The Wyoming Cooperative Fish and Wildlife Research Unit and the Wyoming Game and Fish Department, along with numerous research partners initiated the Wyoming Range Mule Deer Project during winter 2012-2013. The overarching goal of the project is to investigate the nutritional relationships between mule deer population dynamics, energy development and disturbance, habitat conditions, and climate to provide a mechanistic approach to monitoring and management of mule deer. The first helicopter capture occurred in March 2013 with the capture of 70 adult females in the northern (Big Piney / La Barge) and southern (Kemmerer / Evanston) winter ranges. We captured 35 deer on each respective winter range, and animals were fitted with GPS collar that will be worn for 2 years. This has enabled us in tracking trends of nutritional condition, reproduction, survival, and habitat selection of each individual.

This March marked the completion of the first year of research. Many accomplishments have been made along the way including 3 successful captures and recaptures of collared deer. The following highlights the progress we have made over the winter.
March 2014 Recaptures
In March, we successfully recaptured all collared deer. For each captured animal, we measured changes in nutritional condition (i.e. body fat) over the winter and downloaded GPS data from collars. Most deer returned to the same winter ranges they occupied in 2013. Two deer, however, did not follow suit and were found >40 miles from where they wintered in 2013.

Deer caught in Whitney Canyon in March 2013 chose to winter near Bear Lake in Utah

Deer caught in Nugget Canyon last year but has now decided to winter near Fontenelle Reservoir
Nutritional Condition

At each capture, we use ultrasonography to measure changes in body fat as collared deer enter and leave winter ranges. With the completion of three captures (March 2013, December 2013, and March 2014), we have been able to track changes in body fat over two complete seasons – one summer and one winter.

Deer were in better nutritional condition in March 2014 than in March 2013, by more than 1% body fat in both the northern and southern winter ranges (Table 1).

As is commonly observed for overwintering mule deer, most individuals acquired fat in the summer and lost fat in the winter. There were, however, some individuals that did not adhere to that traditional trend and actually lost fat in the summer and gained fat in the winter. There are a number of factors that can influence the dynamics of body fat, such as habitat conditions, climate, and reproduction. By rigorously measuring changes in nutritional condition (i.e. fat reserves), we will establish a better understanding of the factors that interact to determine seasonal dynamics in nutrition for Wyoming Range deer.

<table>
<thead>
<tr>
<th></th>
<th>Mar 2013 % Fat</th>
<th>Dec 2013 % Fat</th>
<th>Mar 2014 % Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>North WY Range</td>
<td>4.49 ± 0.32</td>
<td>9.48 ± 0.48</td>
<td>5.99 ± 0.22</td>
</tr>
<tr>
<td>South WY Range</td>
<td>3.45 ± 0.31</td>
<td>8.22 ± 0.43</td>
<td>4.87 ± 0.42</td>
</tr>
</tbody>
</table>

Table 1:
Reproduction

Each March, we use ultrasonography to assess pregnancy and measure fetal rates.

High pregnancy and fetal rates are common among mule deer populations throughout the west and most deer are pregnant with twins, but maternal nutritional condition at parturition is closely tied to the potential for a fawn to be successfully reared. The figure to the left is of fetal rates of Wyoming Range mule deer as well as deer that winter on the Pinedale Anticline (Mesa) and illustrates little variation in fetal rates between winter ranges and years.

Mortalities

Although annual snowpack for most of Wyoming exceeded 120% this winter, the winter ranges remained relatively free of snow. Such conditions can provide deer with exposed forage that can aid in winter survival. We observed only 2 mortalities of our 70 collared deer since December; the wet summer and mild winter experienced in 2013/2014 may have contributed to the low mortality rates.
Connecting Dots

With the completion of our first year of the project, it is possible to begin to compile histories of individual animals and the environment they experience. When coupled with their changes in nutritional condition along with reproductive success, interesting patterns begin to emerge.

<table>
<thead>
<tr>
<th>Deer ID: 069</th>
<th>Deer ID: 030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture</td>
<td>Reproductive Status</td>
</tr>
<tr>
<td>March 2013</td>
<td>2 fetuses</td>
</tr>
<tr>
<td>December 2013</td>
<td>2 fawns</td>
</tr>
<tr>
<td>March 2014</td>
<td>2 fetuses</td>
</tr>
<tr>
<td>Age = 6</td>
<td></td>
</tr>
</tbody>
</table>

Summers in Ridge Creek in the Greys River
Winters in Nugget Canyon

Summers in Hidden Basin in the Wyoming Range
Winters in Dry Piney
What’s Next?

**Habitat Conditions**
We will continue to collect data on habitat conditions on summer and winter ranges. Starting in May, we will measure mule deer utilization of available browse at each of the 150 shrub transects established in October 2013. We will then compare utilization with measurements of browse production collected from the previous fall.

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We will continue to collect data on forage quality of summer ranges of collared deer. The habitat conditions experienced in the summer directly affects nutritional condition (in terms of fat accumulation) which then carries over to influence reproduction and survival in the following winter months. Using data collected in the summer, we will reconstruct diet composition of individual deer to evaluate how forage quality influences an individual’s ability to gain fat reserves while supporting reproduction over the summer months.
We would like to introduce you to the newest member to the Wyoming Cooperative Fish and Wildlife Research Unit, Ellen Aikens. She comes to the team as a GIS guru with specialized interests in movement ecology. Starting in May, she will begin her PhD research investigating the mechanisms that drive mule deer migration and fine-scale movements on summer range. Ellen grew up on the East Coast in Kintnersville, PA. She obtained her BS at Ursinus College, PA and most recently has worked as a Research Assistant and GIS Lab Manager for the Smithsonian Conservation Biology Institute.

Ellen’s work will take advantage of the intensive monitoring and wealth of data we are accumulating with the Wyoming Range Mule Deer Project. In particular, she will be making use of the GPS data collected on the radiocollared deer, with a keen eye directed towards connecting deer movement with plant phenology, and the resulting changes in nutrition. In collaboration with Dr. Geneva Chong of USGS, Ellen’s work will be supported through funding sources including WLCI, a Berry Institute Graduate Fellowship, and a fellowship from the National Science Foundation. Ellen comes to us with extensive experience in spatial analysis, which makes her a great fit for the project and will most surely contribute valuable insight into understanding the movement ecology of mule deer.
The Wyoming Range Deer Project would not be possible without the financial and logistical contributions of our research partners. Funds have been provided by the Wyoming Game and Fish Department, Muley Fanatic Foundation, Wyoming Wildlife and Natural Resource Trust, Knobloch Family Foundation, Bureau of Land Management, Wyoming Governor’s Big Game License Coalition, Boone and Crockett Club, Animal Damage Management Board, Ridgeline Energy Atlantic Power, Bowhunters of Wyoming, Sportsmen for Fish and Wildlife, and the Wyoming Outfitters and Guides Association.

Thanks to the National Forest Service and Fossil Butte National Monument for providing housing in the study area. Finally, thanks to all who were able to assist with captures, and a special thanks goes to WGFD and BLM personnel who provided further assistance with browse production and fawn surveys.

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