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Raccoon Home Range

Trapping Experience

When our team at wildlands figured out what we were doing, we knew that we had some work to do. We were all interested in raccoons and how they survive in the wild. We decided to try to place to a radio collar on a raccoon to view there movements. So our first task was to live trap a raccoon.

Our team had to set traps out all over the reserve. We set them in different habitats like the marsh and mixed woods. Raccoons like to live near wet or damp areas. So we set the traps by the creek which runs through the reserve. Raccoons are somewhat smart so we hid the traps with dirt on the floor and grass and leaves on the sides and top. This way they will walk in and think it's safe. Raccoon's diet mostly consists of fish. So we decided to bait with tuna. We used one can of tuna for each trap and we had about eight traps set. Now we just had to wait until we caught one.

Once we caught a raccoon we really didn't know what to do at that point. We had to control the animal so we could put the collar on. We had catch poles to help hold the animal down and special gloves so we didn't get bitten or scratched. We caught our first raccoon down in the marsh. First we tried to use the catch poles to rap around the animal. After a couple of minutes of wrestling with the animal it slipped away and ran off. This happened to the next five raccoons we caught. We needed to come up with something to control the raccoon for collaring.

After all the getaways we thought of a different plan. We figured that when we catch a raccoon to just leave it in the cage. We knew now that we needed some

professional help. We called a veterinary clinic to have them put down the animal so we could collar it. It wasn't long until we caught another raccoon. We had another trap called the squeeze trap. This limits the area inside the trap so the animal cannot move around. This helped with the vet when they needed to give the animal a shot of ketamine to put it under. Ketamine is a drug that is injected in liquid form that paralyzes part of your nervous system, so you feel no pain and your voluntary mussels are shut down. This means that he can't move but he still can breathe to live. This help when putting the collar on.

After the raccoon was drugged we had to wait a couple of minutes for it to be totally immobile. Now we can carefully take the raccoon out of the cage without it fighting us. We put the collar on and put him back in the cage. The vet said that the animal would be mobile in about 20 minutes. On the way back we could see that the raccoon was starting to move. We had to release him were we caught him to put him back so he knows were he is. When we did release him he took off as fast as he could. Then we could start using the radio collar to collect data on animal's movements.

Radio-Telemetry

After collaring animals, we needed to start collecting data. Our team is using radio telemetry to find the animal and get data points that represent animal locations. We are observing the raccoon's movements throughout the year.

When we started using radio telemetry, we didn't know what to do. We learned about radio telemetry by studying books and research papers. Radio telemetry is a technique that can increase the efficiency of collecting information. Helps understand

how, when, and why individual animals do what they do. After some practice we knew what we were doing, so we started to collect data. The data that we are collecting will help us understand more about raccoons. When using radio telemetry, we had to use some specialized equipment. We used an antenna and a receiver to locate of the animal. The antenna picks up the radio waves from the collar. The receiver shows how strong the signal is and to determine direction of the animal. Our first raccoon on the collar had a frequency of 150.534 MHz.

When finding the animal we use two possible methods. One thing we could do is walk up on the animal. This means that we use the receiver to pinpoint the raccoon and try to get a visual. The other method is that you use the radio signal and triangulate the animal's position.

To triangulate we move the antenna left until the signal stops, and then move it right until it stops. At the points were the signal stops we take a compass to determine the degree heading. With the two degree headings and our survey location position, it forms a cone or angle. We then bisect the angle to determine the direction of the raccoon. We do this process at three different areas around the animal. After bisecting all three angles we look to see were all three bisecting lines cross each other. This then shows an accurate location of the raccoon.

When we find the animals location we mark the spot on a Global Positioning System (GPS) or calculate it using the triangulation method. Then we download the data points from the GPS onto a computer and use ArcView to put them on a map. Mapping shows us were the animal is located for further study. Once we have many data points on the map, we can look at different movements, patterns, and habitat use.

Our next step is to look at the animals movements on the computer. We use Arc View GIS to project the data points on an aerial photo of the area. It can also show were the animals main activity centers are. These studies tell us how raccoons live and move in the wild.

We actually collared two raccoons for our project. The second raccoon had a frequency of 150.575MHz. We released him in November 2005. We never got a signal on him until March 2006. We are now starting to collect data on him. Once we have a lot of data points on him, then we can compare the two. We can see the differences between the two animals on how they act and move.

Analyzing Animal Movement

Introduction

For years studies have been done to show how animals move in different habitats. Geographic Information Systems (GIS) are commonly used in analyzing animal movement. In addition radio telemetry and other methods can be effective when analyzing animal movements. Radio Telemetry is a method using radio signals to determine location of the animal. Along with radio telemetry, Arc View, a GIS program, can be used to analyze field data. Arc View has many advantages for analyzing radio telemetry data and performing home range and habitat selection analysis. Analytical methods for studying animal movement need to be explained for their usefulness. Explaining how and why the methods work as well as their strengths and weaknesses is important when analyzing data.

Data

After collecting field data, then one can start to analyze. Using the most common program for GIS, Arc View, and the animal movement analysis extension (AMAE), range, habitat and territory can be studied. The program has all the analysis routines, which are tools to figure out home range. The program uses point shape files which can import point data from any GIS (the collection of data from GPS (Global Positioning Satellite) units or other data sources). The analysis tools included were Home Range Analysis, Minimum Convex Polygons, Probabilistic Home Range, Kernel Home Range, Jennrich-Turner and the Harmonic Mean.

The home range is a calculated analytical construct that has biological meaning only when assumptions of home range models are met and limitations of the models are understood (Hooge et al 1999). For the home range to exist at all, the animal must exhibit site fidelity (Hooge et al 1999). Site fidelity is a test to determine significance of the home range. To be site-faithful, the animal's real locations should exhibit neither significant dispersion nor significant linearity (Hooge et al 1999). Significant dispersion is where data points are spread out and not in groups. Significant linearity is where data points are not in groups but are in a line from point A to point B. If the data is neither dispersed or linear, one can analyze for home range.

MCP (Minimum Convex Polygons) are polygons that show the space that the animal both uses and traverses. They include the outer-most area of the data points and not just activity centers. MCP's are the oldest and simplest method. MCP's suffer from sample-size effects. They are affected by outliers, which are single points far from any core areas. The animal will most likely never use the outlying areas.

Probabilistic home range techniques are better than MCP's for describing how animals actually use the area within their home range. Also called utilization distributions, each cell within a probabilistic home range has an associated probability that the animal is at that location (Hooge et al 1999). Using probabilistic home range, an individual can also see the core area of activity. It is useful to see 95% contour as the area the animal actually uses and 50% contour area as the core home range. Another technique used for home range is the Kernel home range. This is the most robust technique used (Hooge et al 1999).

Jennrich-Turner home range is another technique. The Jennrich-Turner is like an MCP method and is useful for comparison with older studies, as well as generating the principle axis of the data.

Harmonic Mean home range can also be used. This technique is especially used in determining animal activity centers. This method is considered less robust than the kernel home range. This means that the kernel home range gives one more information about the range then the harmonic mean.

Habitat Analysis

Habitat analysis uses the movement patterns of the animal to determine the area that could be utilized at each location. It then compares that to the choice made at the next movement. This method is especially relevant when the home range is much larger than the animal's daily movements. When the animal uses different habitats is based on percent, a percent on when the animal will be in that certain habitat.

Hypothesis Testing

The ultimate goal of most movement studies is to compare the patterns of observed movement against a null hypothesis to elucidate such processes as habitat selection, relationships between individuals and population dispersion patterns.

Strengths

One of the primary advantages of integrating GIS with the study of animal movements is the powerful environment available for examining species-habitat relationships. Several functions have been programmed into AMAE (Animal Movement Analysis Extension) to help in examining habitat selection. One tool is classification tool, which allows animal locations to be classified by polygon or a line on which points lie (Hooge et al). AMAE has different tools to use and to compare to each other. AMAE also saves time when using the tools because the computer does all calculations.

Weaknesses

Some methods used in analyzing animal movement are older and less robust. These methods will be less significant than the newer and better designed methods. When analyzing animal movements, understanding the weaknesses of each method is important when reporting the data.

Conclusion

The most important methods for analyzing animal movement are using techniques including Radio Telemetry and GIS with the AMAE. In order to insure accurate results you have to have a testable hypothesis. You also need to have means of gathering data with tools that are reliable such as accurate Radio Telemetry. Animal Movement Analysis Extension uses the gathered data to find the animals range and

habitat. It is useful to have an excess amount of samples (data) to also insure that the results are accurate. These are the many ways to analyze animal movement and by conducting more studies will help understand more about wildlife species.

Raccoons in Motion

All animals have different ways of living. Some are active during the day and some at night. Some travel ten miles in a day and some travel ten feet. Other animals have some kind of specific habitat they need to live in. There is no one kind of habitat that is considered raccoon environment.

Raccoons are mostly nocturnal so they we move mostly at night. Raccoons have two small hands with fingers and hind legs with toes. Their hind feet are bigger than their hands. These proportions help them dig burrows, or to climb trees, or swim, as well as run. Raccoons live mostly in hollow trees or holes in the ground.

On the ground raccoons are walk slow in a shuffling manner. When running raccoons are not fleet. Their feet are those of an animal that does little running. Raccoons have short bursts of speed up to 15 mph; they gallop in a squirrel like bound. Their forelegs and hind legs move as pairs and its tail is carried almost straight up.

Raccoons have a reputation for having endurance. When a raccoon is chased by a hound they are stressed. This then causes the nervous system to respond which makes the blood vessels constrict. This makes the raccoon's heat loss reduce and the body temperature rises. So to help that, the raccoon has a dual cooling system. The first way is panting. Panting induces a through flow of air that is drawn in through the nose and out through the roof of the mouth. This way with each breath of air cools the nasal lining which blood flows through.

The second cooling system is a paired heat-exchange network that prevents the brain from getting hot. Raccoons have a rete, which is a branch of the arteries. These veins and arteries are carrying overheated blood to the head and then draining cooled blood from the nose and mouth. All these adaptations helps raccoons move day to day.

Raccoons are well known for climbing trees. When a raccoon bounds up a tree its front feet grab the bark and its hind feet propel its body. Once a raccoon is in a tree they feel at home. Raccoons have a rolling stride that helps there balance when walking along limbs. Occasionally a raccoon will move into a squirrel's nest and sleep for the day. The general raccoon area is water and woodland.

Raccoons do not have a very big range. They usually stay between one and two miles radius. They can shift resting stops almost daily, sometimes moving as far as a couple miles. Raccoons don't have a particular territory that they live in or protect. Males generally stay away from each other but some times there areas might overlap each other. Females mostly are in groups with a dominant male or with other females. Groups of raccoons live together for companionship and protection from predators.

Raccoons are not specific about how they live. They are scavengers, they use what the find. They have a wide habitat range and there physical ability helps them survive from the environment.

Figure 1. Kernel Home Range Coon 534

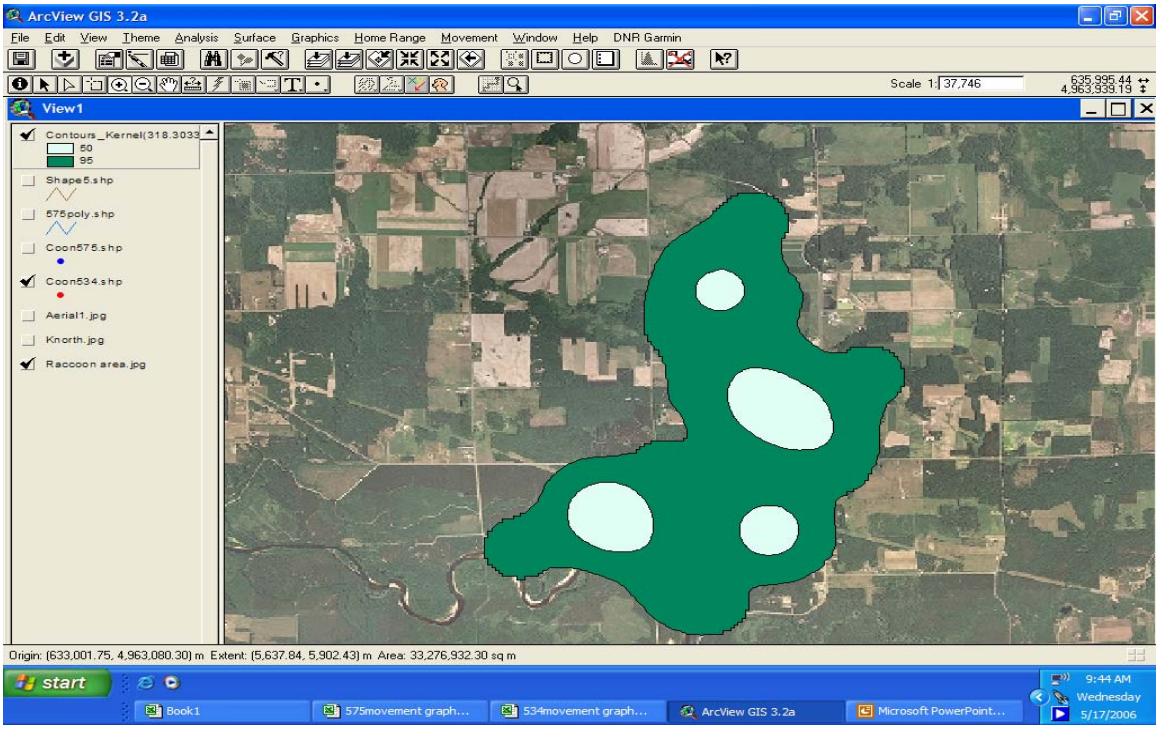


Figure 2. Kernel Home Range Coon575

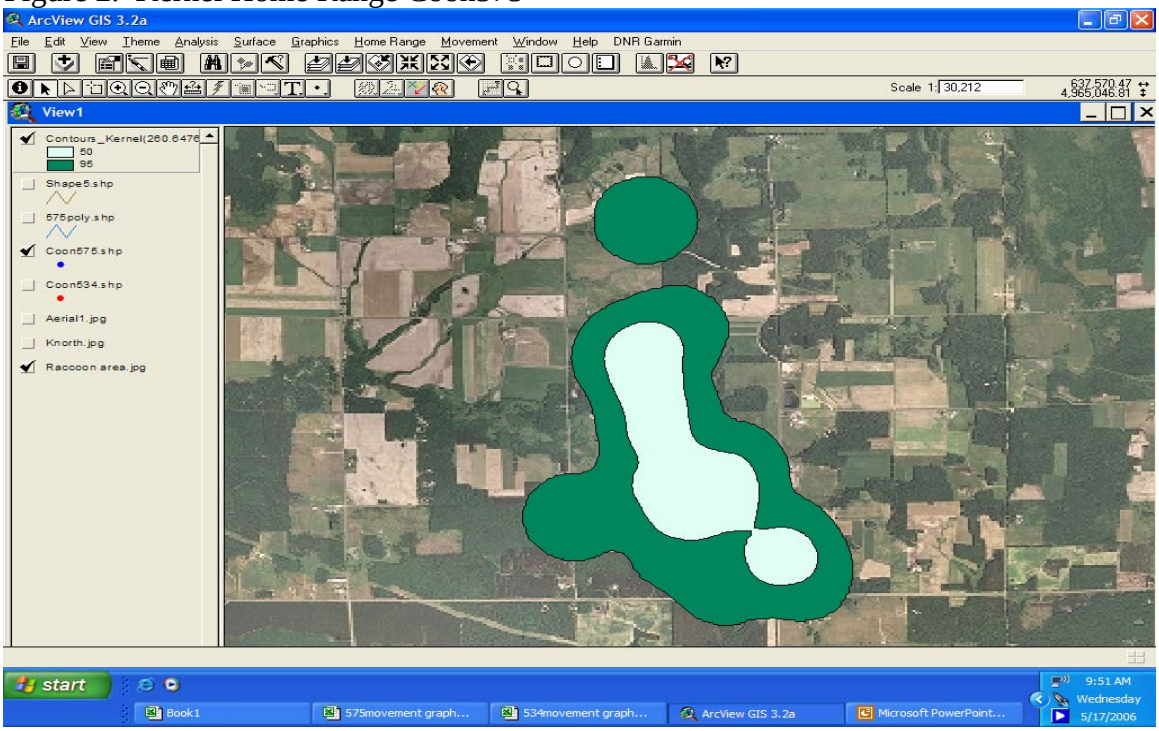


Figure 3. Probability Areas in Acres

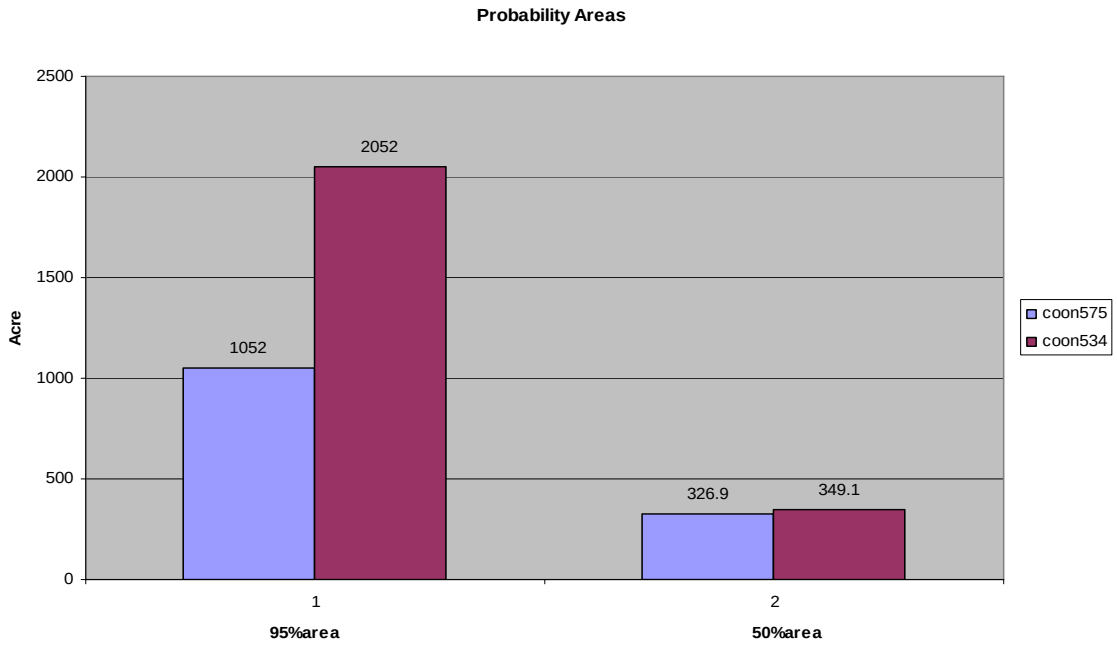


Figure 4. Convex Polygon Coon534

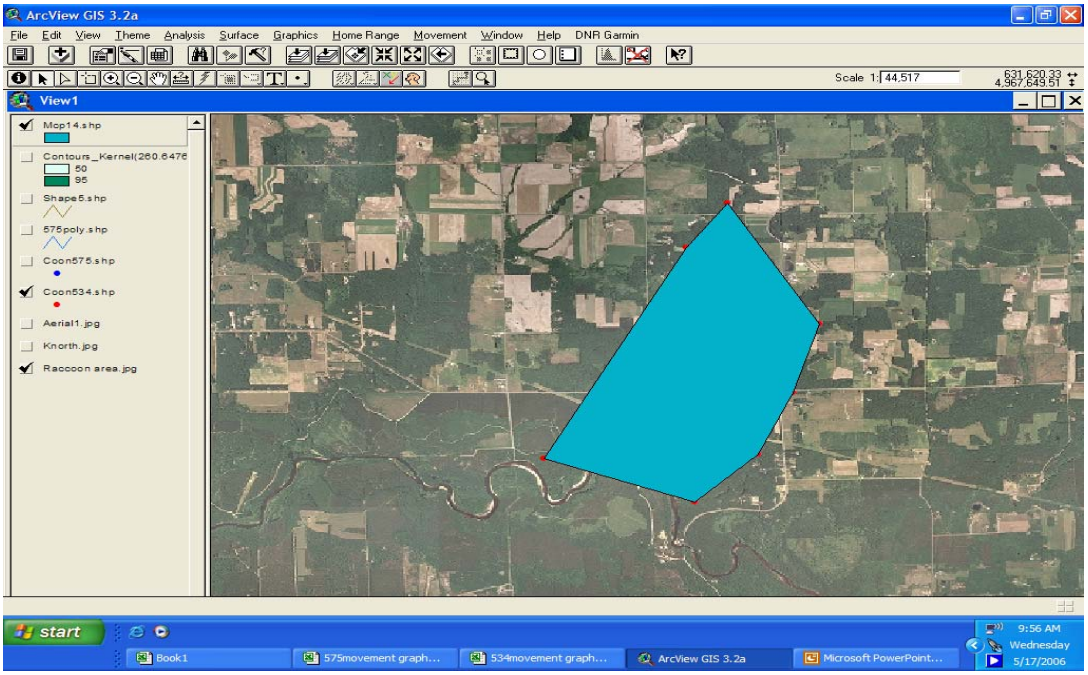


Figure 5. Convex Polygon Coon575

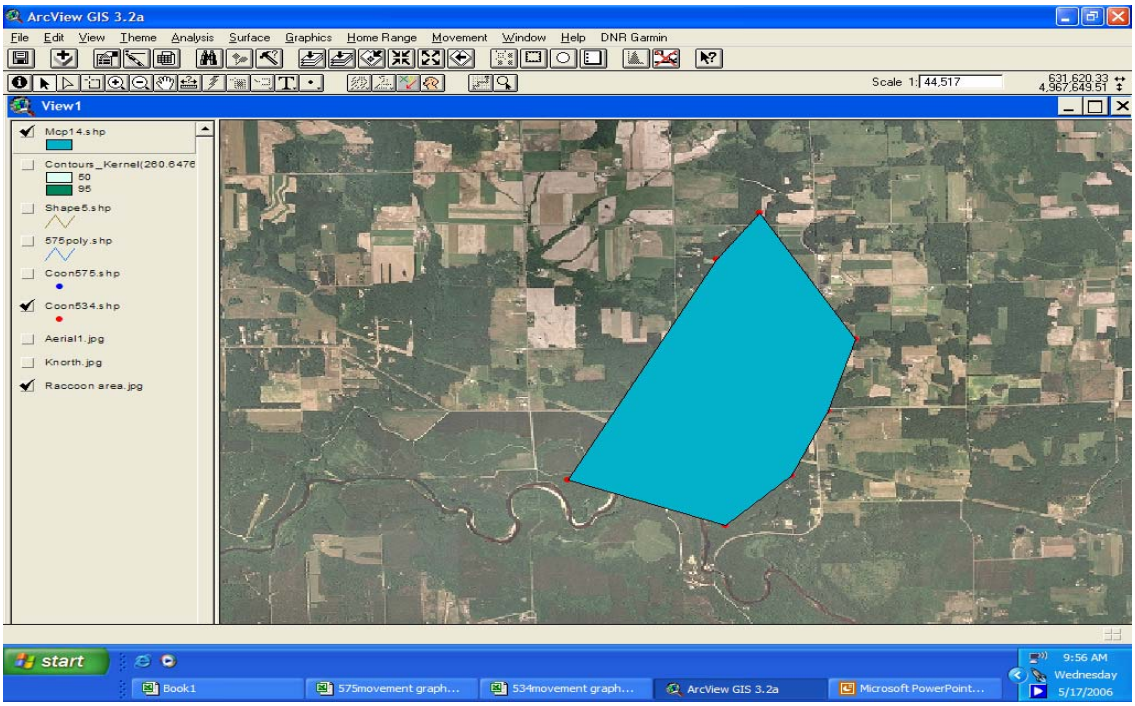


Figure 6. Harmonic Mean Coon 534

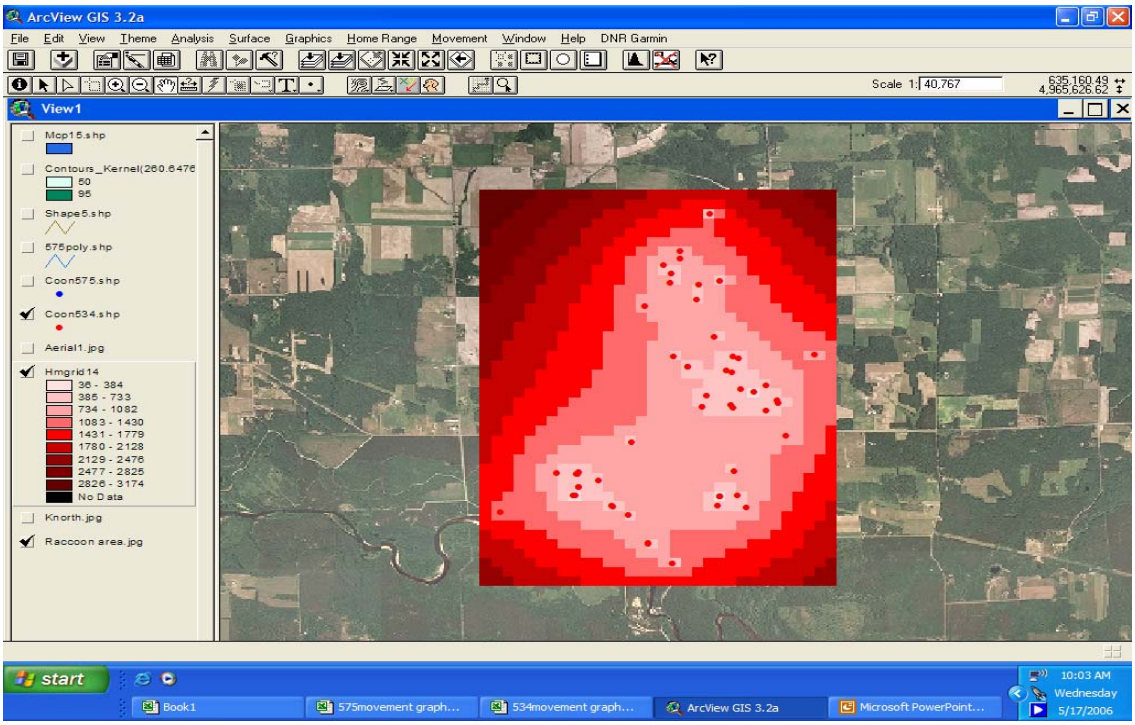


Figure 7. Harmonic Mean Coon575

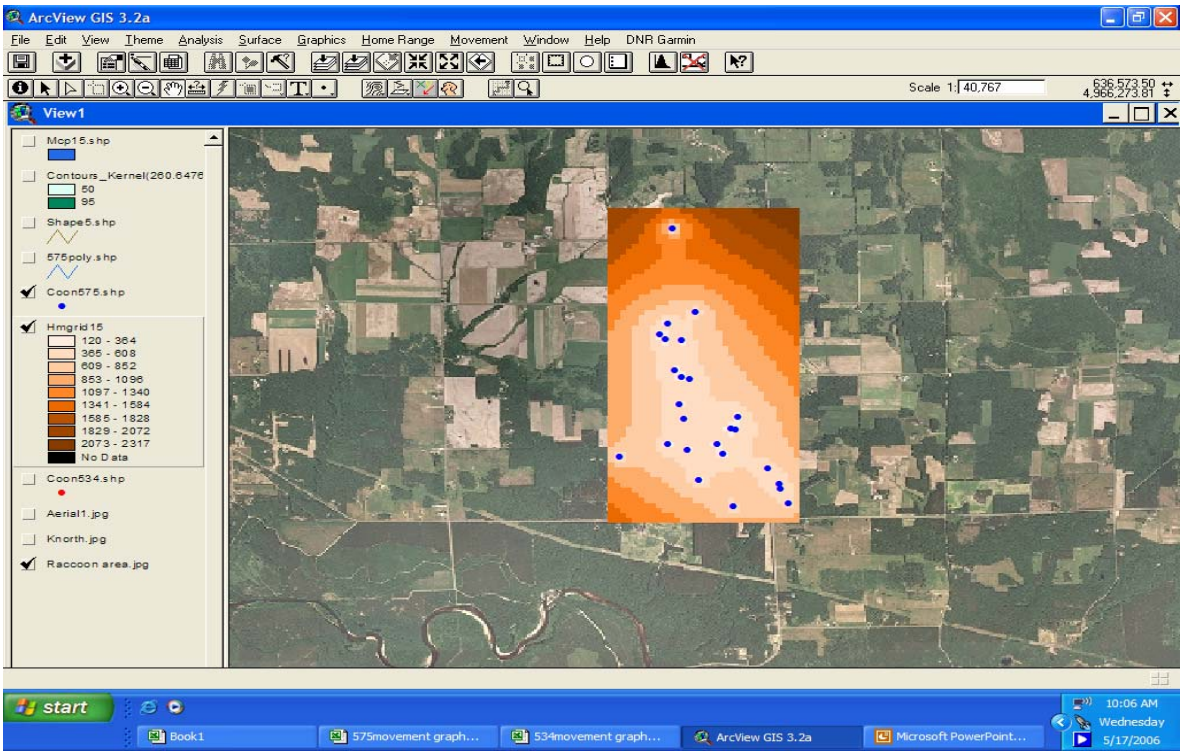


Figure 8. Distance per day Coon 534

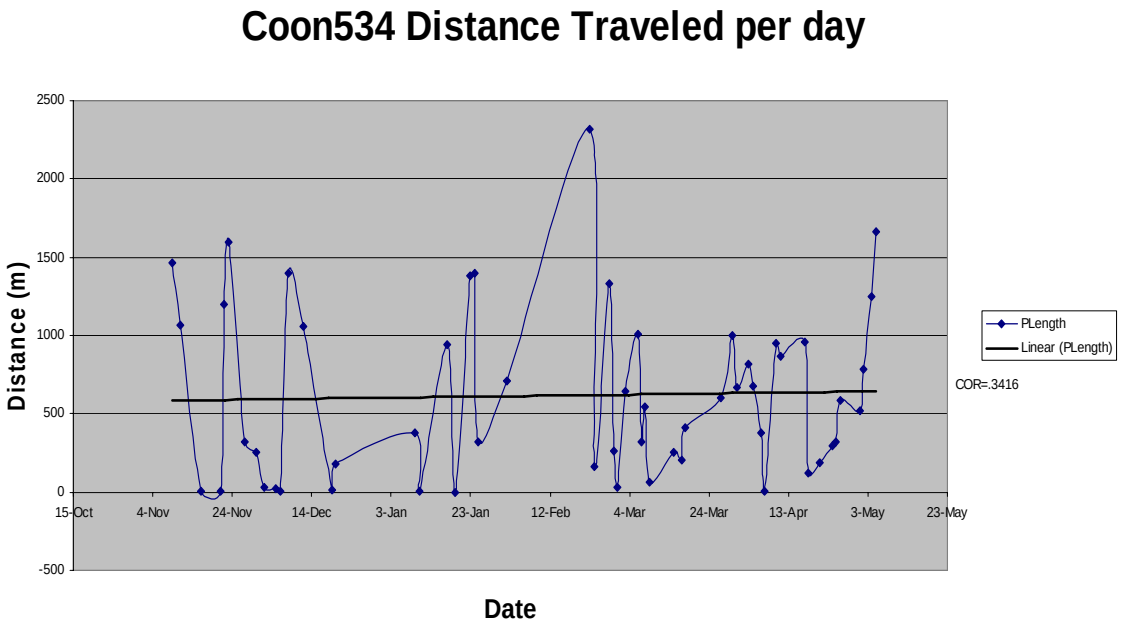


Figure 9. Distance per day Coon575

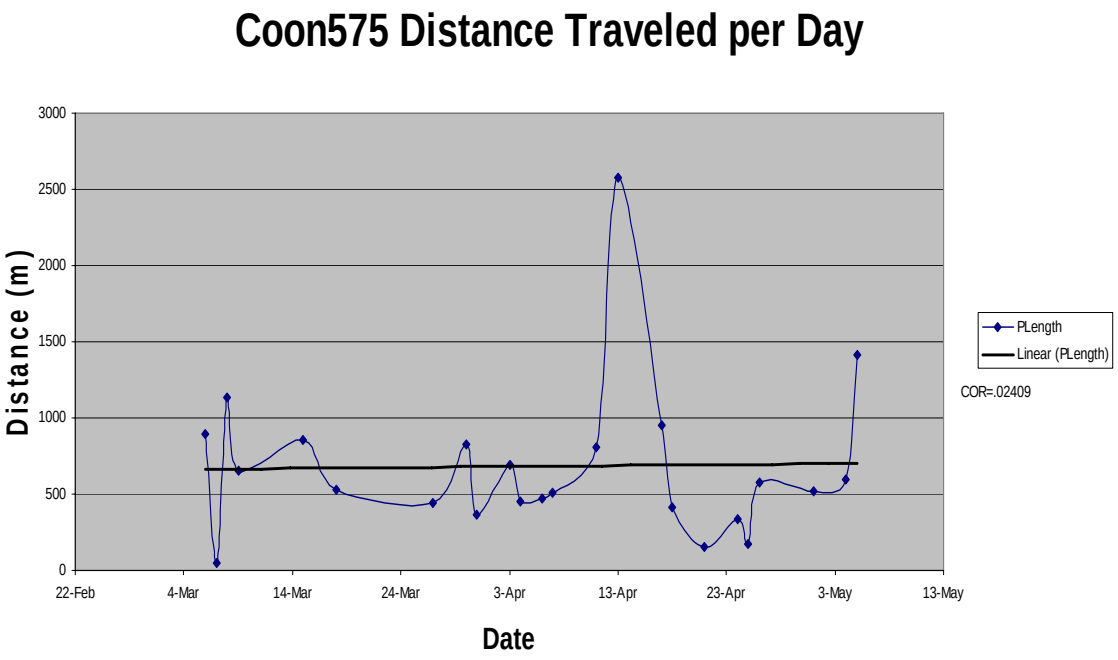


Figure 10. Habitat Pie Chart Coon534

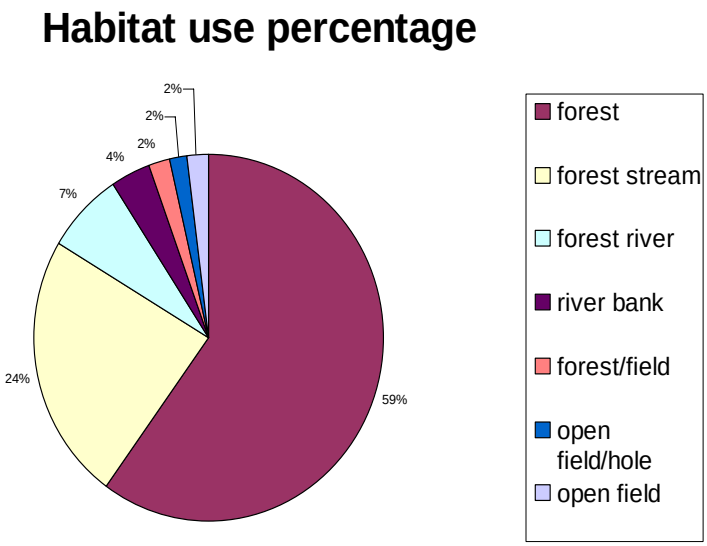
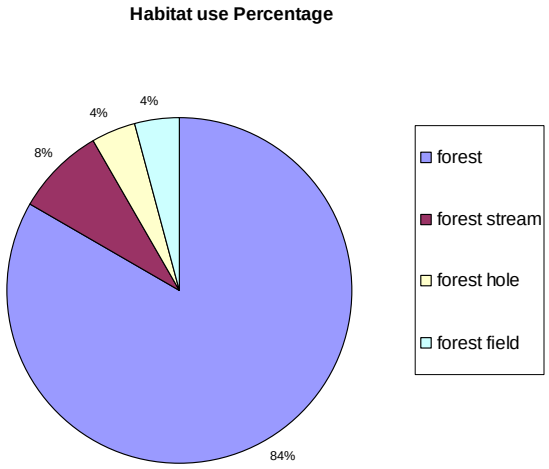


Figure 11. Habitat Pie Chart Coon 575



Summary

Throughout the year two male raccoons have been tracked and data has been collected on where and how they move. Data has been collected to find out if raccoons have a home range. By finding the home range, habitat can also be looked at. All data was analyzed and was found that raccoons have a home range of about 1000-2000 acres. The raccoons have been in many different habitat areas over the year. The two raccoons prefer to live in a wooded or forest areas.

Temperature was also recorded in the data throughout the year. After analyzing the temperature with the raccoon's movement, it can show whether temperature has an affect on the animal's movement. The data showed that there is no relationship with the raccoons moving and the temperature it was when they moved. High and low temperature was also recorded. Again there was no relationship with either of them.

Distance was recorded in the raccoon's movement. By analyzing the movement and distance, general hot spots are shown. This shows the areas that the raccoons prefer to be in most of the time. By looking at the hot spots one could see were raccoons have certain feeding areas.

Since both raccoons were males, it was interesting to see if raccoons are territorial or not. All the movement was analyzed to see if there was a form of territory. The two raccoons were significantly close to each other most of the time. So if raccoons did have a territory, they would generally small and territories would possibly overlap. The closest distance recorded between the raccoons was 9yards.