JAMES RENNIE BEQUEST

REPORT ON EXPEDITION/PROJECT/CONFERENCE

Expedition/Project/Conference Title: Effects of climate change on small mammal population dynamics. .....

Travel Dates: 10 June – 2 September 2008.....

Location: Yukon Territories and Alberta, Canada .....

Group Member(s): Jennifer Sanderson.....

Aims: To estimate effects of climate-related changes in landscape/vegetation structure on population structure and dynamics of arctic ground squirrels in the alpine regions of Kluane National Park, Yukon, Canada. Secondary aims to increase my personal experience of field research methods. .....

OUTCOME (not less than 300 words):-

I was working as a volunteer field assistant under Helen Wheeler, a PhD student at the University of Alberta, Canada, supervised by Dr. David Hik.

Introduction

The current and future effects of climate change are posing a major effect to faunal wildlife. Climatic warming is causing changes in vegetation structure around the world, especially in polar and high mountain regions. A major predicated change in alpine regions is the encroachment of shrub to higher elevations, something that has previously been documented in the areas surrounding the study site (Pika camp, near The Arctic Institute of North America). However, little is known about the potential effects that this change is having on the native fauna.

Arctic ground squirrels (*Spermophillus parryii plesius*) rely heavily on visual detection of predators to avoid predation. They are a social species, using alarm calls upon the detection of a predator to warn the rest of the group. It has been suggested that shrubby environments will act as a population sink as the increased vegetation density will decrease an individual's ability to visually detect predators. This may decrease individual fitness through increased predation mortality or through the indirect fitness costs of increases in predator sensitive behaviour. If these hypotheses are true then the effects of shrub encroachment onto tundra habitat may have huge consequences on arctic ground squirrel populations. This study aims to study population differences between landscapes and to determine how climate change related changes in landscape might effect arctic ground squirrel populations.

Methods

The study was based in a remote field camp ("pika camp") in the Yukon Territories, Canada. Dr. David Hik's research group has used the field site for over a decade, so the terrain was known well documented. Access to the study site was by either hiking or helicopter.

Effects of visual openness of an environment on arctic ground squirrel success and virulence

As long distance visibility associated with landscape increases, population growth rate increases, survival increases, and female reproductive success increases. This effect is due to an increased ability to detect predators from a distance, so predation mortality is likely to be decreased and costs of predator sensitive behaviour are less. To test this hypothesis populations of arctic ground squirrels in different landscapes were monitored.

Research involved live trapping of arctic ground squirrels in both tundra and shrubby landscapes; using capture-recapture techniques to estimate population structure. Further information about populations was gained by collecting morphological measurements, weight, and sex of each individual. Ectoparasite samples (mainly fleas) were collected were possible and faecal samples taken to allow analysis of endoparasite load. As this was part of a long-term research project lasting 3 years, over winter survival and growth patterns could be estimated from recapture data.

Visual openness at each trapping site was characterised by measuring visibility of a 1m x 1m board at different distances from each trap point. This allowed the confirmation that differences in population structure and dynamics could be correlated directly with visibility.

To test the effect of visual openness on squirrel virulence, direct behavioural observations were made within the sites used in trapping methods. Giving up densities were estimated by leaving a set number of "squirrel biscuits" (made by hand from peanut butter, flour, and oil) in a dish of sand. Video footage was taken and tallies of virulent behaviour were counted within lab.

Results and Conclusions

As this was part of a long-term study lasting 3 years it is not possible to do analysis of the results collected in a single season. However, direct observations were suggestive that populations of arctic ground squirrels are more numerous and healthy in tundra than they are in shrub. Results are likely to be published in late 2009/early 2010.

Personal growth and achievements

Personally, I became part of this research project to increase my own experience of field methods. Having previously taken part in two research expeditions to Malaysia I already had a basic knowledge of using live trapping techniques to estimate small mammal population dynamics. By participating in a similar research project in a completely novel environment I was able to obtain a more universal understanding of such research methods. Having completed my volunteering session I now feel very confident in mammal trapping techniques and would be able to plan my own investigation of small mammal population dynamics.

The field camp I was based in was extremely remote, living in tents, and cooking food over gas camping stoves. The weather was completely unpredictable, changing between sunshine, rain, hail, storm, and even snowstorms within minutes! This tested my ability to live in extreme conditions, whilst increasing my confidence. Each day I was out by myself and would not see another person until evening when we all returned to camp, this obviously increased my independence, whilst allowing me to grow on my own initiative as I had to deal with surprise situations such as the presence of predators on a study site by myself. Further to this, working in a small team increased

my personal skills such as teamwork and communication. Overall it was an extremely valuable experience.