Space use and home range overlap of least chipmunks in the Laramie Range

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Background:

I am a fifth year senior in the UW Department of Zoology and Physiology. I will be graduating this semester with a BS in Zoology and a BS in Wildlife and Fisheries Biology and Management. I would like to continue on to graduate school to study behavior in mammals. This project allowed me to gain experience in that area of study. This study was conducted in collaboration with Dr. Merav Ben-David and fellow undergraduate student Garret Smith.

Abstract:

Body mass, which represents the energy demands of animals, has been identified as an important predictor of home range size in many terrestrial and marine mammals. In most studies, only interspecific effects of body size have been explored but few addressed the effects of sexual dimorphism within species. Female-biased sexual size dimorphism is typical in most chipmunk species, including the least chipmunk (*Tamias minimus*). In September 2015, we radio collared 23 chipmunks (14 males and 9 females) in two forest and two sagebrush grids and tracked them daily. Tracking lasted from 5-31 days. Using kernel density estimators of repeated relocations we found that despite differences in body mass, male and female home ranges were similar in size. Similarly there was no sex-related difference in maximum daily distance moved. There was little
overlap of home ranges at the 50% contour among all chipmunks, but while females showed little overlap with other females at the 95% contours, there was substantial overlap between males and females as well as males and males. We also found that several pairs of chipmunks which exhibited high overlap in home range shared hibernacula, and many sagebrush chipmunks established hibernacula in forested stands. Our results suggest that body size had no effect on space use of chipmunks and that while females may be territorial, males are not. Relatedness among individuals that exhibit home range overlap and those that share hibernacula should be investigated in future studies.

**Introduction:**

It has been found in a multitude of past studies that body mass is an important predictor of home range size in many mammals (Lindstet et al. 1986, McNab 1963, Swihart et al. 1988). Body mass represents the energy demands of animals, because an animal requires a higher amount of energy to achieve and maintain a large body size than an animal with a smaller body size would. One particular study by Tucker, Ord, and Rodgers in 2014 showed that as the body mass of a mammal increases, so does the home range size. Their results yield a linear, positively correlated relationship between body mass in kilograms to home range size in square kilometers on a logarithmic scale. This relationship was found to occur in both marine and terrestrial mammals, as well as across feeding types in mammals, including carnivores, herbivores, and omnivores. Another study showed through meta-analysis that body size accounted for 53-85% of variation in home range size alone different species, where larger species occupied larger home ranges (Tucker et al. 2014). These results are not surprising since as an animal increases in size, you would generally expect it to require more space to move around in and gather the amount of food and other resources necessary for its survival.

Most studies in the past have only explored the interspecific effects of body size in mammals, which means they have looked at the effects among various different species. Very few studies, however, have looked at the intraspecific effects of sexual dimorphism, so we know very little
about the effects of body size within individual species, but between the male and female sexes. A study by Garland, Dickerman, Janis, and Jones in 1993 separated studied species into two feeding types: Carnivora and ungulates. While there are no visible correlations when all species are looked at together, if separated into these two feeding types, there is a definite positive correlation within each group between increasing body mass (kg) and increasing home range area (km^2) on a logarithmic scale.

Another important finding from past studies was that home range size in mammals depends on habitat quality. One study by Zielinski et al. in 2004, for example, measured the home range sizes of fishers (Martes pennanti) in seven different areas with varying habitat types. Their study areas were all located in California in the Sierra, Coastal, Coastal-Sierra combined, Northwestern California (site a), Northwestern California (site b), Rocky Mountains, and Central Sierra areas. The researchers found that out of these seven study sites, the home range size of fishers was largest in the Rocky Mountains where habitat quality was lowest. The home range sizes were larger in locations with higher quality habitat. These results are not surprising since when the quality of a habitat is lower, that means there will be a lower density of food within that habitat. Because of this, an animal would be expected to expand its home range in order to find and gather the amount of food necessary to meet its metabolic requirements.

There have been a few scientific projects in the past which have studies least chipmunks (Tamias minimus) specifically, but the most relevant data found pertaining to our study was the data which has been collected by the Wildlife Ecology and Management class at the University of Wyoming. This class is instructed by Dr. Merav Ben-David, and her students have been collecting data on least chipmunks in the Laramie Range each spring and fall since 2004. Results from their combined data show that least chipmunks inhabit both forest and sagebrush habitats in the Laramie Range. However, the abundance of chipmunks is generally higher in the forest grids. In the sagebrush ecosystems, the count of chipmunks in all grids averaged to approximately 40 chipmunks from 2010 to 2015. The forest grids, in comparison, averaged to approximately 60 during this time period.
Results from the Wildlife Ecology and Management class also showed that there is a female-biased sexual size dimorphism in the least chipmunks (Fig. 1). The females were shown to have a significantly larger body mass than the males in both the forest and sagebrush environments in the Laramie Range, according to data from 2006 through 2014. Female-biased sexual dimorphism is typical in most other chipmunk species as well, and the amount of dimorphism appears to positively correlate with severity of the environment (Levenson 1990).

The annual cycle of a least chipmunk is fairly straightforward. Chipmunks emerge from hibernation around April each year, and soon after, they begin breeding. They raise their young through the summer, prepare for hibernation near the beginning of autumn by gathering food and building a cache in an underground burrow, and then recommence hibernation again in October. It has been hypothesized that the chipmunks will stir throughout the winter and travel to their cache periodically, but this has not been confirmed.

Based on the results of the past studies aforementioned, we developed three hypotheses to be tested in our study:
1. Male *T. minimus* individuals will have smaller home ranges than female individuals.
2. Home range size differences will be more pronounced in sagebrush (more extreme) habitats.
3. There will be less overlap of home ranges in sagebrush habitats.

Our first hypothesis was that male *T. minimus* individuals would have smaller home range sizes than females. This supposition was made based on the findings of Tucker, Ord, and Rogers, which correlated greater body mass with larger home range. Since the Wildlife Ecology and Management class findings showed that male chipmunks have a lower body mass than females across both the sage and forest ecosystems, it would be reasonable to suppose that they would then have a smaller home range size.

Our second hypothesis stated that the home range size differences between male and female chipmunks would be more pronounced in sagebrush environments. This inference was based on the idea that sagebrush habitat is more extreme than the forest habitat. There is less vegetation to protect from wind and harsh weather, and there is less cover to protect from predators, and most importantly for this hypothesis, there is less abundance and variety of food available. This demonstrates that the habitat quality of the sagebrush is lower than that of the forest, and as we saw in the results from Zielinski et al., home range size in an individual mammal species is generally higher in areas where habitat quality is lower. This would suggest that the home range size of chipmunks in the lower quality sage environment would be lower than in the forest.

Our third hypotheses predicted that there would be less overlap of chipmunk home ranges in the sagebrush habitats than in the forest. Since the Wildlife Ecology and Management class found that abundance of chipmunks was lower in sagebrush stands, it would be reasonable to presume that there would be less overlap of chipmunk home ranges simply due to a larger amount of space available to each individual chipmunk. The lower habitat quality of the sagebrush environments could also influence home range overlap since fewer resources would not be able to support as many individuals in the same amount of area as in the forest, where there is a greater abundance of resources.
Methods:

Study Area

Our study took place approximately 21 km east of the city of Laramie in southeastern Wyoming. The study area was specifically located in the southern part of the Laramie Range in Medicine Bow National Forest, with sites on either side of Interstate-80 (Fig. 2). The elevations at all sites were around 2600 m, and the climate was semi-arid continental with an average annual precipitation ranging from 38 to 48 cm and an average annual temperature of 0°C.

Figure 2: Locations of all least chipmunk (*Tamias minimus*) trapping grid locations surveyed by the Wildlife Ecology and Management class in the Laramie Range, Wyoming. Our study utilized forest grids F1 and F2, and sage grids S1 and S2.
**Grids**

We set up six grid areas for chipmunk capture and tracking: three in sagebrush habitat and three in forest habitat. Sagebrush habitat in the Laramie range was dominated by Mountain big sagebrush (*Artemisia tridentate*) with a sparse scattering of Limber pine (*Pinus flexilis*). The forest habitat contained primarily Lodgepole pine (*Pinus contorta*), scattered with Ponderosa pine (*Pinus ponderosa*), Quaking aspen (*Populus tremuloides*), Limber pine, and a few Douglas fir (*Pseudotsuga menziesii*).

We trapped chipmunks in two forest (F1 and F2) and 2 sagebrush (S1 and S2) grids. This resulted in one forest and one sage grid occurring on each side of Interstate 80. Each grid contained 40 traps set in a 5x8 grid pattern with 50 m between each trap on all sides (Fig. 3, Fig. 4). The resulting area of each trapping grid was 200x350 m. Each grid was constructed using a predetermined compass aspect to set up the starting points for each A-E line in the grid (A1, B1, etc.). The aspect was then shifted 90 degrees, and we walked following that aspect for each line, stopping to place traps. Each line was flagged with flagging tape so anyone checking traps could easily follow the route and find traps, where the location was double-flagged. We placed a Tomahawk live trap at each 50 m point on the grids (Model 102, Tomahawk Live-Trap Co. Tomahawk, WI, USA). The traps were placed in locations within two meters of the exact 50 m point so we could ensure the traps were adequately covered by vegetation to help protect any trapped animals from unfavorable weather conditions. We also covered traps with strips of tarp to provide more protection from precipitation and wind.
Figure 3. Satellite image of a sage grid (S1). This is an example of the standard 5x8 grid set-up. It shows the typical vegetation cover and distribution of a sage grid.

Figure 4. Satellite image of a forest grid (F1). This is an example of the standard 5x8 grid set-up. It shows the typical vegetation cover and distribution of a forest grid.
**Trapping**

Trapping occurred for a period of five consecutive days in September, 2015, for each grid site. We visited the trap sites twice per day. We baited and set the traps each morning at approximately 7:00 am using a bait which was a combination of peanut butter, oats, and molasses. Since chipmunks obtain most of their water through the food they consume, we also placed a piece of fruit (apple or strawberry) in the traps to provide them with a suitable source of water. After traps were baited and set, we left the grid sites and returned at approximately 4:00 pm to check traps for captures. Trap status was recorded under one of six categories: open with bait, open without bait, closed with bait, closed without bait, by-catch species, or chipmunk capture. Any traps without captures were closed to ensure animals would not be captured overnight, since the lowered temperatures would stress the animals and could result in mortalities. In traps which contained animals other than least chipmunks, the species was recorded, and animals were promptly released at the capture site.

**Processing**

Traps containing captured chipmunks were carried to a processing site, where chipmunks collected from multiple lines could be simultaneously processed. Processing procedures followed the guidelines provided in the University of Wyoming Institutional Animal Use and Care Committee permit. Each chipmunk was first scanned for a Passive Integrated Transponder (PIT; Biomark, ID, USA) tag. If the chipmunk had a tag, the PIT tag code found by the scanner was recorded, the chipmunk was recorded as a recapture, placed in its cage, carried back to the capture site, and released.

If the PIT tag scanner did not pick up a tag number, the chipmunk was recorded as a new capture. It was placed into a plastic bucket with cotton balls soaked with 1cc isoflurane and a sealable lid, which sedated the animals enough so they could be easily handled. Chipmunks were moved from the bucket to a plastic ZipLock bag and weighed to the nearest gram using a Pisola scale. The weight of the plastic bag was subtracted from the total weight to determine the weight of the chipmunk in grams. The animal was then removed from the plastic bag and sexed to
determine if it was a male or female. Males were recorded as being reproductive or juvenile. Females were recorded as lactating or juvenile. We then selected a new PIT tag, sterilized it with betadine, and inserted it under the skin of the chipmunk’s neck using a similarly sterilized syringe. Blood samples were collected from randomized individuals during handling and were used for stable isotope analysis. These blood samples were drawn by shaving a small area on the inner thigh of the chipmunk and performing venipuncture of the saphenous vein. Handling time of each individual was kept under three minutes to reduce the amount of stress endured by the animal as much as possible. They were also given a short period of time to recover before being released at the capture site.

Tracking

We fitted 32 select individuals with VHF radio-collars which weighed 0.75 g, or 1.9% of the average chipmunk body mass of 40 g. The collars were model M140 from Advanced Telemetry Systems (ATS), and they were set to pulse at slow rate with a life expectancy of 68 days for collars. The group of collared individuals included 20 males and 12 females. Males were divided
with 13 in the forest grids and seven in the sage grids. Females were divided with six collared individuals in each habitat type. Chipmunks were tracked daily between September 7 and October 6, 2015 (Fig. 5), to determine daily relocations of each chipmunk. Each chipmunk was tracked from 2 to 31 days to their location within 10 m. We determined location of each chipmunk by either a stationary signal, often in the tree tops or underground, or by finding the strongest VHF signal if the chipmunk was moving. If a signal was stationary and in the same location for multiple days, we determined if it was due to a dropped collar or hibernation. Hibernation was discerned by attenuation of the radio-collar signal, which would only be audible from a maximum of 10 m from the underground hibernacula, whereas above-ground dropped collars, as well as collars on active chipmunks, were audible from 200–1000 m away. After pinpointing chipmunk location, we recorded the easting and northing UTM coordinates (NAD 83 system) off of a hand-held GPS unit, along with a location description (ground, tree, or hole).

**Statistical Methods**

We used a Robust-Design mark-recapture model in program MARK (Cooch and White 2015) to determine population sizes and densities. We used Robust-Design models with unequal time intervals (Kendall et al. 1995) to estimate daily capture and recapture probabilities, apparent monthly survival, and the abundance of chipmunks at each grid. We employed Kernal utilization distribution (KUD) and minimum convex polygon (MCP) methods utilizing the adehabitatHR package in Program R (R Foundation for Statistical Computing, Vienna, Austria) to perform spatial analysis to determine the size of the home range (hectares) for males and females by habitat type. For these analyses, we included only animals with five or more relocation points (25 total individuals). Next, we ran regression analyses of KUD 50%, 75%, and 95% contours on Program R to find effects of sex and habitat, along with other variables, on chipmunk home range overlap. The overlap estimates were then compared across each habitat type and each grid within those habitat types. Finally, we compared body mass (grams) between males and females and between individuals of each habitat using ANOVA (“analysis of variance”).
Results:

Sample

Our sample size of chipmunks included 12 females and 20 males to make a total of 32 individuals fitted with VHF radio-collars. Thirteen males and six females were tracked in the forest habitats, while seven males and six females were tracked in the sage habitats. Chipmunks and their collars met a variety of fates: two chipmunks were mortalities, eight dropped collars which were not recovered, 11 dropped callers which were recovered, eight entered into hibernation with their collars, and three collar signals went missing.

Population Estimates

Mark-recapture surveys indicated that chipmunk abundance for the fall surveys increased in both the sage and forest habitat types since 2010. However, the increase was more dramatic in forest habitats, while the S1 grid was an exception with a lower number of recaptured individuals (Fig. 6).
Body masses

Both male and female chipmunks captured in fall 2015 showed an overall significantly higher body mass compared to chipmunks in 2006 through 2014 (Fig. 7). Chipmunks in 2015 showed the greatest difference in body mass from past years in the forest grids, whereas sage grids exhibited less of a difference. Male and female chipmunks continued to exhibit a female-biased sexual size dimorphism.
Distances

The maximum distance traveled by chipmunks ranged from 31.1 to 230 m in the forest and 71.7 to 267 in the sage. The mean maximum distance of combined males and females was not significantly higher in the sagebrush (156 ± 66.6 m) than in the forest grids (121.4 ± 56.3 m). When males and females were separated, there was also no difference between habitats or sexes (Fig. 8). In the forest, female distance ranged from 43.4 to 230 ± 73.8 m, and males ranged from 33.1 to 223 ± 51.1 m. In the sagebrush, female distance ranged from 71.7 to 204 ± 52.6 m, while males ranged from 87.8 to 267 ± 71.8 m.
Home range size and overlap

With MCP, the home range sizes of chipmunks ranged from 0.59—1.1 ha. The two habitats yielded similar results with forest averaging 1.22 ± 0.25 ha and sagebrush averaging 0.95 ± 0.59 ha (Fig. 9 and 10). There was a slight correlation between sizes calculated by MCP and 50% KUD ($R^2 = 0.67$, $p = 0.81$; Fig. 11). However, all KUD estimates were highly correlated (50 and 75%; $R^2 = 0.99$, $p < 0.001$; 50 and 95%; $R^2 = 0.96$, $p < 0.001$; Fig. 12). Most individuals captured in the sagebrush grids used forested areas extensively, and all hibernacula were found in forest areas.
Figure 9. Minimum convex polygons of chipmunk home range in forest 1 (top) and sagebrush 1 (bottom) habitats in the Laramie Range, Wyoming fall 2015. These polygons were generated for animals with a minimum of 5 relocations.

Figure 10. Minimum convex polygons of chipmunk home range in forest 2 and sagebrush 2 habitats in the Laramie Range, Wyoming fall 2015. These polygons were generated for animals with a minimum of 5 relocations.
Home range overlap was relatively low at the 50% KUD for both sexes (Table 1). However, males exhibited higher inter- and intra-sexual overlap than females at the 95% KUD (Table 2).

Figure 11. Relationship between home range size of chipmunks using 100% MCP and 50% KUD. Although size estimates were similar correlation between the 2 methods was low.

Table 1. Degree of overlap of 50% KUD home ranges of male and female least chipmunks in the Laramie Range, Wyoming, in fall 2015.

<table>
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<th>M-M</th>
<th>M-F</th>
<th>F-F</th>
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<td>F1_F1</td>
<td>0.06 (-0.01-0.13)</td>
<td>0.17 (0.02-0.32)</td>
<td>0 (0-0)</td>
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<tr>
<td>S1_S1</td>
<td>0.02 (-0.01-0.05)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
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<tr>
<td>F2_F2</td>
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<td>0.07 (-0.02-0.16)</td>
<td>0 (0-0)</td>
</tr>
<tr>
<td>S2_S2</td>
<td>0.11 (-0.10-0.32)</td>
<td>0.25 (0.10-0.40)</td>
<td>0.10 (-0.08-0.28)</td>
</tr>
<tr>
<td>F2_S2</td>
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<td>0 (0-0)</td>
<td>0 (0-0)</td>
</tr>
<tr>
<td>S2_F2</td>
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<td>0 (0-0)</td>
<td>0 (0-0)</td>
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<tr>
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<td>0.08 (0.04-0.12)</td>
<td>0.04 (-0.02-0.10)</td>
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</table>
Table 2. Degree of overlap of 95% KUD home ranges of male and female least chipmunks in the Laramie Range, Wyoming, in fall 2015.

<table>
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<td>F2_F2</td>
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<td>F2_S2</td>
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<td>0.01 (0.00-0.02)</td>
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<td>S2_F2</td>
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<td>0.01 (-0.01-0.03)</td>
<td>0 (0-0)</td>
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<tr>
<td>All</td>
<td>0.20 (0.14-0.26)</td>
<td>0.15 (0.10-0.20)</td>
<td>0.05 (-0.01-0.11)</td>
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</tbody>
</table>

Figure 12. Relation between home range size of chipmunks using 50%, 75%, and 95% KUD.
Core areas in the forest habitats coincided with hotspots of trapping, but core areas in sagebrush coincided less with trapping in the 50% KUD analysis (Fig. 13, 14, and 15).

Figure 13. KUD contour lines of least chipmunk home range along with trapping sites (green dots) transposed onto a map of the forest 1 (F1) grid in the Laramie Range, Wyoming. Size of green dots corresponds to number of chipmunks captured at that location. These contours were generated for animals with a minimum of 5 relocations.

Figure 14. KUD contour lines of least chipmunk home range along with trapping sites (green dots) transposed onto a map of the sagebrush 1 (S1) grid in the Laramie Range, Wyoming. Size of green dots corresponds to number of chipmunks captured at that location. These contours were generated for animals with a minimum of 5 relocations.
Home range size based on 50% contours with KUD were similar to MCP and larger with 75% and 95% contours. There were no significant differences between sexes or habitats.

Figure 15. KUD contour lines of least chipmunk home range along with trapping sites (green dots) transposed onto a map of the combined forest 2 (F2) and sagebrush 2 (S2) grids in the Laramie Range, Wyoming. Size of green dots corresponds to number of chipmunks captured at that location. These contours were generated for animals with a minimum of 5 relocations.

Figure 16. Amount of overlap in home range area (ha) among both sexes and habitats for MCP100, 50% KUD, 75% KUD, and 95% KUD.
The 50% KUD core areas showed little overlap between sexes. This segregation continued for females intra-sexually in the 95% contours. However, males exhibited higher overlap of home ranges in the 95% contours, and so did females with other males (Fig. 17). There were no habitat differences in overlap.

Figure 17. The proportion of overlap among home ranges of least chipmunks in the Laramie Range, Wyoming. Home range overlap is shown between males, between females, and intersexually with males and females.

_Hibernacula_

Hibernation was initiated during the first two weeks of October, although one individual in sage grid 2 entered hibernation on Sept 28, 2016. Prior to hibernation, most individuals which had been caught in sagebrush moved to wooded or forest sections of their home range. Two pairs of tracked chipmunks were were found to hibernate together in a shared hibernacula.
**Discussion:**

We found from our data that male *T. minimus* individuals had similar home ranges to females. These findings did not support our hypothesis that male least chipmunks would have smaller home ranges due to their lighter body mass. The chipmunks were heavier on average in 2015 than in past years (especially in the forest), but they retained their female-biased sexual size dimorphism, so the similar home range sizes are not due to a similarity in body masses. However, we cannot say exactly why the chipmunks showed no difference in home range size between sexes.

Our second hypothesis was also not supported. We predicted that home range size differences between male and female chipmunks would be more pronounced in sagebrush habitat because it is a more extreme and lower quality habitat. However, we found no difference between home range sizes in sagebrush compared to forest habitats. There was a lower abundance of chipmunks in the sagebrush, especially in the Sagebrush grid 1. Fewer individuals could have impacted our results since lower abundance could result in lowered competition between individuals for essential resources like food, and therefore result in less need to expand their home ranges to compensate for the lower habitat quality.

Finally, we found that there was similar overlap of home ranges in the forest and sagebrush habitats, whereas we predicted there would be greater overlap in the forest environments due to a higher abundance of chipmunks. These findings suggest that chipmunks may maintain similar levels of interaction versus territoriality due to social constructs of their species, despite the type of habitat they reside in.

One interesting finding was that although the 50% KUD contour shows similar levels of home range overlap among all sex combinations, the 95% KUD contour shows that the proportional home range overlap of females with other females was very low compared to the male-male or male-female overlaps. This indicates that females were exhibiting intra-sexual territoriality. Intra-sexual territoriality in which both sexes repel or avoid same-sex conspecifics is common in sciurids. Some examples include the California ground squirrel (*Otospermophilus beecheyi*),
Gunnison prairie dog (*Cynomys gunnisoni*), white-tailed prairie dog (*Cynomys leucurus*), red squirrel (*Tamiasciurus hudsonicus*), and the woodchuck (*Marmota monax*). However, intra-sexual territoriality of only the females in a species is rare. One of the few sciurid examples is the Eurasian red squirrel (*Sciurus vulgaris*). This finding merits further investigation to see if female-female territoriality occurs in other chipmunk species, how often it occurs within least chipmunks, and why it occurs in chipmunks when so few other species practice it.

One unique finding from our study was that two pairs of our tracked chipmunks hibernated communally. Communal hibernation occurs in several sciurid species including the northern flying squirrel (*Glaucomyys sabrinus*) and the Alaska marmot (*Marmota broweri*), but it has not been documented in any chipmunk species before. Both sets of tracked least chipmunks were male-female pairs, but we do not have enough information to determine if they are mating pairs, if they are related (mother-male offspring), or otherwise. These findings merit further investigation to determine the advantage of communal hibernation among least chipmunk individuals and to discover if other chipmunk species do in fact practice communal hibernation.

Our study area was a mosaic type habitat, which was comprised of small patches of sagebrush and forested areas interspersed within each other. This allowed chipmunks to include both types of habitat in their home ranges. Future studies should trap chipmunks in continuous habitats to determine if home range size and overlap would be more pronounced in environments that were truly separate. This is especially important in the sagebrush habitat since it is more extreme, and all chipmunks in this habitat type within our study area were able to migrate to forest areas before commencing hibernation.

Additionally, future studies should assess the genetic relatedness of least chipmunks in relation to both communal hibernation as stated before, as well as with respect to home range overlap. Relatedness of individuals could decrease the amount of territoriality between them, which could have an effect the size of their home ranges. Effects of annual changes in resource availability on home range size and overlap should also be investigated. We tracked chipmunks for only two months in the fall, while they were collecting resources for their winter cache. Home range size
and overlap between sexes and habitat types may change during the spring while the chipmunks are breeding, or through other parts of their yearly cycle.
Works Cited:


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  ➢ University of Wyoming Department of Zoology and Physiology
  ➢ University of Wyoming Research Office

Note: All data and results collected along with corresponding charts and graphs in this study belong to the Department of Zoology and Physiology and to the researchers (Dr. Merav Ben-David, Garrett Smith, and Sara Locker) who will be submitting them for publication to the “Wildlife Society Bulletin,” which is a peer-reviewed journal.