Raccoon (*Procyon lotor*) Home Ranges in Itasca State Park

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Introduction

Raccoons (*Procyon lotor)* are some of the most popular and most damaging animals in the state park. Guests delight in viewing these charismatic animals, but they cause thousands of dollars in damages each year in their attempts at stealing food. We are examining the home range of raccoons in Itasca State Park in Minnesota in late May through early June. The home range of adult mammals can be affected by a wide variety of different things from sex, availability of resources, and weather (Gehrt & Fritzell 1997).We are predicting the males will have a larger home range than those of females. Earlier studies have found that young raccoons are often born in early May, and it is the females that care for the young (Stuewer 1943). Female animals would be restricted to the area around the natal den while males are free to roam. Also, raccoons are promiscuous animals, so it's advantageous for males to maintain a large home range to overlap with as many females a possible (Gehrt & Fritzell 1997).

We also expect the proximity to the campground to have an impact on the home range sizes. Food quantities and dispersal can affect movements and home range of a wide variety of mammals. If the raccoons remain near the campground, they're expected to have a smaller home range. They have an abundant, relatively stable food supply. This means they won't need to wander far in search of food (Prange et al. 2004). If the raccoons leave the area of Bear Paw Campground, we expect them to have a larger home range because they'll be moving farther in search of food.

Materials and Methods

The first step in our study was to capture the raccoons. On May 27 and 28, 2010 at approximately 8:30 p.m. live traps were set out near the banks of Lake Itasca. The traps were all set near the University of Minnesota Itasca Biological Station, and they were baited with saltine crackers and peanut butter. The traps were checked at 6 a.m. the following morning. Two raccoons were caught on the 27th and four were caught on the 28th. One of these was released due to an injury on its neck.

Once captured, the raccoons they were given .03 cc of Telazol per pound of body weight. The Telazol was at a 100mg/ml concentration. Raccoon number 365 had to be given a second dose at half strength. Once they were under, radio collar model number M1940B was placed on them. This and all transmitter and receiving equipment was supplied by Advance Telemetry Systems in Isanti, Minnesota. They were than held for approximately 11 hours before they were released back into the forest near their capture site.

To collect our data we set up two 6 meter towers with nine element antennas on top. These two towers were used to triangulate the location of the animal. Signals were taken from May 31 to June 10 at a minimum of two times a day typically around 12:30 p.m. and 6:30 p.m. Additional daily readings were also often taken throughout the day. On June 2, readings were taken every two hours for 24 hours. Our data was processed using the ArcMap 9 software. The data was analyzed using the kernel method and a minimum convex polygon. We tested for the standard deviation by having all group members take two reading from an unmoving point and calculating the differences.

Results

We trapped and collared five raccoons all south of boat house at University of Minnesota Itasca Biological Station. Of the three females we caught, none showed signs of lactation.

Transmitter Frequency	Date	Weight (kg)	Sex	Lactating	Teeth Condition
164.355	5/28/2010	6.1	Female	No	Worn
164.365	5/28/2010	8.2	Female	No	Average
164.376	5/29/2010	6.4	Female	No	Good
164.386	5/29/2010	6.4	Male	N/A	Good
164.395	5/29/2010	6.4	Male	N/A	Average

Table 1: The measurement and observations from the raccoons we trapped and radio collared.

We took a total of 36 data points for each of the raccoons. Unfortunately, we had but 11 usable readings after we discovered our error. When the second tower was put up, the antenna was not bolted down tight enough. This caused the antenna to spin around on the tower, so the antenna and the compass point were not aligned. It was on our eighth of ten days that this was discovered. The standard deviation was 1.8. This was used to find the error polygon of each point. The average error polygon of the points used 38944. These points were than analyzed using the kernel method and the minimum convex polygon.

Raccoon Number	Area of Minimum Convex Polygon (m^2)
164.355	24,138
164.365	31,160
164.376	62,631
164.386	746,269
164.395	66,869

Table 2: Area of minimum of convex polygon in square meters for each of the raccoons.

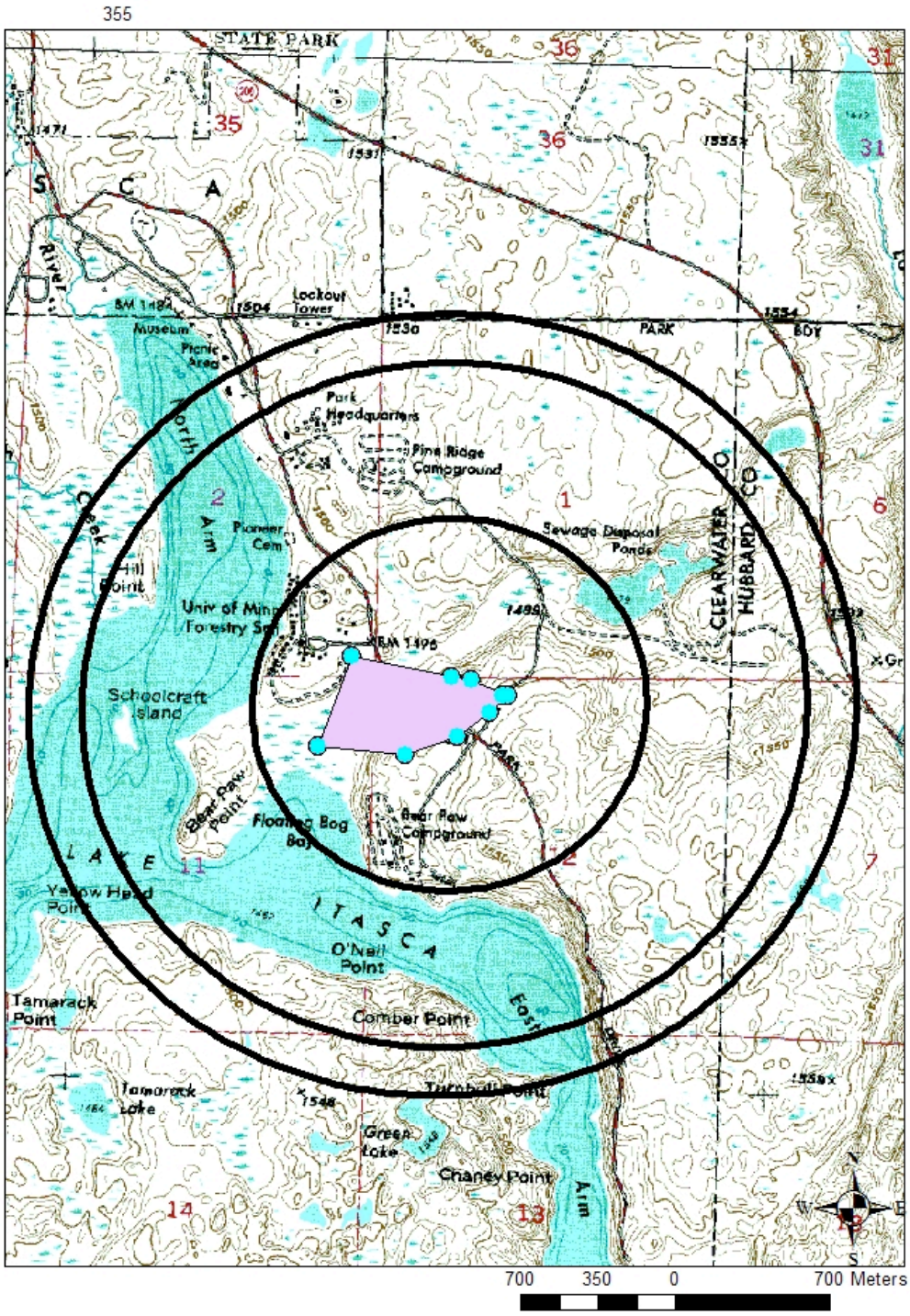

Figure 1: Kernal and minimum complex polygon for raccoon 164.355. Kernal rings show location 50, 90, and 95 percent of the points.

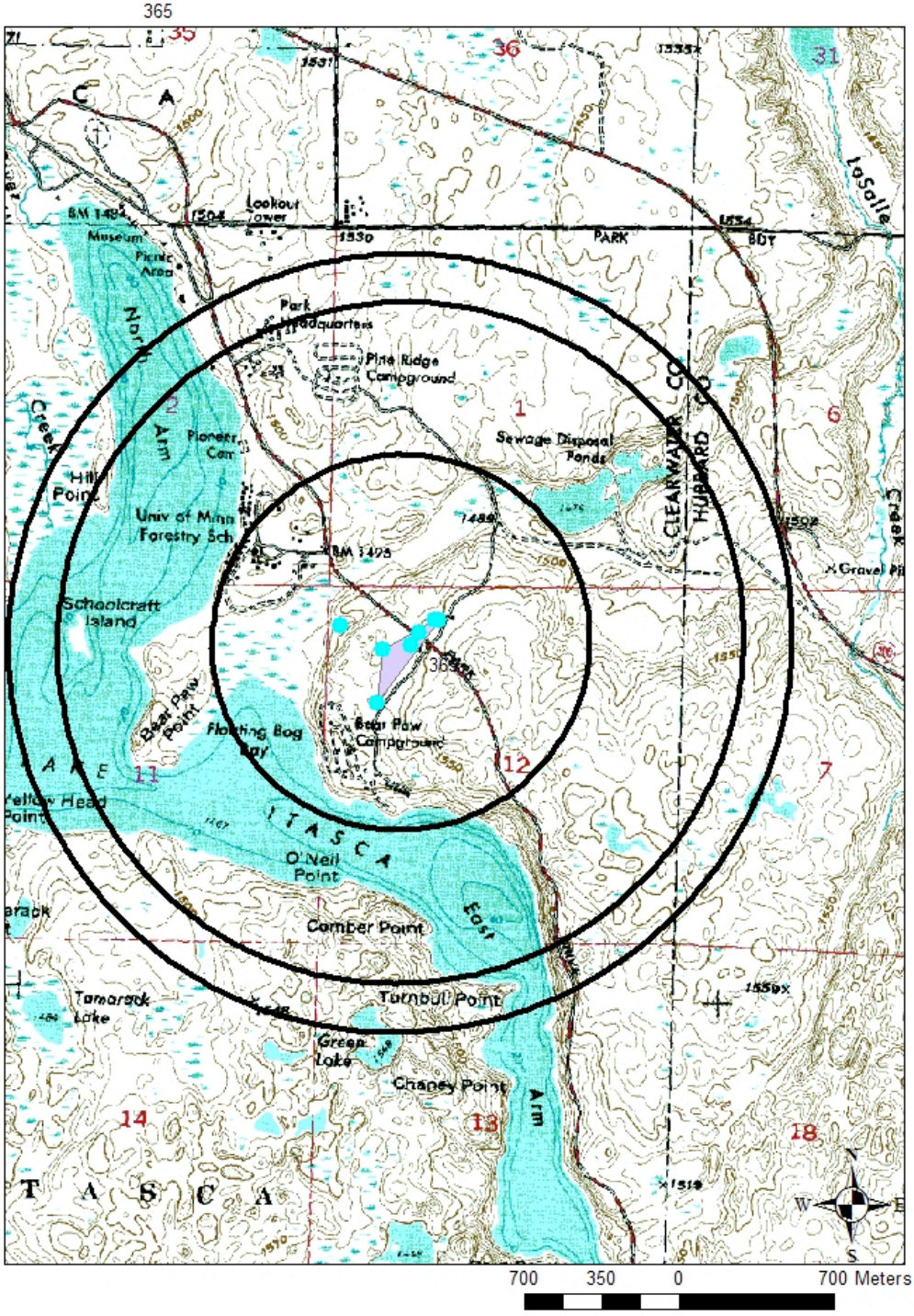

Figure 2: Kernal and minimum complex polygon for raccoon 164.365. Kernal rings show location 50, 90, and 95 percent of the points.

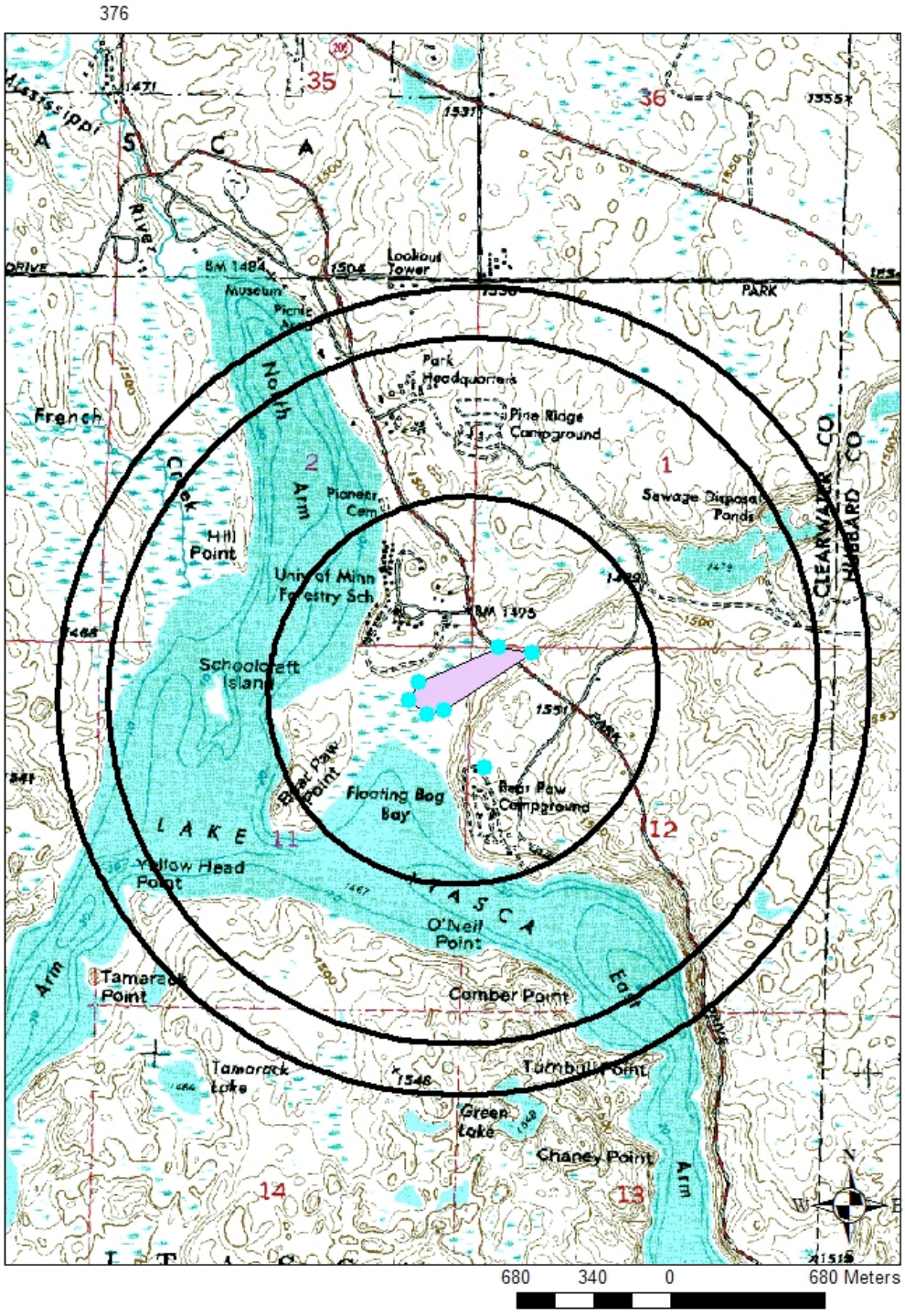

Figure 3: Kernal and minimum complex polygon for raccoon 164.376. Kernal rings show location 50, 90, and 95 percent of the points.

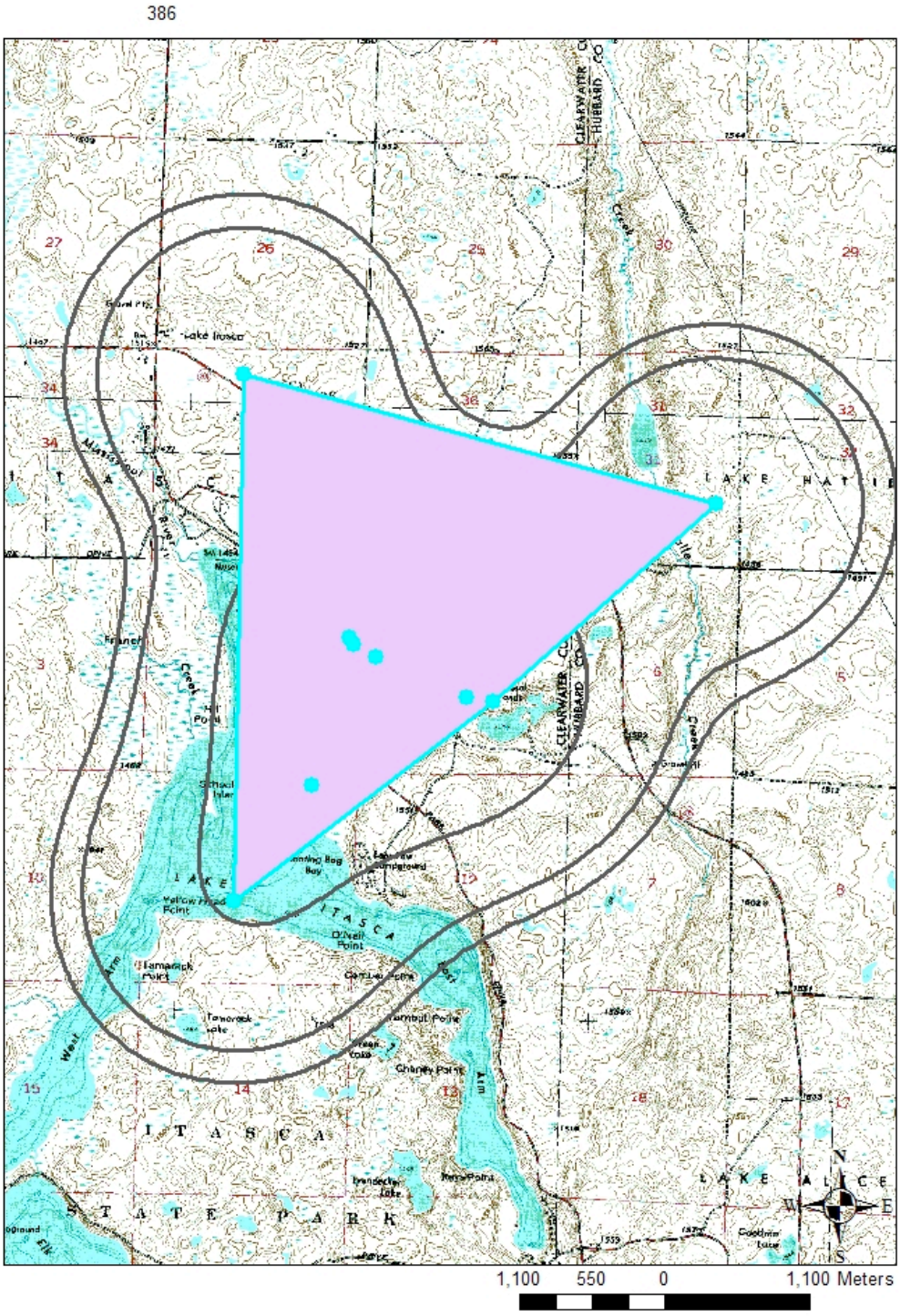

Figure 4: Kernal and minimum complex polygon for raccoon 164.386. Kernal rings show location 50, 90, and 95 percent of the points.

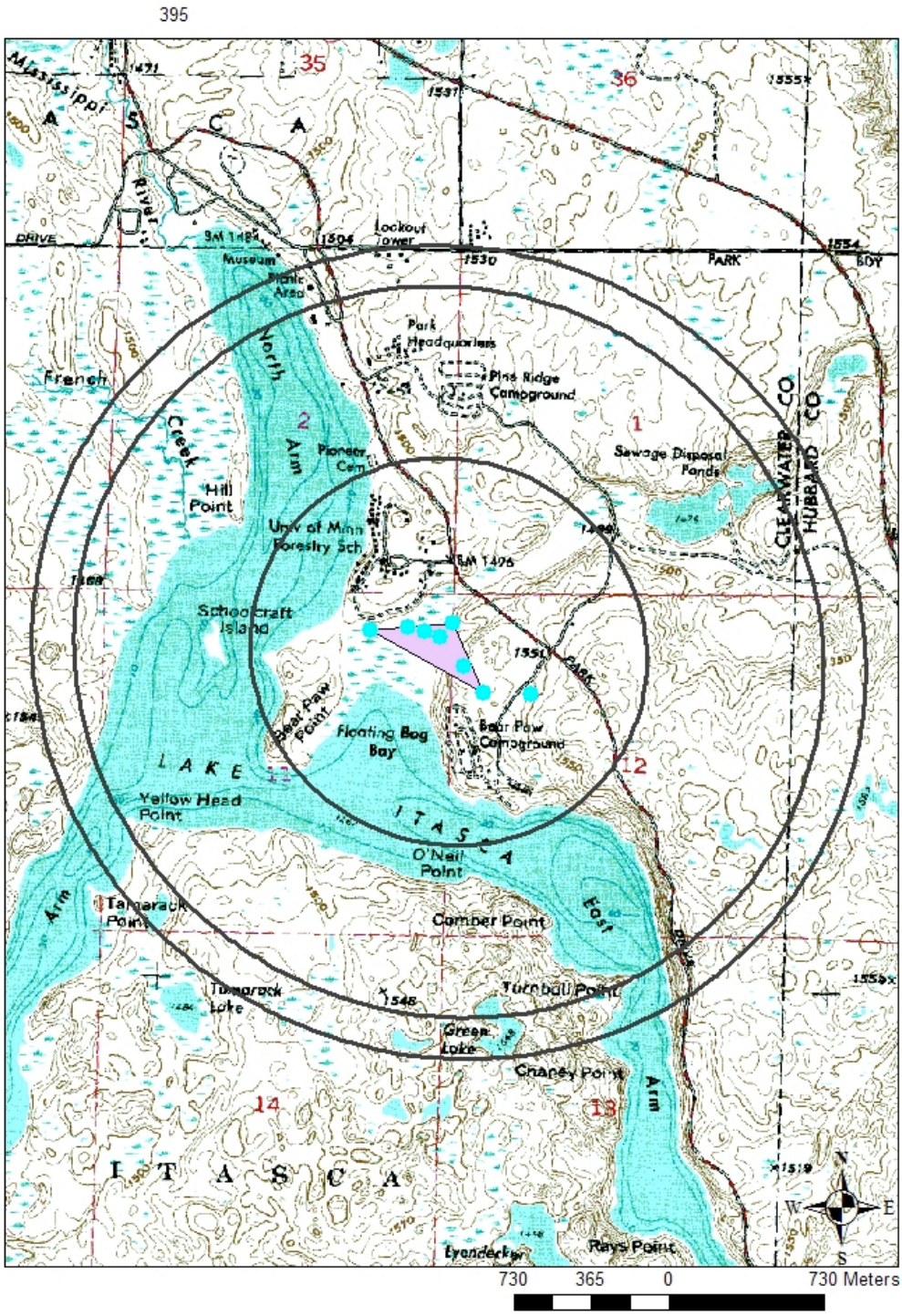

Figure 5: Kernal and minimum complex polygon for raccoon 164.395. Kernal rings show location 50, 90, and 95 percent of the points.

Discussion

Our data did show the males to have larger home ranges than the females as we predicted. None of the females in our study were lactating, so it wouldn't be the necessity to return to a natal den that is limiting the size of their range. I suggest that males simply evolved to have larger home ranges than would be needed to meet their food demands, so their home range would overlap with many females. We also found a trend between tooth quality and territory size. The animals with the teeth in the best condition had the largest range for their sex, and the female with the worn teeth had the smallest range. We assume the raccoons with the better teeth are younger, while the raccoon with the worn teeth is the oldest. It would make sense that as raccoons age their home range would shrink. It has learned the locations to shelter, food, and water, so it no longer needs to journey outside that range.

Overall, the raccoons in our study seem to focus their habits around the Bear Paw Campsite. This provides them with a large stable food source, so it makes sense for them to stick around. The one exception to this has been the young male number 164.386. Although he has frequented the campground, he was moved over a expansive territory. We believe this to simply be a combined effect of his age and sex.

There is further research needed in this area. First, we'd like to simply get more data points. The more points of reference the better understanding we will have over the raccoon's home range. A more long term study is also needed. This way we could see if either male or female raccoons change their home range through the different seasons. It's also important to see how mother raccoon's home range would change after giving birth. For this reason a more extensive study with a larger number of raccoons would be fruitful. We'd also like to find how the presence of humans is affecting the raccoon's home range. For this we'd radio tag some

raccoons in a more secluded area of the park and see how their home range differs from those near the campground.

References

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Prange, S., Gehrt, S.D., & Wiggers E.P. 2004. Influences of Anthropogenic Resources on Raccoon (*Procyon lotor*) Movements and Spatial Distribution 3:483-490

Stuewer, F.W. 1943. Raccoons: Their Habits and Management in Michigan 2:203-257