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**STATEMENT OF CHARLES BEDFORD
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BEFORE THE
COLORADO ROADLESS AREAS REVIEW TASK FORCE**

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Mr. Chairman and members of the Task Force, thank you for the opportunity to provide comments to the Task Force as you prepare to make recommendations to Governor Owens regarding roadless areas in Colorado. My name is Charles Bedford and I am the Colorado State Director for The Nature Conservancy. Prior to joining The Nature Conservancy staff four years ago, I served as the Director of the State Land Board and a legal counsel and policy advisor to Governor Romer. I am pleased to present the Conservancy's views on this important topic.

The Nature Conservancy Background

The Nature Conservancy is dedicated to preserving the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The Conservancy has more than 1.1 million individual members and 30,000 members in Colorado. We currently have programs in all 50 states and in 30 other nations. To date our organization has purchased or established conservation easements on more than 14 million acres in the 50 states and Canada, and has helped local partner organizations preserve over 102 million acres in other nations. We have also worked with public land managers such as the Forest Service to provide scientific information to inform land use planning, management, and monitoring. The Conservancy itself owns more than 1,340 preserves in the United States – the largest private system of nature sanctuaries in the world. Our conservation work is grounded in sound science, strong partnerships with other landowners, and tangible results at local places.

In Colorado we have worked with communities for over 30 years to conserve the state's rich natural heritage and our way of life. We have worked with local partners to protect more than 600,000 acres of forests, prairies, canyons and wetlands. We have also worked with agency partners such as the Forest Service, Bureau of Land Management, and Department of Defense to help ensure the sustainability of biological resources on federally managed lands.

The Conservancy works to achieve lasting conservation results by finding common ground with communities and partners. Our approach is based on sound, scientific analysis that also accounts for people and the needs of local communities. We also promote key public policies that represent a balanced and practical approach to conserving lands and waters, and our quality of life, in Colorado.

Overview of Statement

Our comments concerning roadless areas are rooted in our mission – ensuring the sustainability of biological diversity by conserving the best places in Colorado where native plants and animals can thrive. We understand that in making your recommendations, the Task Force will be considering other factors, such as recreation and commercial and commodity opportunities. We do, however, urge the Task Force to ensure that other uses are compatible with the conservation of natural values. We cannot control where species and ecosystems occur on the land, but we can control the placement of the human footprint.

Our statement addresses two major issues:

- I. The importance of areas without roads to biodiversity.
- II. Key potential impacts of roads on biodiversity.

We will also provide statements related to the potential management of areas without roads. The remainder of this document provides additional information about each of these topics.

I. Importance of Areas without Roads to Biodiversity

Over the last decade, the Conservancy has made significant investments in carrying out detailed ecological assessments across the United States. These assessments, and those of many other researchers reveal a high correlation between areas without roads and sites that scientists have determined to be important for the protection of biodiversity. Indeed, a key element of our assessment process is to identify large forested areas that are free or have a minimum of fragmenting features such as roads.

The number of roads in Colorado is increasing rapidly. For example, data from the Colorado Department of Transportation indicates that the “lane miles” of county roads (the length of the highway segment multiplied by the number of through lanes) increased 22% in five years, from 111,000 miles in 2000 to 135,000 miles in 2004 (CDOT 2004). This rate of road construction suggests an increasing importance of remaining large and unroaded areas.

The Conservancy completed a statewide analysis to determine the relative importance of National Forest lands to large patches of natural habitat that are unfragmented by roads (not including OHV), transmission lines, and railroads – similar features to what the Forest Service uses when inventorying roadless areas. Note that this is a conservative estimate of roadlessness since OHV roads were not assessed.

The analysis demonstrates that the Forest Service is by far the single largest manager of patches of unfragmented natural habitat in Colorado that are over 5,000 acres. The Forest Service manages approximately 42% of such areas. The Bureau of Land Management is the next largest land manager, at approximately 19%. A myriad of private land owners manage the vast majority of the remaining areas – approximately 29%.

These large expanses of unfragmented forests and other ecosystems are important to biodiversity values for several key reasons.

1. Ecological systems that historically occurred in large patches are generally healthier, more resilient, and better able support a broad diversity of species when they exist in large and undisturbed blocks. The health of the landscape is generally greatest in areas that are large and unfragmented. For example, weed invasions are typically less abundant in large unroaded areas because it is difficult for weeds to access these areas – they have no entry point. Weedy invasions almost always occur as a result of an unnatural disturbance such as road construction, turning of soil, etc. The presence of weeds is inversely related to the abundance of biodiversity—in general, the more weeds that exist, the less native vegetation and wildlife is present. Unnatural fire starts are also positively correlated with more roads (Forman and Sperling *et al.* 2003).

2. Many important species in Colorado – especially mid-and large-sized species like lynx, mountain lions, badgers and pine martens - require large and relatively undisturbed habitat. Several large and mid-sized mammals, including Canada lynx, wolverine, grizzly bears and wolves, have disappeared or declined significantly in Colorado due in part to habitat loss and the indirect impacts of fragmentation caused by roads, pipelines, and other factors. Some of these losses have cascading impacts on ecosystems such as increases in other predatory species such as coyotes. Examples of the acreage required by different species include:

- Pine marten – home range of ~4,000 acres. This member of the weasel family primarily inhabits spruce fir and lodgepole pine (Fitzgerald *et al.* 1994).
- Badgers – one study showed that 9 were found in ~6,400 acres near Woodland Park (Pike San Isabel NF) (Fitzgerald *et al.* 1994).

3. Areas without roads provide necessary sanctuaries and seclusion for wildlife during sensitive portions of their life cycle such as nesting, denning, and winter habitat. Lack of disturbance during sensitive parts of a life cycle can be critical for a species' existence.

Examples include the following:

- Elk calving season– Elk require solitude and minimal disturbance during the calving season. Roads encourage disturbance that can negatively impact elk during the calving period, which is when large elk are sensitive to relatively small impacts. For example, coyotes tend to hunt along roads. Cow elk may exert large amounts of energy to defend newborn calves. The likelihood of calve mortality increases with disturbance such as predation by coyotes (Wisdom and Cook 2000)
- Sharp-tailed grouse wintering – Sharp-tailed grouse generally spend winters in relatively undisturbed montane shrublands. Disturbance in and from their winter range causes displacement to less suitable habitat, expenditure of energy, and increased exposure to predators (Connelly *et al.* 1998)
- Golden eagle nesting period – These raptors will typically leave their nests if disturbed. Continued disturbance can cause nest abandonment or create unsuitable habitat for future nesting attempts (Kochert *et al.* 2002)

4. Protection of existing intact public lands, and in particular, areas without roads, is especially critical for species at risk of extinction. According to a national survey completed in 2000, only a small percentage of species at risk of extinction, including listed species, are located on public lands that currently afford a high degree of protection to biodiversity. The areas that provide the greatest degree of protection to biological resources, including wilderness areas on

National Forest lands, comprise only a tiny fraction of habitat for these at risk populations (3% to 5%). Areas that provide somewhat lesser protection, such as some state parks and national wildlife areas, only contain an additional 1% to 4% of these populations (Stein *et al.* 2000). On public lands, therefore, the remaining large blocks of habitat without roads that do not lie within a special designation such as wilderness study areas or research natural areas are extremely important and are the “next best thing” to special designations in terms of supporting forest health.

The Conservancy’s ecoregional assessments revealed that increased protection for vulnerable species habitats may decrease the need for additional Endangered Species or special status listings. For example, the Southern Rocky Mountains Ecoregional Assessment (Neely *et al.* 2001) takes into account species with the potential to be listed under ESA. Of that list, examples of those that inhabit National Forest lands include the following:

- Northern goshawk
- Sharp-tailed grouse
- Gunnison prairie dog
- Boreal toad
- Northern leopard frog
- Colorado river cutthroat trout

Maintaining high quality habitat that is minimally impacted by roads is an important conservation strategy for each of these species. The most efficient way to address the needs of these species is to conserve lands and waters that are currently in the best condition and have had the least potential role in development for other purposes. Generally speaking, public lands are less developed and in larger patches from a conservation standpoint than privately-held lands in a similar area (excepting grasslands). As such, federal land management agencies can play a key role in conserving biological diversity by ensuring that large areas that remain close to their natural condition remain in a largely unfragmented state.

If habitat for special status species, even those that remain relatively common, is not protected on public lands, then the burden of protecting such species will necessarily shift to private landowners to protect this habitat. Public lands are generally less developed and in larger patches than privately-held lands. Therefore, focusing compliance and habitat goals on public lands is an efficient way to lessen the burden on private landowners.

II. Key Impacts of Roads on Biodiversity

Roads, together with the activities for which the roads would be built, pose a number of significant threats to biodiversity. Harmful effects from these roads include increased mortality, modification of animal behavior, alteration of the physical environment and spread of invasive species. Roads change soil composition and density, temperature, soil water content, light levels, dust, surface waters, patterns of runoff and sedimentation. Overall, the presence of roads is highly correlated with reduced native species composition, decreased population sizes, and other processes that negatively shape aquatic and riparian systems (Spellerberg 1998; Haskell 2000; Trombulak & Frissell 2000). Findlay and Bourdages (2000) state, “Evidence is accumulating that road construction may result in significant loss of biodiversity at both local and regional scales”.

A key reason for the significance of the loss is that although the actual footprint of the roads is small, the road-effect zone is very large (Forman and Alexander 1998). This zone may extend the impacts of roads more than two orders of magnitude.

Three of these effects -- habitat fragmentation, introduction and spread of invasive species and increased water pollution – are among the most serious threats to plants and animals in Colorado.

1. Habitat Fragmentation

Habitat loss is one of the leading identified threats to biodiversity (Stein *et al.*, 2000). Indeed, Forest Service Chief Bosworth has identified habitat fragmentation as one of the principle threats facing the health of our forests.

Habitat fragmentation is particularly troublesome because plants and animals are often best protected by safeguarding landscapes made up of large, continuous blocks of habitat that allow free movement and migration of wildlife (Groves 2003). Fragmentation of habitat leads to decreased native species diversity, reduced genetic exchange within populations, increased mortality, and lower densities of some species in the smaller habitat areas that remain after fragmentation (Arnold *et al.* 1995; McIntyre 1995). Roads also contribute to the fragmentation of habitat and the isolation of wildlife populations by increasing the mortality of wildlife attempting to cross roads (Mumme *et al.* 2000; Trombulak & Frissell 2000).

The introduction of a new road or other disturbance can result in a domino effect of negative consequences to forest, woodland, or grassland health. In Colorado for example, new roads can have a particularly egregious effect in arid ecological systems with shallow soils, such as pinyon-juniper (PJ) woodlands. In an undisturbed PJ system, rainfall skirts over the fragile soil crusts until it enters a streambed. Road construction, however, destroys the soil crust. Rainfall then becomes trapped in the disturbed places, which expand through erosion and create a new flow pattern that is often permanent. Mud puddles in new places create a wetter environment that drowns the roots of some species and may attract nonnative species. Weedy invasions such as smooth brome establish and modify the soil chemistry, which creates a new growing environment for species that never lived there before. Weedy invasions can form large homogenous patches, which prevents the reestablishment of native species. In the absence of restoration efforts, this domino effect will continue. The quality of the system and its ability to support healthy native populations will continue to decline.

2. Introduction of Invasive Species

Invasive species are another major threat to the protection of vulnerable species and native habitats. Forest Service Chief Dale Bosworth has identified invasive species as one of the four key threats to forest health. There is no question that invasive species are a serious threat to biodiversity, and that this problem is getting worse. Unchecked by natural predators and diseases, many introduced species are flourishing at the expense of native U.S. species, taking over natural ecosystems and pushing many of our rarest plants and animals toward extinction (Stein *et al.* 2000) (e.g., Sage grouse species).

Forest roads contribute to the introduction of invasives in a number of ways. Roads may be the first point of entry for invasives into a new landscape, and can also serve as a corridor along which they can move farther into the landscape (Pauchard & Alaback 2004). In addition to the environmental harm this causes, there can also be huge economic costs, either through direct destruction of economically important species (*i.e.*, the threat to oak and other species of trees from sudden oak death) or through the efforts needed to control and eradicate invasive species that displace native ones.

As a Colorado example, dalmation toadflax and yellow toadflax are rapidly creeping up into the forest and meadows near Vail, Breckenridge and Telluride. For much of the last 25 years, individuals have planted the toadflaxes in pots because of their beauty. Some wildflower mixes also contained toadflax seeds. Little did the homeowners know that toadflaxes are weedy invaders, and that their seeds tend to be caught in tire treads and become established in disturbed areas along roads and footpaths. Toadflaxes are crowding out native plants in many meadows and grasslands between forested areas in Colorado.

Locally-invasive wildlife is problematic as well. Like plants, wildlife typically gain entry into new systems by following roads and human habitation. In Colorado for example, crows used to be rare, but have followed farming and human habitation westward through most of the state. They are major predators of many native birds and frequently kill fledglings in their nests. Similarly, raccoons have infiltrated much of the state by following roads and human habitation into areas they previously did not inhabit. In fact, the Conservancy noticed a raccoon at one of our preserves for the first time just two years ago. Raccoons are problematic because they are major ground predators of birds, reptiles, and small mammals. It is highly likely that the construction of roads into previously unroaded areas in Colorado will facilitate the intrusion of additional such problematic species.

3. Increased Water Pollution

Roads create increased water pollution because, as the Forest Service states, “Geomorphic effects of forest roads range from chronic and long-term contributions of fine sediment into streams to catastrophic effects associated with mass failures of road fill material during large storms... The effects of roads on aquatic habitat are believed to be widespread and profound.” (USDA Forest Service 2000).

The 2000 Forest Service report notes that surface erosion from road surfaces, cutbanks and ditches represents a significant, and in some landscapes, the dominant source of sediment to streams. Culverts, which allow streams to pass under roads, restrict fish movement and have significant impacts on patterns of fish abundance and diversity. Several studies have correlated increases in road density or indices of roads with decreases in patterns of fish density and fish species diversity. Increased volumes of fine sediment in stream gravel have been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity and increased predation of fishes. Increased fine sediment can also reduce benthic organism populations and algal production. Once such processes occur, they can adversely affect species, even those far downstream, for long periods of time (USDA Forest Service 2000; Trombulak & Frissell 2000; Crist and Wilmer 2002).

In Colorado, siltation from roads can be particularly problematic to native freshwater species such as the greenback cutthroat trout and non-native but economically important trout species. Again, the domino effect of road construction becomes evident. Road construction strips native vegetation from the roadbed, exposing raw soil. Rainfall dissolves and carries exposed soil to streams, often at an exponential rate. This erosion causes sedimentation of the streams, which diminishes the water quality and the habitat of trout and other species. The sediment directly suffocates trout eggs, which are laid in gravel. In addition, the sediment reduces the oxygen content of the stream, which in turn reduces the availability of trout-preferred food sources such as mayflies and damselflies which survive only in highly oxygenated streams. As the number of mayflies and damselflies decreases, the number of chironomid midges – midge larvae - increases. Midges are not preferred food of most native fish and their habitat preferences are in contrast to the preferred food such as mayflies and damselflies. Trout found in poor quality habitat may become malnourished, as is evidenced by large heads and lean bodies. The reproductive output of trout depends on their body weight – the lower the body weight, the fewer the eggs they lay. Such conditions may cause increased mortality and expensive habitat rehabilitation to maintain viable native fish populations.

Management of Areas without Roads

We understand that the Task Force has been pondering questions related to management of areas without roads, such as whether to identify uniform management prescriptions for roadless areas. From a biological perspective, the Conservancy believes that management prescriptions for such areas should be tailored to the plants, animals and systems that occur in the area. There are probably some basic rules that are applicable to and appropriate for all roadless areas, such as the importance of minimizing intrusions that disturb soil but allowing “primitive use” activities such as hiking, photography, and wildlife watching. In terms of actual on-the-ground management, however, management prescriptions may vary based on the type of ecological system. Some prescriptions may apply to the same type of ecological system; for example, timing restrictions in elk calving areas. By contrast, differences may exist between different systems (wet spruce and fir forests vs. dry spruce and fir forests), and between the same systems in different places (dry spruce and fir forests in one part of the landscape versus another). It is important to take natural variation of different systems into account when developing management prescriptions.

Conclusion

Thank you again for the opportunity to provide comments on behalf of The Nature Conservancy. We would be happy to provide the Task Force with further information to meet the critical goal of conserving Colorado’s rich natural heritage and our way of life.

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Note: Colorado-specific examples are based on communication with Chris Pague, Senior Ecologist, Colorado Chapter of The Nature Conservancy. February 2006.