spread their seeds by having mammals carry them off to different locations, so if the mammals that once carried the seeds disappear then those plants can't spread. The decrease in certain mammals can also have an effect on the economy in some places, if the area relies on hunting and trapping. It is important to document the abundance of mammals so that these things don't happen. By keeping track of what species have low populations in certain areas we can help keep a stable ecosystem.

Several things can disrupt an ecosystem. Humans have one of the biggest impacts on mammals in the world today. One of the most devastating threats to biodiversity as a whole is the loss of habitat. The most common reason for habitat loss is the conversion of land for other uses such as new or expanding agricultural and urban areas. Once this land has been converted it is often permanently lost. Expansion is not the only way that humans affect mammals. Since the industrial revolution, pollution has become a growing threat to biodiversity. Examples of this include oil spills, nuclear accidents, and shipping and refinery accidents. The initial effects of these accidents can result in enormous amounts of death. There are also effects that can last for many years. These effects can have drawn out ecological impacts. The accumulation of constant pollution can be more harmful than individual disasters. Many pollutants release toxins which cause compounds to resist degradation and build up in the environment. (Sechrest and Brooks, 2001)

Humans are not the only thing that can harm mammals. The environment, though not as imposing, can also cause damage. The existence of mammals depends on everything around them. The communities that mammals live in require high levels of conductance and interaction between the different species to keep them stable. The biodiversity of an ecosystem is one of the main elements in their stability. This biodiversity ensures that the

ecosystem won't deteriorate because the presence of so many different species acts as a safety net. There is, however, a 'critical' level that once an ecosystem falls below makes it very vulnerable to extinction. So if one species becomes too populous, their prey can become scarce and fall below this critical level, causing a chain reaction in the levels of connection in the ecosystem.

Another key element in the dynamics of an ecosystem is its ability to withstand disturbances like climate change, natural disasters or the introduction of a new species. Climate variations can harm some species in a community causing the number of unharmed competitors to increase. However if the biodiversity is high enough the overall soundness of the community will remain. (Elias, 2001)

Where different mammals choose to live often depends on the different types of resources that different habitats have. Some mammals need certain things to survive and sometimes these things can only be found in a certain habitats. These habitats can become unusable sometimes for reasons such as forest fire, human development and exploitation, or fragmentation. (Dudley, 2002) Habitat destruction is also a major threat to biodiversity. Fragmentation reduces the total area of the habitat and increases the amount of edge perimeter while decreasing the amount of interior area. In the Midwest, much of the natural habitat has been converted to agricultural uses. (Rosenblatt, 1999)

On the gently rolling and flat lands of Wisconsin, the continuance of reproduction often depends on the openness of the canopy. It appears that each species has its own critical level. Because of their general adaptability, oak forests can provide homes to just about any kind of plant or animal.

There are two main types of oaks in Wisconsin, the black oak and the white oak. The two species are hard to identify in the field due to hybridization and backcrossing. As a result, certain traits have become associated with certain areas. For example, an area can have trees with the same bark type but various trees will have different leaves and acorns.

The black oak is usually found on moist soils. Its acorn has a deep cup with loosely appressed scales and an oval shape. Its black bark is what gives it its name and is broken up into equidiametric patches on adult trees. Black oaks, usually found in southern Wisconsin are fairly intolerant to shade.

The white oak, sometimes referred to as yellow oak, prefers hot, dry hill sides that face the southwest. It is very intolerant and mostly stays in southernmost Wisconsin near the Mississippi river. The white oak has gray flaky bark with thin cupped, oval acorns.

Alders are trees usually found on wet ground such as the banks of rivers and near lakes and ponds. They can also occupy areas that were once swamps. Alders usually have a high degree of stability, but are less stable if they have derived from forest burns. These growths are sometimes overrun with cedar swamps. Alders and other tall shrub communities are probably the most overlooked community, economic wise, in Wisconsin. This type of shrub will probably continue to expand due to hunting ground programs need for it.

Pine forests are also light and open. Their needle like leaves allow for light to enter. They are also important economically. Their wood can be used for many things such as furniture, turpentine, and paper. During the 1800s many of the old growth pine forests were cut down for these purposes. To recover from this many pine plantations were planted. Pine plantations are usually thought to be barren, supporting little wildlife. Although pines prefer well drained dry soil, they do tolerate a wide variety of climates. They are also resistant to ground fires and other basal injuries.

Prairies are another widespread habitat in Wisconsin. They usually stay to the southwest because Wisconsin is on the northeastern boundary of America's prairie lands. Prairies are plant communities that are dominated by grasses rather than trees. Along with the grasses are many other herbs that are known collectively as "forbs". Woody shrubs, and in some cases tree seedlings, can also be present. To actually be considered a prairie, the area must be an open area with the majority of the plants being grasses. At least one half of those grasses have to be true grasses, and there can be no more than one adult tree per square acre. Most of the animals that occupy prairies are grazing animals which feed on the grasses. (Curtis, 1961)

Some of the most common medium size mammals that are found in Wisconsin are skunks, raccoons, minks, and other members of the weasel family. These mammals are tolerant to many different types of habitats and prey and can be found throughout much of Wisconsin.

Skunks are probably best known for the sharp odor that their anal glands give off. It's when they're frightened that they release this smell. This sign, along with stamping their feet, is their signal to a predator to back off. Most predators will be driven away by this but some types of owls can just ignore the smell. Skunks mainly eat eggs, fruit, rodents, and insects. Because of their fairly long claws, they are able to dig up their food. They usually live near farms and suburbs because they are good at hunting rodents. Skunks make their dens under rocks, logs, or in other animal's burrows.

Raccoons are fox-like carnivores that can grow to be over two feet long. Raccoons can live in just about any habitat from marsh to suburbs, forests to prairies. They have sharp senses of smell and hearing. These help them to find and dig up their food. Raccoons are omnivores and will eat almost anything. They are usually drawn to crayfish, fruit, birds' eggs, grass shoots, nuts, reptiles, mollusks, poultry, insects, and garbage that they find in cities or camp sites. Because they have such sensitive hands, raccoons like to investigate things with them. This is probably one of the main reasons why they are so curious. Raccoons eat a lot during the summer and sleep away most of the winter. They do emerge from their dens, usually holes in hollow trees, during periods of warm weather. Raccoons are solitary animals except when they mate. Male raccoons will usually mate with several females, but females will only mate with one male. They will usually give birth to three or four cubs, but have given birth to as many as seven.

Minks are members of the same family as weasels. They look about the same other than the size difference. Minks are usually larger than weasels. Minks are spread over the majority of the United States. They make their dens in rock crevices, holes in stumps, or burrows near riverbanks. Minks eat small fish, frogs, and mammals that they find while hunting along stream and lake shores. Minks are excellent swimmers and are more active during dusk, nights, and dawn than during the day. They are usually solitary animals. Minks usually only come together when the female gives birth. They have short, thick, long fur that is highly prized throughout the fur trade. Minks have become rare in some parts of their original range because of over trapping and trade. Most furs today are provided from minks that are bred on farms for their fur. This doesn't sit well with many animal rights activist groups. (Jackson, 1961)

Fishers were once considered extinct in all but the northernmost regions of Wisconsin, but because of successful restocking programs from the 1950s they are starting to make a comeback. Fishers usually stick to coniferous forests and avoid open areas. They are slender animals with a bushy tail and pointed nose. The head and shoulders are slightly

grey while the rest of the body is a dark brown. Fishers usually live in rock piles, abandoned beaver lodges, tree cavities, or hollow logs. The females give birth in March or April after a ten to eleven month pregnancy. The average litter for a female is about three. The young eat meat that is brought to them by the parents. Its prey includes voles, red squirrels, snowshoe hares, mice, and other small mammals. Fishers are one of the major predators for the porcupine. They attack the face for about thirty minutes until the porcupine becomes exhausted and can't defend itself. (Kurta, 1995)

Although cats are not usually considered predators, they are definitely hunters. The population of feral cats is hard to gauge but they usually occur in towns, near barns, and other free ranging areas. Between 1960 and 1990 the number of feral cats doubled. This is about thirty percent of owned cats. In Wisconsin alone there are about two million barn and outdoors cats. These cats' diets take their toll on the rest of the mammals living in the same area. Even though seventy percent of their diets consist of small mammals, the remaining thirty percent is a mix of birds and other mammals they can get. A large cat population can significantly reduce the amount of prey for other predators such as hawks and weasels. (Coleman, 1996)

One way to record the presence of these mammals and measure their abundance is to use track boxes. Track boxes were started as an alternative method to live traps. Live traps can end up being expensive as well as time consuming. The purpose of track tubes is to be used as a way to assess the population of whatever mammal that you happen to be studying. The track tubes record the footprints of the mammals. Track tubes allow you to determine the presence or abundance of mammals without the use of live traps. Track tubes in the past have mostly been used for small mammals. Now they can be used for both small and medium sized mammals; some people are even trying to use them for animals as large as bears. Track tubes are much less expensive than live trapping. They also take less work so you can test many sites at once. Sometimes, though, you are not able to distinguish between the tracks of different animals. The method is overall a good one if the only thing you want to find out about is the relative abundance and composition of mammals in an area. (Glennon, 2002)

Question:

What mammals occur in different habitats?

Hypothesis:

I believe that mammals will follow past research patterns and show no habitat preference.

Materials:

For the track boxes, plain plastic boxes that were about a foot by two and a half feet in length were used. A hole that was roughly a foot square was cut in the front so that

mammals could get inside the boxes as seen in Figure 1.



Figure 1 shows the opening cut in the box as a door.

Figure 1

Shown in figure 2, plexi-glass sheets were attached with Velcro strips to the bottoms of the boxes. Carbon Black was sprayed to about one third of the Plexi-Glass near the front opening, and Con-Tact paper was attached with duct tape to the remaining two thirds. Two and one half inch PVC piping was cut in half length wise and hot glued to the far end of the box as feeding tray.



Figure 2 shows the inside of the track box.

Figure 2

One box was made with the two long sides cut out and replaced by chicken wire. This was done to see if the animals would be less hesitant to enter if it was not an enclosed area.

Beef scraps were used as bait for the majority of the project, but there was not enough to complete the project with, so tuna was used for the remainder.

#### Methods:

There were four different habitats used; pine, prairie, alder, and oak. These sites were picked because they represented a variety of habitats that were on the farm. At each site three rows of three boxes were put out one row at a time (Figure 3).



Figure 3 is one rows of boxes put out as a data set.

Figure 3

Each row of three boxes was left out for two days. Three boxes were used instead of one for replication. This made for a more accurate assessment of what was found. Each habitat was sampled this way three separate times. There was no specific spacing that was used to place the tracks. A set distance resulted in some boxes sampling other habitats, so the boxes were placed so that they would all fit inside the selected area. Because of time issues, at the end of the project two rows of three were put out instead of one. They remained out for two days, the same amount of time as the previous samplings.

The data that was collected were the tracks from the mammals. They would smell the bait, and walk in through the hole. Once they were in, they would walk over the carbon black and leave their tracks on the contact paper. The contact paper was put sticky side up so that the tracks would be clearer. When a box got a track, overhead transparencies were laid on the contact paper to keep the track from smudging and the contact paper was pulled from the box. It is not necessary to pull the plexi-glass sheet from the box along with the contact paper. However, the carbon black should be washed off and reapplied about once every two weeks to make sure that the tracks stay clear.

The books, Mammals of Wisconsin by Hartley H.T. Jackson, and Mammal Tracking of North America by James Halfpenny, and Elizabeth Biesiot were used to identify the tracks, along with the assistance of Scott Theil.

Scents and the open box with sides made out of chicken wire were also used; however, there was no specific pattern for their use. Both mink and fox scents were used on the boxes. The scents were spread by taking a stick and dipping it in the scent. Then it was rubbed on tree or plant that was near the box. Some was also put on the ground near the box opening to draw the mammals to it.

#### Results:

There was difficulty identifying some of the tracks because the contact paper did not always take a clear print. There was also difficulty because I had not had much experience previously identifying tracks.

In the pine habitat no tracks from medium size mammals were recorded.

In the prairie, a raccoon and fisher were recorded in the same box on February twenty seventh. Beef was used as bait and there was no scent. A cat was also recorded here on April ninth. Beef was used again as bait, and there was no scent.

In the Alder two raccoons were collected; the first on January twenty fourth, and the second on April tenth. Beef was used as bait in both and no scent was used. Six cats were also recorded. The first two cat prints were collected on January eighteenth. The next cat

tracks were collected on April tenth with beef scraps and no scent. The open box with the chicken wire sides was used on one of these while the other was a regular box. The following two cat prints were found on April twenty third in a regular box with beef, and no scent. Four fisher tracks were collected; two on April tenth and two on April seventeenth. An open box was used for one of the tracks on April tenth. All the boxes had beef for bait and no scents were used. There was one skunk track recorded on January eighteenth with beef and no scents. There was also one dog track collected on April seventeenth, also with beef bait and no scents.

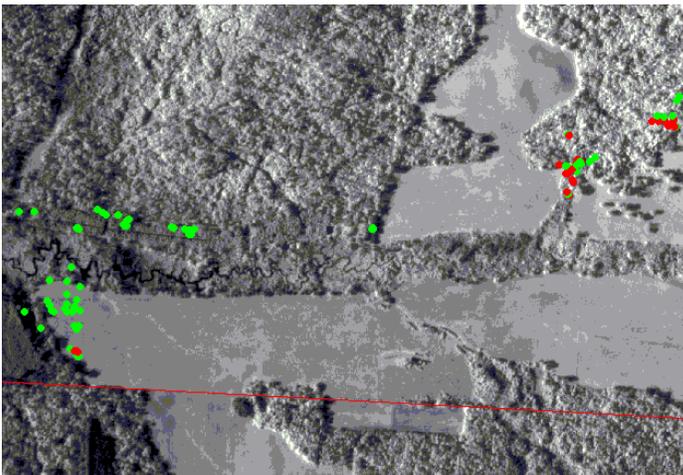
The last habitat that was sampled was an oak forest. One mink was found there on January twenty third. The open box was used with beef for the bait and fox scent was placed around the box. Seven total cats were found in the oak area. The first two were on January nineteenth and April twenty third. Both of these had no scents and used beef for the bait. The other five cats were all found on April twenty fifth. In these boxes tuna was used for bait, but no scents were used. One of the boxes that received a cat was the open box; the rest were regular. Five raccoons were found in this area too. The first was found on January twenty third. Both fox scent and the open box were used along with beef. The rest of the raccoons were found on April twenty fifth with tuna used for bait and no scents.

Table 1

**Number of Occurrences of Each Mammal by Habitat Type**

	PINE	PRAIRIE	ALDER	OAK	
<b>CAT</b>	0	0	6	7	Table 1 shows the number of each mammal in the separate habitats.
<b>RACCOON</b>	0	1	2	5	Altogether, out
<b>MINK</b>	0	0	0	1	of one hundred and seven
<b>FISHER</b>	0	1	4	0	boxes put out, twenty-two
<b>SKUNK</b>	0	0	1	0	boxes recorded tracks. Some
<b>DOG</b>	0	0	1	0	of the boxes recorded multiple
					tracks at a time, so there were

a total of twenty nine mammals recorded. Any tracks that were unidentifiable or were small mammal tracks were not counted as a hit.



The dots are the points where boxes were put out. The green is where no tracks were recorded and the red is where an identifiable track was recorded.

Figure 4

Table 2

<u>Point</u>	<u>Track</u>	<u>Section</u>	<u>Date</u>	<u>Box</u>	<u>Bait</u>	<u>Scent</u>
15	Cat	3A:2	18-Jan	regular	beef	none
16	Skunk	3A:2	18-Jan	regular	beef	none
17	Cat	3A:2	18-Jan	regular	beef	none
21	Cat	4A:1	19-Jan	regular	beef	none
26	Mink	4A:2	23-Jan	open	beef	fox
27	Raccoon	4A:2	23-Jan	regular	beef	fox
29	Raccoon	3A:3	24-Jan	regular	beef	none
48	Raccoon/Fisher	2C:1	27-Feb	regular	beef	none
81	Raccoon	3C:1	10-pr	regular	beef	none
82	Cat/Fisher	3C:1	10-Apr	open	beef	none
83	Cat/Fisher	3C:1	10-Apr	regular	beef	none
84	Fisher	3C:2	17-Apr	regular	beef	none
85	Dog/Fisher	3C:2	17-Apr	regular	beef	none
87	Cat	3C:3	23-Apr	regular	beef	none
89	Cat	3C:3	23-Apr	regular	beef	none
92	Cat	4C:1	23-Apr	regular	beef	none
93	Cat	4C:2	25-Apr	regular	tuna	none
94	Cat/Raccoon	4C:2	25-Apr	regular	tuna	none
95	Cat/Raccoon	4C:2	25-Apr	regular	tuna	none
96	Raccoon	4C:3	25-Apr	regular	tuna	none
97	Cat/Raccoon	4C:3	25-Apr	regular	tuna	none
98	Cat	4C:3	25-Apr	open	tuna	none

Table 2 shows the recorded identifiable tracks, what date they were collected on, what bait was used, what type of box was used, what GPS point they were, and what kind of scent, if any, was used.

#### Discussion:

As shown in Figure 4, the majority of the tracks recorded were found in the alder and the oak areas. Twenty-seven out of the twenty nine tracks recorded were from these two areas. Out of those twenty-seven tracks, twenty were either cat or raccoon. There were six cat tracks in the alder area, and seven in the oak. Raccoons only had two tracks in the alder, while they got five in the oak. The fishers were most common in the alder area. Four out of the five fisher tracks recorded were there. Only one fisher track was taken in the oak.

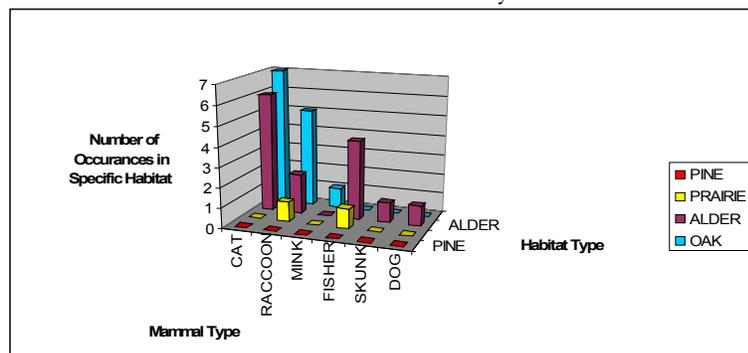


Figure 5 shows the amount of the different mammals that were collected in each habitat.

Figure 5

Only two out of the twenty-nine tracks recorded were received with the use of scents. The two tracks received were both in the oak area and were with fox scent.

The open box received three hits from animals; one of the hits was in the alder. It collected both a cat and a fisher. The other two tracks it recorded were in the oak area. One of these was a cat and the other was a mink. The rest of the boxes that collected data were

boxes that still had plastic sides. The majority of the tracks were also received with the use of beef for bait instead of tuna. However, beef was used for the majority of the project and when tuna was put out hits were more frequent.

Conclusion:

I have failed to reject my null hypothesis, and conclude that because the P-Value for the ANOVA test shown in table 3 is greater than .05, there is no significant difference between the amounts of tracks received in each habitat. I must also conclude that there is no significant difference in the abundance of each mammal.

Table 3

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<b><i>P-value</i></b>	<i>F crit</i>
Rows	30.21	5	6.0417	2.0934	<b>0.1229</b>	2.901
Columns	26.46	3	8.8194	3.0558	<b>0.0608</b>	3.287
Error	43.29	15	2.8861			
Total	99.96	23				

Table 3 is the results of the statistical ANOVA test that was run on the data to find out whether or not there was a significant difference.

I feel that because of their location, the oak and alder received more hits, although there were no tests run on this. These areas were closer to the barn, houses and road that were near the property. I also think that the large amount of cats had an effect on the amount of other tracks received. It is suggested that cats can impact the amount of other predators in an area because they decrease the amount of prey.

I also feel that it made no difference whether the sides on the track boxes were replaced by chicken wire. Mammals went into both, and although it seemed like more went into the regular boxes, there were five regular boxes and only one open one. Adding a scent is another thing that I felt didn't impact the results. I did not get a chance to run any tests on this but, it didn't seem to make a difference.

Something that did seem to make a difference, in my opinion, was the change of bait towards the end. When I switched to tuna I got a hit in every box that I put out (excluding the pine area). When I had beef for the bait, I usually only received one or two tracks every so often. However, the tuna did seem to draw a lot of cat and raccoons. Tuna was only used for the last two weeks of the project, and I feel that if the tuna had been used for the same amount of time as beef there would have been a greater number of hits.

Further Research:

I feel that if I had been able to put out more boxes, or had a longer time to work on this project that I would be more confident in the results from the statistical tests. This is something that I would recommend to anyone continuing this research.

There were several things that I think would be interesting to take a closer look at with this project. One of these things is to look at the relationship of the cat population and compare it to the abundance of other mammals. Another thing that I would do differently is to design my project so that I could be more confident if the use of scents or an open box affected the mammals' readiness to go in.

The difference in bait would be another thing that I would study in more depth. I feel it would be useful to know if tuna or beef worked as better bait or if one drew certain mammals more than the other.

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