



UTAH MUSEUM OF NATURAL HISTORY

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Dear Wildlife Trails Volunteers,

I would like to thank all of you for your tremendous assistance during the last year. Through your efforts, we were able to gather a very extensive amount of data, which we hope will allow us to answer the major questions that this study is examining.

We are extremely grateful for the care and rigor that all of you displayed in gathering the data and entering it into the computer. The validity of any scientific investigation is dependent upon the quality of the data, and we appreciate your efforts at ensuring that the data gathered were of the highest quality.

We are quite confident that the data that you have gathered will be extremely useful in developing guidelines for designing more effective wildlife corridors and enhancing ecological connectivity between ecological isolates in western North America.

I have learned a tremendous amount from all of you through the discussions we had, and I greatly appreciate your recommendations for improving the project.

Thank you again for your assistance.

Best regards,

Bill

EARTHWATCH INSTITUTE FIELD REPORT 2006

Project Title: Wildlife Trails of the American West

Principal Investigators: William D. Newmark and Eric Rickart

Positions/Affiliations: Research Curator; Curator of Vertebrates/Utah Museum of Natural History, University of Utah

Research Sites: Red Butte Canyon, Wasatch-Cache National Forest, Utah (40° 46' 52" N, 111° 48' 46" W)

Trail Gulch, Salmon-Challis National Forest, Idaho (45° 26' 30"N, 113° 58' 01" W)

Sheep Creek, Salmon-Challis National Forest (45° 31' 05"N, 113° 52' 30" W)

Local Management Status of the Research Sites: Red Butte Canyon: Research Natural Area; Trail Gulch and Sheep Creek: U.S. National Forest

Scientific names of primary species being studied: *Odocoileus hemionus*, *Cervus elaphus*

Key Research Objectives: The objective of this study is to identify landscape predictors of ungulate movement in western North America by documenting the landscape attributes of wildlife trails. Specific questions that will be addressed include:

- (1) What are the landscape attributes (e.g., slope, aspect, elevation, cover, food availability, snow depth, and distance to high risk predation zones and water) of wildlife trails?
- (2) How do non-landscape features such as predator distribution and abundance interact with landscape features to affect ungulate movement?
- (3) How does the relative importance of landscape and non-landscape features vary seasonally?
- (4) How does the relative importance of landscape and non-landscape features vary with scale of movement?

Data Collection and Results

a) Give a concise account of the data you have collected during the past field season.

Wildlife Trails

Earthwatch teams located more than 165 permanent trail segments during July at Sheep Creek.

Carnivore scent station

The June and July teams monitored a carnivore scent station and downloaded film from a remote-sensing camera. This year we photographed a black bear cub and adult at the carnivore scent station.

Vegetation analysis

The June and July Earthwatch teams recorded percentage cover for the 14 most important food plants in the combined diets of elk and mule deer in 3,951 1 m x 1 m plots along 37 transects. This is truly an impressive achievement.

Data entry

Volunteers entered more than 5,000 lines of data into Excel spreadsheets.

b) What progress have you made towards achieving your original objectives?

Considerable progress has been made over the last year in achieving the stated objectives of this study. All data that have been gathered during the past field season have been entered into a GIS database. Summary statistics have been developed for the Trail Gulch study area at a scale of 70 m for mean slope, elevation, aspect, distance to water, proportion of open habitat, proportion of closed (forested) habitat, and food availability.

A spatial regression predictive model has been developed that identifies important landscape predictors of deer and elk movement in Red Butte Canyon during the spring, summer and autumn.

c) Please provide a summary of your results.

In Red Butte Canyon, we determined that animals are more likely to move in open habitat and in regions close to water. Elk and deer trails are also significantly less steep than local terrain. Our results suggest that predator avoidance, water requirements, and energy expenditure are important determinants of elk and deer movement in Red Butte Canyon.

Significance/Benefits of Research

a) What is/are the significance/benefits of your research at the following levels?

- local (in the area of the research site)
- national
- international

This is the first study to conduct a multivariate analysis of landscape predictor of large mammal movement at a fine scale. The results of this study should be extremely valuable in more effectively designing wildlife corridors and enhancing ecological connectivity among habitat isolates. The results of this study are highly relevant at a local, national, and international level.

b) How do your findings contribute to issues of sustainability?

Enhancing ecological connectivity among habitat isolates is an important means to minimize the adverse impacts of habitat fragmentation. This study will provide conservation practitioners with important guidelines for more effectively designing wildlife corridors and enhancing ecological connectivity among habitat isolates.

Dissemination of Results

The results of this study shall be published as a series of articles in peer-reviewed scientific journals.

Publications:

Newmark, W. D. and Rickart, E.A. (in review). Wildlife trail network reveals fine-scale landscape predictors of ungulate movement. *Journal of Animal Ecology*.

Volunteer Tasks and Accomplishments

- a) How did the volunteers contribute ideas, skills, expertise and motivations beyond that which you anticipated?

Physically, this is a very demanding project. The volunteers showed remarkable stamina and commitment to gather data under very difficult field conditions. The study sites at Trail Gulch and Sheep Creek are steep and rocky. On a daily basis, the volunteers hiked long hours, often in very hot conditions over difficult terrain.

In addition, the volunteers entered an extensive amount of data into several Excel databases. Finally the volunteers worked extremely well together as a team and prepared, while in the field, outstanding meals.

- b) How have volunteers helped you to achieve your research or educational objectives?

Volunteers located and mapped more than 165 trail segments at Sheep Creek. Volunteers recorded the percentage cover of the 14 most important food plants in the combined diets of deer and elk in 3,951 1 m x 1 m plots along 37 transects. Finally, volunteers entered more than 5,000 lines of data into existing databases.

Project Development

- a) What logistical or scientific challenges have you encountered in the past season and how will you address them during the next field season?

Conducting plant cover surveys at Trail Gulch and Sheep Creek is both tedious and physically demanding. In order to reduce the tedium of the work, volunteers work in pairs and alternate tasks.

- b) Have you used any additional methods/strategies to meet your research objectives? If so, please describe them.

We are continuing to experiment with various carnivore attractants at camera stations. Over the coming months, we shall try to determine which attractants are most effective. In addition, we are exploring the possibility of using very high resolution (6 cm) color infrared aerial imagery to map wildlife trails in Red Butte Canyon.

- c) How will you develop your research in the coming field season?

We need to continue to locate and map wildlife trails at Sheep Creek, monitor carnivore scent stations, and estimate food availability for elk and deer. In addition, if we can raise sufficient funds to purchase high resolution color infrared imagery of Red Butte Canyon, we will ground truth the aerial imagery with the assistance of volunteers in October 2007.

Educational Opportunities

- a) Does your project directly or indirectly involve the following groups in your research topic?
- Local communities

- Students
- Early career scientists
- Other groups

A doctoral student from Montana State University, a Masters student from Memorial University in Newfoundland, Canada, and an elementary school teacher from Utah served as field assistants this year. Their performances were outstanding and they greatly assisted the volunteers in all aspects of the project.

- b) Please tell us the ways your research helps these groups better understand the conservation of a sustainable environment.

A number of local residents have expressed a keen interest in learning more about the project and even possibly participating in the project.

- c) Has your project helped lead to the completion of Masters' theses, or other educational research findings?

An undergraduate student at the University of Utah majoring in biology conducted an independent study in Red Butte Canyon last year on wildlife trails.

Partnerships

- a) List partnerships or collaborations with other organizations that you have developed or maintained in the past season.

Wasatch Cache and Salmon-Challis National Forests have given us permission to conduct this research on these national forests.

- b) How have these organizations contributed to your project objectives?

It would not be possible to conduct this study without the support and permission of these national forests. Dick Wenger, the senior wildlife biologist on the Salmon-Challis National Forest, has been extremely helpful and instrumental in helping us identify potential study sites on this national forest.

- c) How do you anticipate these organizations will use the results generated by the project, and in what timeframes?

Our results should be extremely useful to forest managers in designing more effective wildlife corridors and enhancing ecological connectivity among habitat isolates.

Acknowledgements

We greatly appreciate all the support we have received from Earthwatch this year. We would particularly like to thank Tania Taranovski, Mary Rowe, Kelly Proffitt, Kelly Carter, and John Roberson for their assistance this year.