

## 9TH BOULDER COUNTY ECOSYSTEM SYMPOSIUM

### Issues at the Urban-Nature Interface

This year's BCNA Ecosystem Symposium explored a variety of issues at the interface of urban and natural environments. The symposium was held March 22nd at the Boulder Public Library auditorium and was, once again, well attended. Research results were presented by a variety of excellent speakers. The abstracts from the talks are presented below.

#### **The Impacts of Accumulated Road Traction Sand on the Riparian Habitats of Long Canyon**

***Presenter: Brad Johnson (Johnson Consulting, Ft. Collins)***

Stream degradation due to excessive sedimentation is one of the most pervasive problems affecting streams in the United States. National surveys have repeatedly singled out sedimentation as an important pollutant based on quantity as well as economic and ecological effects (USEPA 1997). Boulder Open Space and Mountain Parks (BOSMP) staff suggested that traction control sand applied to Flagstaff Road could be a potentially major source of anthropogenic contamination in the Long-Gregory Creek watershed on BOSMP land. We conducted a study to investigate the source, distribution, and impacts of sediment derived primarily from winter sanding treatments of Flagstaff Road. Impacts to riparian areas are discussed in this talk.

We used a comparative approach to evaluate potential impacts of accumulated road sand. Sample plots were placed every 100 m along the Long-Gregory Creek riparian zone - from Long Creek's headwaters down to a major break in topography and geology at approximately 6500 ft. of elevation. Reference plots were similarly placed along four unimpacted reference streams within the watershed. At each plot we sampled soils and vegetation, mapped sediment deposition, and surveyed channel cross-sections. Multivariate statistical analyses showed that road-derived sediment accumulation has significantly altered the plant species composition within impacted stream reaches. Vegetation impacts included a shift in species composition to more ruderal, disturbance-tolerating species, preclusion of some characteristic and sensitive riparian species, burial of herbaceous and woody vegetation, and likely stressing of rare species populations. The accumulation of road-derived sediment has also affected channel morphology by creating wider and shallower channel

cross-sections. We concluded that road sediment accumulations have caused demonstrable impacts to Long Creek riparian areas, causing changes in channel morphology, sediment dynamics, and plant species composition. Reduction of road-sediment inputs to Long-Gregory Creek must be undertaken to mitigate ecological impacts and allow for ecological restoration.

### **The Effects of Recreational Trail-use on the Behavior and Nesting Success of American Robins and Yellow Warblers**

***Presenter: Bill Merkle (University of Colorado)***

This research examined the effects of recreational trail-use on the behavior and nesting success of American robins (*Turdus migratorius*) and yellow warblers (*Dendroica petechia*) in willow/cottonwood riparian habitats located on public open space lands in Boulder County, Colorado. Nests were located and monitored in riparian corridors with and without trails to determine nesting success. In addition, behavioral observations were conducted on pairs of birds associated with active nest-sites. Vegetation at each study site, as well as each nest-site, was also quantified. Results indicate that increasing intensity of recreational trail-use was associated with increased incubation behavior and reduced feeding of nestlings by female American robins. Male robins appeared to increase their feeding at higher use sites, countering the reduction in female feeding. Surprisingly, both American robins and yellow warblers achieved higher nesting success with increasing intensities of trail-use possibly due to some potential nest predators being displaced from trail sites by disturbance from recreational users. For robins, nesting success was lowest at low use trails. Some of the refuge effect for yellow warblers was reduced by increased parasitism by brown-headed cowbirds with increasing trail use.

### **Conditioning Pavlov: Changing Visitor Behavior?**

***Presenters: Matt Jones & Steve Mertz (Boulder Open Space & Mountain Parks)***

The City of Boulder, Colorado has one of the finest examples of municipally owned open space in the western U.S. While open space provides unique recreation opportunities for city residents, high use levels threaten fragile resources and the recreation experience of open space enthusiasts. Currently, the City registers 3.5 million annual day use visits on 130 miles of designated trails within the 35,000 acres that comprise the Open Space and Mountain Parks system. Minimum impact education was seen as one way of accommodating increasing public use while protecting the resource

and related visitor experiences. City of Boulder Open Space partnered with Leave No Trace, Inc. (LNT) to assess the effectiveness of a "front country" Leave No Trace on Open Space program specifically designed to address visitor impacts on municipal open space areas. Three research elements were used in 1998 to measure and improve program effectiveness: 1) Focus groups were convened to refine programmatic content prior to implementation, 2) trail head contact logs were used to track 1,700 educational contacts, 3) a post-campaign assessment survey of 630 randomly selected visitors was conducted to determine program effectiveness. The results of the survey confirmed an increase in program awareness and a higher level of minimum impact knowledge by those who said they heard of the program. Outreach mechanism effectiveness was also assessed, with trail head contacts thought to be the most effective. A pre/post study was conducted in 1999 of City of Boulder Open Space visitors to determine if their knowledge and behavior changed following a "front country" Leave No Trace (LNT) educational effort. Respondents were asked LNT knowledge and behavior questions at trail heads. Visitors were then contacted at the same trail heads to educate them about LNT principles. A brochure was handed out to reinforce the contact. Signs were placed. Respondents were surveyed later to again measure their LNT knowledge and behaviors. Surveys were also analyzed to determine whether central or peripheral routes of communication appear to be a more compelling approach. Additionally, results were compared by user group, age, frequency of visits to open space, gender, and years living in the county. Results indicate that LNT knowledge did increase, albeit minimally, and only differed significantly by gender. Overall, LNT knowledge was considerably high before the treatment. Also, familiarity with regulations was more predictive of whether an individual actually practiced LNT behaviors than was one's LNT knowledge or time spent thinking about specific LNT behaviors. This indicates that LNT educational, or central route, efforts may not be as effective as other strategies, such as enforcement, in changing behavior when the user group is already highly knowledgeable of LNT principles.

## **The Ponderosa Pine Forest Bird Communities of the City of Boulder Open Space and Mountain Parks and Boulder County Open Space Properties**

***Presenter: Heather Swanson (University of Colorado)***

Foothill ponderosa pine (*Pinus ponderosa*) is common along the eastern slope of the Colorado Front Range, extending the entire length of the state.

A number of Neotropical migrants breed in the ponderosa pine forest and adjacent montane riparian and shrubland habitats of Boulder County. Many of these species are considered sensitive across their southwestern range. As a result, urban development and management activities such as thinning, burning and recreational development may have a large impact on these birds and their long-term survival. To address this issue, we monitored the breeding birds on City of Boulder Open Space and Mountain Parks as well as Boulder County Open Space from 1999- 2001. We collected data on breeding success (including predation and parasitism), community composition, and vegetation characteristics of the forest stands in an attempt to define the current avian community and to make recommendations about management of the forest properties. We found that City of Boulder Open Space, Boulder Mountain Parks, and Heil Open Space support a broad community of breeding birds. However, we found that breeding success of some species may be compromised by factors such as Brown-headed Cowbird parasitism, nest predation and human disturbance, which may increase with high degrees of urbanization. This suggests that Open Space Management agencies may need to address the issue of urbanization and recreational use in their wildlife management plans. We found that bird communities differed with stand-level vegetation differences created by long-term fire suppression in Boulder County. We will present management recommendations for treatment of these sites so as to maximize the diversity of the forest bird community present. In addition, we will present GIS models representing the factors that determine the presence or absence of a species in a particular ponderosa pine stand which can be used in future planning to minimize negative impacts to sensitive species on Boulder Open Space. Overall, Boulder Open Space properties provide important habitat for migratory and resident ponderosa pine forest bird species. However, human development and fire suppression have altered the habitat available to the birds in some cases and future management to address these impacts will be necessary to protect this diverse bird community.

### **Results of Monitoring vegetation Associated with Black-tailed Prairie Dog Colonies on City of Boulder Open Space, 1997-2001**

***Presenters: Lynn Riedel (Boulder Open Space & Mountain Parks) & David Buckner (ESCO Associates)***

Vegetation of areas occupied by black-tailed prairie dogs as well as adjacent unoccupied areas has been monitored for percent cover by

species and species density at over thirty sites across the City of Boulder Open Space lands from 1997 through 2001. Black-tailed prairie dogs appear to occupy a wide variety of short-stature vegetation. Across Boulder Valley, the condition and character of vegetation at the onset of prairie dog occupation is quite variable. Hence the reactions of vegetation to prairie dog occupation is quite variable. Although exceptions to most potential general patterns or trends can be found, sample data from 28 sites for 1997, 1998, and 1999 average to show: 1) Total vegetation cover on prairie dog-occupied sites averaged more than unoccupied sites. The difference ranged from as little as 1.6 percent in 1997 to as much as 9.6 percent in 1998. 2) The percent of the ground surface covered by litter (without overhanging plant cover) was greater in unoccupied sites than on occupied sites. The difference ranged from 6.9 percent in 1997 to 27 percent in 1999. Exposed bare soil was greater in occupied sites than in unoccupied sites. The difference increased from 6.3 percent in 1997 to 12.9 percent in 1999. Despite greater total vegetation cover, occupied sites averaged distinctly lower total ground cover. Species density (number of species per 100 sq.m.) averaged from 14 to 22 percent fewer species per 100 sq.m. on occupied sites than on unoccupied sites in all three years. The presentation will review accumulated data and results through 2001.

## **Black-tailed Prairie Dog Protection at the Urban / Wildland Interface: the City of Boulder's Approach**

***Presenter: Cary Richardson (Boulder Open Space & Mountain Parks)***

In February 2000 the Boulder City Council passed an ordinance making it illegal to kill prairie dogs within the city limits and on any city owned lands, regardless of location. The subsequent resolution explains that the City of Boulder Open Space & Mountain Parks Department will take a lead role in providing, locating, and preparing receiving sites, and in relocating prairie dogs. OS&MP staff is taking a series of steps, to accommodate these displaced animals while attempting to balance our charter goals. Some of these steps include conducting a refined habitat suitability analysis to identify the most appropriate sites within which to create artificial colonies, experimenting with relocation and site preparation techniques, and prioritizing the acquisition of potential prairie dog receiving sites. We are also monitoring colony expansion and changes to plant communities, including noxious weed infestations, to help assess the long-term effects of this protection strategy.

## **Mule Deer Movements in Relation to Spatial Patterns of Chronic Wasting Disease Prevalence in Northcentral Colorado**

***Presenter: Mary Conner (Colorado State University)***

Chronic wasting disease (CWD) is endemic in northeastern Colorado and southeastern Wyoming. Prevalence in mule deer (*Odocoileus hemionus*) varies from 0 to 15% among different spatial areas and tends to follow biologically-relevant patterns: lower elevation foothill subpopulations of mule deer at the core of the endemic area have the highest rates of CWD, with prevalence declining to varying degrees in all directions. Migration and dispersal movements of deer were hypothesized to contribute to the observed spatial patterns of CWD prevalence. The primary goals of our study were to describe patterns of mule deer movement and determine whether deer movements from areas of high CWD prevalence are related to levels of CWD prevalence in surrounding areas and/or mule deer populations. To this end, we radiocollared 80 mule deer throughout the CWD endemic area. Radiocollared deer were located every 1-2 months from January 2000 to January 2002. We found that movements of deer showed a relationship to prevalence patterns. Deer in the Virginia Dale area, with high levels of CWD prevalence, migrated north into areas of Wyoming with equally high prevalence. Deer located west of Virginia Dale, where levels of CWD prevalence were relatively low, migrated west into areas of even lower prevalence. There were mixed movement patterns of deer in the foothills between Lyons and Horsetooth Reservoir; between 0-30% of the deer made long altitudinal migrations to the west while the remaining deer did not migrate. Deer that migrate to the west may be responsible for the southern spread of the disease through contact on summer range. Migration patterns of mule deer may partially explain spatial patterns of CWD prevalence in northcentral Colorado and southcentral Wyoming