



**UTAH MUSEUM OF NATURAL HISTORY**

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January 11, 2008

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 ANNUAL FIELD REPORT

**Project Title:** Wildlife Trails of the American West  
**Date completed:** January 11, 2008  
**Completed by:** William Newmark  
**Period covered by the report:** June 2007 to January 2008

### Project Description and Background

**Principal Investigators:** William D. Newmark and Eric A. Rickart

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

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**Research Site (s):** Red Butte Canyon, Wasatch-Cache National Forest, Utah (40° 46' 52" N, 111° 48' 46" W )  
Sheep Creek, Salmon-Challis National Forest (45° 31' 05"N, 113° 52' 30" W)  
Pierce Creek, Salmon-Challis National Forest (45° 39' 17"N, 113° 55' 26" W)

**Local Management Status of the Research Site(s):** Red Butte Canyon: Research Natural Area; Sheep and Pierce Creek: U.S. National Forest

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

### Reporting on research objectives

1. Provide a summary of progress this year towards each of the objectives stated in your most recent research proposal. If work has not yet started on some of these objectives, state when you will start to work on them.

Considerable progress has been made over the last year in achieving the stated objective of this study. All data that have been gathered during the past field season have been entered into an Excel and GIS database. Summary statistics have been developed for the Trail Gulch study

area at a scale of 70 m for mean slope, elevation, aspect (direction slope is facing), 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 fall. A manuscript summarizing these results has been submitted to *Oecologia*.

**Objective 1:** The objective of this study is to identify landscape predictors of ungulate (hooved animals) 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?

## **Non-technical summary of results**

1. Give an account of the data collected and results (inputs and data) for the period covered by the report, mentioning any emerging trends.

### Data collected *Wildlife Trails*

During July, Earthwatch volunteers assessed the prevalence and distribution of wildlife trails along Pierce Creek, a new study site.

### *Carnivore scent station*

The June and July teams monitored a carnivore scent station and downloaded film from a remote-sensing camera.

### *Vegetation analysis*

The June and July teams recorded percent cover for the fourteen most important food plants in the combined diets of elk and mule deer in 1028, 1 m X 1 m plots (m = meters) along 14 transects (data collection along pre-set measured lengths or patches of an area). This is an impressive achievement.

### *Date entry*

Volunteers entered more than 2,000 lines of data in to Excel spreadsheets.

## 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 at an intermediate scale.

## 2. How do these data contribute to achieving **conservation impacts**?

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.

## 3. What is/are the **significance/benefits** of your research at the following levels?

- local (in the area of the research site)

A number of local residents have expressed a keen interest in learning more about the project and even possibly participating in the project. Local residents have also been invited to attend lectures about the project.

- National

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

- International

This is the first study to use wildlife trail networks to identify landscape predictors of large mammal movement. Furthermore, this is the first study to conduct a multivariate analysis (analyzing more than one statistical variable at a time) of landscape predictors of ungulate movement at an intermediate-scale and will serve as an important bridge between studies of ungulate movement that have been conducted at finer and coarser-scales (smaller and larger scales). The results of this study should be extremely valuable in more effectively designing wildlife corridors and enhancing ecological connectivity among habitat isolates.

## **Communication 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). Intermediate-scale Landscape Predictors of Ungulate Movement in the Central Rocky Mountains. *Oecologia*.

## **Educational Opportunities**

### 1. 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 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.

Several elementary teachers and retirees that participated in the project this year requested copies of the project's PowerPoint presentation so that they can share this presentation with their students; or contact the local editor of their newspaper about the importance of conserving biodiversity. A mid-career volunteer who participated on the July team was inspired to return to graduate school and study biology.

2. How does your research help these groups better understand and act towards the conservation of a sustainable environment?

This project highlights the importance of enhancing ecological connectivity among habitat isolates to reduce species loss and provides a conceptual framework for how this can be achieved.

3. Has your project contributed to the completion of Masters' or Ph.D. these or degrees, or other educational research findings?

In 2006, an undergraduate student at the University of Utah majoring in biology conducted an independent study in Red Butte Canyon on wildlife trails.

## **Other**

We received a grant this year from the National Geographic Society to purchase very high resolution (6 cm) aerial photography of Red Butte Canyon Research Natural Area so that we can expand the mapping of wildlife trail networks in the canyon. In November, we hired an engineering firm in Salt Lake City to conduct the aerial photography and they are currently processing the digital imagery. The DIGIT lab at the University of Utah will develop in the coming six months summary statistics of the response and predictor variables at a scale of 70 m for the entire canyon.

## **Acknowledgements**

We greatly appreciate all of the support that we received from Earthwatch this year. We would particularly like to thank Kim Ciano, Mary Ellen Rowe, Nicole Like, Kelly Proffitt, and John Roberson for their assistance this year.