Betraying the Future: A Critique of BLM's WOPR DEIS.

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Introduction

I submit here detailed comments concerning three aspects of BLM's WOPR DEIS. These are in addition to three letters I have previously submitted that address these and other concerns, albeit in less detail.

I admit profound disappointment in this document that reveals that BLM administration is trapped somewhere in late 19th century – early 20th century thinking, as if the events and science of the past decades had never transpired. The lack of concern with the overall parameter of biodiversity preservation is appalling. Original forests are universally recognized as one of our planet's greatest natural resources because they provide jobs and sustenance for hundreds of millions of people. They are nature's pharmacies and raw material factories, with unmatched biological diversity. They cleanse and restore water supplies. They provide increasingly needed re-creation.

As a professional research scientist who has worked for forty years, first at the National Institutes of Health and then at Northern Arizona University, to find therapeutics for cancer and viral diseases, I am greatly dismayed by the BLM's WOPR DEIS. Presently, the rate of species extinction is at least 1000 times was it has been in the past, except possibly in times of great planet-wide catastrophes or massive climate changes. Humans are the cause of this extinction and the cause is very easy to understand. Animals and plants need space, and they need energy to exist. Anyone can see that humans have occupied much of the planets surface. Moreover, over 40% of the world's photosynthetic capacity (read ability to produce food or energy) has been taken over by people, directly or indirectly. No wonder that the natural world is in peril.

To someone in drug discovery, this is a frightening scenario. One analogy is that every time a species goes extinct, it is like a book, or a whole shelf of books, being burned. Knowledge, insight, wisdom, all vanish. Over the eons, with struggles waged among species and against the ever-changing often hostile environment, plants and animals have developed incredibly complex solutions to unbelievably difficult problems. We stand as the beneficiaries of this ageless combat.

One way in which our profit is manifold is through the novel medicines that nature has provided us. There is in both medicine and pharmacy, not to mention in the

lay public, a serious lack of acknowledgment and appreciation that such compounds continue to come from natural sources. Gordon Cragg and associates at the National Cancer Institute illuminated the lack of appreciation of natural products as an important source of approved drugs in the United States. They conducted an analysis of drugs approved by the Food and Drug Administration in the United States in a 12-year period (1983–1994) and found that 157 of 520 drugs (30%) approved were natural products or their derivatives. In the same period, 61% of anticancer agents approved were natural products or their derivatives. A prime example is Taxol from the Pacific Northwest's Pacific Yew (*Taxus brevifolia*). Even when a physician prescribes an antibiotic, there is little awareness that a fungus or a bacterium, probably associated with some decaying plant material, was the original source of that compound.

Cancer is not the only disease for which nature has provided therapeutics. For instance, natural products have played an important alternative role in the research for new acetylcholinesterase inhibitors, as exemplified through the discovery of galantamine from Caucasian snow-drop and available as Razadyne, in the USA by the FDA for the symptomatic treatment of Alzheimer's disease.

Another example of new drugs originating from natural products and introduced to the United States market, include tiotropium for the treatment of chromic obstructive pulmonary disease. Nitisinone has recently been released for the therapy of a rare inherited disease, tyrosinaemia. Calanolide A is effective against drug-resistant strains of HIV (AIDS virus). And the list goes on.

We are steadily losing a number of plant species each day. One-eighth of all plant species are estimated by the International Union for the Conservation of Nature to be threatened. Some of these lost species have never been catalogued, for the others they have never been evaluated biologically. Ill-advised actions as contained in the three action alternatives of the BLM WOPR DEIS will only make a bad situation worse.

Habitat loss and fragmentation are the most serious threats to biological diversity and the primary cause of the present extinction crisis. The theory of island biogeography predicts that a loss of area will lead to extinctions and reduced species richness. (see references below)

Groombridge, B. 1992. Global Biodiversity. Chapman & Hall, London.

Heywood, V. H. 1995. Global Biodiversity Assessment. Cambridge University Press, Cambridge, UK.

Reed, D.H. 2004a. Extinction risk in fragmented habitats. Animal Conservation 7: 181-191.

Reed, D.H. 2005. The relationship between population size and population fitness. Conservation Biology19: 563-568.

Reed, D.H. and Frankham, R. 2003. Correlation between fitness and genetic diversity. Conservation Biology 17: 230-237.

The contribution of deforestation to the loss of biodiversity has not always been appreciated. Worldwide, the rates of deforestation will likely drive up to 80% of all species of plants and animals to the verge of extinction within 50 years. For instance, in eastern North America, one in seven endemic bird species—those found only there—became extinct during the forest clearing that peaked just over a century ago. In the state of Hawaii, over 90% of the bird species were lost as a consequence of human impacts. The fate of other species is not so well known, but they are likely to have been even more seriously effected. Presently, between 7% and 40% of various kinds of animals and plants are on the verge of extinction in the U.S., most as a consequence of our destroying their habitat. Birds are among the groups least affected. We study birds because declines in bird populations indicate loss of function throughout entire ecosystems.

These losses matter to us in many ways. The loss of such a high fraction of species raises considerable ethical concerns. There are economic concerns too. In the past, there has been a tendency to see the wood, but not the forest (to take liberties with an old adage). It is a simple matter to estimate how many board feet a forest may provide and so how much that wood is worth. Science now understands that such estimates grossly misrepresent the value of forest ecosystems to local communities and to our nation.

Ecology—a science that so often demonstrates the "law of unintended consequences"—shows that converting trees to timber on a massive scale through clear-cutting (regeneration harvest according to the WOPR DEIS) often has severe ecosystem consequences. Well understood scientific results show that such forestry often leads to serious problems of erosion, damage to streams and rivers, the slow regeneration of forest, and the vulnerability of the even-aged forest that does grow back to diseases and infrequent but catastrophic fires.

Ecosystems provide essential services, including protecting water quality and reducing soil erosion. A new understanding is emerging that joins ecology with economics. This process requires ecologists to document the variety of ecosystem processes and challenges economists to estimate their value. Some of these connections are easy—the loss of forests protecting salmon streams is a major source of concern to the many, independent small businesses that depend on salmon. Other connections are harder to estimate—how much local economies gain from the esthetic values of old-growth forests, for example—but the overall values involved are likely to be huge.

Aquatic systems in general, and fish diversity in particular, have been devastated throughout most of this country—and particularly in the American West—over the last 50 to 100 years. For example, nearly every native fish species in Arizona is declining, endangered, or already extinct, hundreds of stocks of salmon throughout the Pacific Northwest are declining or extinct, and the four most endangered groups of organisms in north America, as measured by proportion imperiled, are all aquatic: freshwater mussels, crayfish, amphibians, and fishes.

Forests are also the basis on which biological diversity, including endangered species, depend. Biodiversity, too, plays an important role in maintaining our activities, be they commercial uses or recreation.

Your WOPR proposes widespread clearcutting of public forest, involving over 1,000 miles of new logging roads and 140,000 acres of clearcuts (regeneration harvest!) in the first decade alone would cause further species extinction and loss of natural systems and values.

I support as an alternative the Community-Conservation Alternative. If that is not possible, then I support only the NO ACTION ALTERNATIVE. Alternatives 1, 2, & 3 are not acceptable in any form. The BLM could avoid conflict and controversy by adopting the Community-Conservation Alternative for the Western Oregon Plan Revisions because it fits the realities of the early 21st century Oregon economy. This common sense vision includes:

* Protecting all the remaining mature and old-growth forests on federal land;

* Shifting the agency's efforts toward ecological restoration of forests and watersheds; and

* Achieving social and economic objectives through forest restoration activities.

The Community-Conservation Alternative advances the terrestrial and aquatic ecosystem management goals of the Northwest Forest Plan by keeping intact the remaining mature and old-growth forests on federal lands in Western Oregon and by maintaining and restoring the aquatic health of forested watersheds.

The Community-Conservation Alternative advances the social and economic goals of the Northwest Forest Plan by encouraging active restoration of forests and watersheds, including road decommissioning, road maintenance, stream restoration, prescribed burning, and the careful thinning of plantations to restore them to forest health. The need for restoration far exceeds the agency's current capacities to accomplish needed work. The Community-Conservation alternative

can be a new beginning for the BLM to service western Oregon's real economic needs and insure the heritage of Oregon forests for future generations.

The Community-Conservation Alternative also meets the agency's goal of simplifying project planning and reducing costs because, in most cases, surveys for species associated with old forests would be unnecessary, and pursuing less controversial projects (e.g. restoration projects to help the forest and streams, rather than clearcutting them) would lead to more public support and less conflict.

An increased focus on active restoration work will present the BLM with a number of opportunities. Besides solving real on-the-ground forest and watershed problems, restoration projects provide economic opportunities for workers and rural communities and allow the agency to practice much needed ecosystem management, work cooperatively with stakeholders, and generally create the circumstances needed to get forests working again.

I have dealt with three interrelated areas: climate change; wilderness; ORV proposals. In the briefest summary, I find that:

1. ***The WOPR DEIS decision to neglect climate change is erroneous and deficient on two grounds; first, it fails to employ the current science to develop reasonable alternative scenarios that would serve as vital planning tools; second, it completely fails to ascertain the effects of the proposed action alternatives on forest carbon budgets and human-induced climate change as well as human welfare and economies***
2. ***The WOPR DEIS employs gross misinterpretations of the Wilderness Act and the O & C Act.***
3. ***In respect to ORV-designated areas Currently, hundreds of thousands of miles of routes give off-road vehicles abundant access to our parks, forests, and other public lands and waters creating an imbalance between the amount of land available to off-road vehicles and the amount of land available to non-motorized users***
4. ***Federal agencies have failed to enforce laws designed to protect our wildlands and drag their feet on implementing important new regulations.***
5. ***ORVs also emit large amounts of pollution, including carbon monoxide, hydrocarbons, and carcinogens such as benzene. The small, inefficient two-stroke engines of some of these machines spew out as much as 30 percent of their fuel unburned polluting the soils, air, and water of our National Forests, National Parks, and other public lands including Oregon BLM holdings.***
6. ***The idea that most ORV riders obey the laws and regulation is patently FALSE, and additional designation of ORV areas will NOT solve the problem. It will only exacerbate it.***

7. ***The BLM has failed to analyze sufficiently the negative effects of ORVs (and their created roads) on reptiles.***
8. ***The BLM has failed to address adequately the effects of ORV-induced stress on wildlife populations.***
9. ***The BLM has failed to analyze adequately the effects of noise form ORVs on wildlife.***
10. ***The BLM has failed to adequately analyze the critical negative effects of ORV-induced introduction of exotic invasive plants, pets, and pathogens onto public lands. Nowhere has BLM addressed the cost to the public, now and in the future of exotic invasives as admitted under Alternative 2.***
11. **The BLM has failed to analyze adequately the effects of ORVs on soils.**

My reasoning and supporting documentation follows below.

The WOPR and Climate Change: Logging While The Earth Burns.

The BLM's decision to assume " no change in climate conditions" is a huge error in the construction of the WOPR DEIS. No serious corporate or government entity can avoid facing the stark realty of human-induced climate change.

The most respected scientific bodies have stated unequivocally that global warming is occurring, and people are causing it by burning fossil fuels (like coal, oil and natural gas) and cutting down forests. ***The U.S. National Academy of Sciences, which in 2005 the White House called "the gold standard of objective scientific assessment," issued a joint statement with 10 other National Academies of Science saying "the scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action. It is vital that all nations identify cost-effective steps that they can take now, to contribute to substantial and long-term reduction in net global greenhouse gas emissions." (Joint Statement of Science Academies: Global Response to Climate Change [PDF], 2005)***

Former Vice-President Al Gore and the Intergovernmental Panel on Climate Change (IPCC) shared the 2007 Nobel Peace prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" (Nobel Prize Foundation).

The only debate in the science community about global warming is about how much and how fast warming will continue as a result of heat-trapping emissions. Scientists have given a clear warning about global warming, and we have more than enough facts — about causes and fixes — to implement solutions right now.

In the United States, the issue has captured public attention and taken center stage in corporate boardrooms, Hollywood and the U.S. Congress. At least 17 states have adopted ambitious targets to reduce heat-trapping gases. More than 600 cities have signed the U.S. Mayors' Climate Protection Agreement to meet the Kyoto Protocol's emissions reduction targets. Venture capital is pouring into clean energy investments in record amounts. Institutional investors representing over $4 trillion in assets and many major corporations have called for strong action.

Around the world, leadership on climate change and clean energy continues to build. The European Union will soon launch Phase II of its emissions trading system, while voluntary markets for carbon offsets explode around the world. China enacted tough fuel economy standards and set a national goal of generating 15% of its energy from renewable sources by 2020. The Brazilian state of Amazonas announced the country's first climate change law to allow compensation for avoided deforestation.

The WOPR DEIS decision to neglect climate change is erroneous and deficient on two grounds; first, it fails to employ the current science to develop reasonable alternative scenarios that would serve as vital planning tools; second, it completely fails to ascertain the effects of the proposed action alternatives on forest carbon budgets and human-induced climate change.

In respect to the first omission above, I refer the BLM to the paper "**THE POTENTIAL IMPACTS OF GLOBAL WARMING ON THE PACIFIC NORTHWEST (PNW)** Critical Findings for Washington and Oregon from the First National Assessment of the Potential Consequences of Climate Variability and Change ", an overview prepared by Phil Mote, Ph.D. (University of Washington) and Blair Henry (Northwest Council of Climate Change). For instance that summary states that:

1. For the PNW, the most significant consequence of climate change is likely to be the reduction in all-important summer water supply. As the climate warms, snowpack will shrink and summer streamflow will drop considerably. This and other climate changes will have a wide range of consequences, most of them negative, for humans and ecosystems. Climate variations have clearly played a role in PNW salmon history, with low summer streamflow and warm coastal ocean temperatures tending to reduce salmon production. Unfortunately, these conditions are likely to become more common in a warming climate, adding to the already long list of human-caused problems that now threaten the survival of salmon in the PNW.

2. ***Some types of trees grow better with more carbon dioxide in the air, but for most Northwestern coniferous forests, growth tends to be lower (and forest fires more extensive) during warmer, drier years***. It is not yet clear how forests will change in the future, but some changes in forest composition, area, and density are likely.

3. Climate change is sure to occur in some form. Though the details are not yet clear, we know enough already to begin planning. With few exceptions, natural resources are managed as if climate were constant. Recent experience with year-to-year climate variations, like those associated with El Niño, provides some practice at dealing with years when climate is different from normal. In years ahead we will see a change in the definition of normal. ***The single most important thing that the region can do to prepare for a changing climate is to develop a dialogue between scientists and decision-makers.*** An increased awareness of how climate affects the region will increase resilience to climate variations and change. In addition, we can reduce local pressures on our resources and ecosystems.

4. ***Ecosystems are more resilient to climate variations and change when they include a high degree of biodiversity, that is, a wide range of different habitats, species, and genetically different types within the same species. For salmon, ensuring biodiversity mostly means increasing available healthy and connected habitat while continuing to control harvests. For forests, ensuring biodiversity means avoiding single-species plantations.***

In addition to the above more general considerations, ***the BLM WOPR needs to analyze the effects of increased carbon dioxide level on the spread of exotic invasive species into areas modified under the action alternatives. Minimally this would entail analysis of not onlt timber production areas, but also road construction, and ORV-emphasis areas. Then also, in addition to concluding that some action would increase the invasion of exotic invasives, the analysis MUST calculate the projected costs of such future management as may be required to control such invasives and the loss of forest productivity in response to these invasives.***

In respect to the second glaring omission of the WOPR DEIS, effects on carbon budgets and climate change, I refer the BLM to An article in BIOSCIENCE 46, 836-844 (1996) entitled "Two Decades of Carbon Flux from Forests of the Pacific Northwest", by Cohen et al. Because of its importance, I am appending this article to my comments, but here quote some particularly relevant observations and conclusions from the article. I have boldfaced certain passages for emphasis.

> Harvest activity was distributed widely across the study area (Figure *5)* and occurred over 15.3% of the total forest area (Table 1). Of the total forest area, 32.5% was a net carbon sink, all represented by nonharvested stands. **Most of the area with no change in carbon stores (a total of 27.6% of the forest area) was also in nonharvested forest. Except for the 0.4% of forest area that was harvested but stable, all harvested areas were a net source of carbon to the atmosphere.** Curiously, although only 15.3% of the iorest area was harvested during the 19- year period, the forest area was nonetheless a net carbon source to the atmosphere. Because we mapped harvest activity over'the 19-year study period, the minimal possible age for nonharvested stands is 20 years. This finding raises an important question: **How can forests 20 years of age and greater be a source of carbon to the atmosphere?**
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> **The answer can be found in the complex relationship between forest succession and decomposition processes, harvest and other disturbance activity, and forest products manufacturing**. Except in riparian zones, a closed canopy of mixed coniferous trees is the general cover condition of primary forest stands within the PNW region (Franklin and Dyrness 1988). The most recent severe, widespread fire or other natural disturbance activity in the study area was more than 450 years ago, with more recent localized, partial burning occurring at intermittent intervals (Agee 1991). Thus, if an area was never harvested, it most likely consists of a mature (80-200 years) or old-growth (more than 200 years)

closed-canopy conifer (Franklin and Spies 1991). These mature and oldgrowth forests are generally slow growing, such that they are at most only a moderate carbon sink or stable (Grier and Logan 1977). This situation is revealed in Table 1, in which net carbon flux over the 19-year period is summarized by 1991 forest cover condition. After severe disturbance, such as clearcut logging, early successional brush-dominated and other nonconifer cover conditions occur. But under ideal conditions, especially with plantation forestry, return to a closed-canopy conifer state is generally expected within 20 years, according to forestry professionals of the PNW region. By the time this young conifer state is reached, accumulation of biomass by live trees is expected to result in high rates of carbon sequestration (Long and Turner 1975, Turner and Long 1975). This latter point also is revealed in Table 1, in which our estimates show that young conifer stands were the largest net carbon sinks over the study period. If all closed-canopy conifer stands were either a net carbon sink or carbon stable during the period of this study, then early-successional forest conditions must have been responsible for the full net carbon source observed. Table 1 clearly demonstrates this scenario. By superimposing the harvest map on top of the vegetation cover map of 1991 we discovered that much of the remaining early-successional forest was apparently clearcut before 1972. That these areas were clearcut is evident from the size, shape, and location of early-successionalnonconifer forest stands not harvested during the study period (Figure *6)*.

There are several probable causes for early-successional, nonconifer stands remaining a net carbon source for an extended period. The most likely reason is that the predominant preharvest condition was mature or old-growth forest (Table 2). These forests commonly contain a large amount of fine and coarse woody debris that is not removed during or after harvest, but is left on site to decay slowly, at a rate of approximately *3%* per year (Harmon et al. 1996 j . Furthermore, during harvest approximately 50% of the living biomass is converted to additional woody debris that decays on site (Harmon et al. in press). Of the carbon removed from the site and distributed throughout the forest products sector, approximately 40% quickly returns to the atmosphere due to losses during primary and secondary manufacturing, and to incineration and decomposition of short-lived forest products (Harmon et al. in press). The remaining forest products decompose slowly, at a rate of approximately 2% per year (Harmon et al. in press). Thus, even though early-successional nonconifer forests are sequestering carbon by accumulating living biomass, decay of carbon pools from the previous forest outweighs production by the new forest.

On balance, between 1972 and 1991 the forests of the pilot study area have been a net source to the atmosphere of 1.13 x **lo6** g C . ha-l . yr-l (Figure 4). A simple areal extrapolation of this average net flux to the 10.4 million forested ha of the full PNW region yields a total net flux from the region to the atmosphere of 11.8 x 10l2 g C/yr. This regional flux estimate is lower thanthat of Harmon et al. (1990), who found that the amount ranged between +15.3 x 10l2 g C/yr and +18.5 x 10l2 g C/yr over the past 100 years. Our lower estimate for the more recent time period probably reflects the fact that during the last two decades some harvest activity occurred in second-growth forest on private lands and in less productive primary forests on public lands. ***Our extrapolated regional estimate indicates that the PNW region, although it represents only 0.25% of the total 4.1 billion ha of forest on Earth, was the source of 1.31% of the total recent land-use related carbon flux of +0.9-.0.4 x 1015 g/yr on a global basis (Dixon et al. 1994). The most probable explanation for this disproportionate contribution is***

> ***that forests of the PNW region generally store significantly more carbon than most other forest systems. Although replacing older forests with more vigorous young forest can increase sequestration by live carbon pools, decomposition of the large detrital pools after harvest greatly offsets gains in biomass by living pools for an extended period of time.***

The implications of this study (and others) is crystal clear. ***The BLM WOPR action alternatives will INCREASE NET CARBON FLUX TO THE ATMOSPHERE, RESULTING IN INCREASED GLOBAL WARMING AND ACCELERATED CLIMATE CHANGE AS COMPARED TO THE NO ACTION ALTERNATIVE***.

At the same time the BLM WOPR would, by converting moist old growth forests into dry flammable tree plantations and simultaneous neglecting previous clearcuts now filled with dangerous fuel, place communities at enhanced risk of uncharacteristic fire.

Given such an unpalatable scenario, the BLM must account for the environmental and economic costs (on a regional, national, and worldwide basis) of such intemperate actions. Moreover, the BLM needs to compare the above costs to the future potential of avoided deforestation revenues. Enormous potential lies in forest practices that would result in NET carbon sequestration (e.g., see Forests, Carbon and Climate Change A SYNTHESIS OF SCIENCE FINDINGS *A project of* The Oregon Forest Resources Institute Oregon State University College of Forestry Oregon Department of Forestry. **Logging mature old-growth is NOT the way to do this.**

The WOPR and Wilderness.

The WOPR DEIS claims evaluation of 146 public wilderness proposals and found that just 9 (comprising 26,123 acres) were suitable as defined by wilderness characteristics but that of these only 5 of these areas would receive the management required to maintain wilderness qualities. These wilderness designations are a pivotal step if we are to protect this planet's biological diversity.

Oregon ranks ninth among the lower 48 states in wilderness acreage. Washington state has twice as much acreage, Idaho has nearly twice as much, and California has 6 times as much as Oregon. Considering the remarkable natural treasures of Oregon, this is an unacceptable number. Just as unacceptable is the fact that BLM wilderness areas in Oregon represent just 2.4% of the national total of BLM wilderness areas!

This analysis and the resulting proposal (under three action alternatives) is badly flawed. I contend that the DEIS eliminated areas form protection based upon arbitrary and capricious criteria set by the BLM administration and counter to precedent contained in previous wildrness area designations.

First, according to the DEIS (appendices and elsewhere), size was a key non-selection criterion. This is in disregard of the wording of the Wilderness Act itself which specifically states: "has at least five thousand acres of land ***or is of sufficient size as to make practicable its preservation and use in an unimpaired condition***".

For instance:

▲ The United States Congress designated the Menagerie Wilderness in 1984 and it now has a total of 4,800 acres. All of the wilderness is in **Oregon** and is managed by the Forest Service.

▲ The United States Congress designated the Oregon Islands Wilderness in 1970 and it now has a total of 372 acres. All of the wilderness is in **Oregon** and is managed by the Fish & Wildlife Service.

▲ ***The United States Congress designated the Baboquivari Peak Wilderness in 1990 and it now has a total of 2,040 acres. All of the wilderness is in Arizona and is managed by the Bureau of Land Management.***

▲ The United States Congress designated the Fort Niobrara Wilderness in 1976 and it now has a total of 4,635 acres. All of the wilderness is in Nebraska and is managed by the Fish & Wildlife Service.

▲ The United States Congress designated the Glacier View Wilderness in 1984 and it now has a total of 3,123 acres. All of the wilderness is in Washington and is managed by the Forest Service.

▲ The United States Congress designated the Chase Lake Wilderness in 1975 and it now has a total of 4,155 acres. All of the wilderness is in North Dakota and is managed by the Fish & Wildlife Service.

▲ The United States Congress designated the Rockpile Mountain Wilderness in 1980 and it now has a total of 4,089 acres. All of the wilderness is in Missouri and is managed by the Forest Service.

▲ The United States Congress designated the Big Lake Wilderness in 1976 and it now has a total of 2,144 acres. All of the wilderness is in Arkansas and is managed by the Fish & Wildlife Service.

▲ The United States Congress designated the Gee Creek Wilderness in 1975 and it now has a total of 2,493 acres. All of the wilderness is in Tennessee and is managed by the Forest Service.

▲ The United States Congress designated the Bristol Cliffs Wilderness in 1975 and it now has a total of 3,738 acres. All of the wilderness is in Vermont and is managed by the Forest Service.

▲ The United States Congress designated the Great Swamp National Wildlife Refuge Wilderness in 1968 and it now has a total of 3,660 acres. All of the wilderness is in New Jersey and is managed by the Fish & Wildlife Service.

▲ The United States Congress designated the Thunder Ridge Wilderness in 1984 and it now has a total of 2,344 acres. All of the wilderness is in Virginia and is managed by the Forest Service. The Thunder Ridge Wilderness is bordered by the James River Face Wilderness to the north. The smallest of Virginia's Wildernesses, Thunder Ridge sits high on the northeastern slope of the Blue Ridge, separated from James River Face Wilderness by Forest Service Road 35. It's bordered on the south by the Blue Ridge Parkway.

▲The United States Congress designated the Three Ridges Wilderness in 2000 and it now has a total of 4,608 acres. All of the wilderness is in Virginia and is managed by the Forest Service.

▲The Three Ridges Wilderness is located in the George Washington National Forest, east of the Blue Ridge Parkway in Nelson Co., VA.

▲The United States Congress designated the Shawvers Run Wilderness in 1988 and it now has a total of 3,467 acres. All of the wilderness is in Virginia and is managed by the Forest Service.

▲The United States Congress designated the Peters Mountain Wilderness in 1984 and it now has a total of 3,328 acres. All of the wilderness is in Virginia and is managed by the Forest Service. Peters Mountain Wilderness, lying on the east slope of Peters Mountain,

▲The United States Congress designated the Little Dry Run Wilderness in 1984 and it now has a total of 2,858 acres. All of the wilderness is in Virginia and is managed by the Forest Service. Little Dry Run Wilderness is located on the east end of the Mount Rogers National Recreation Area.

▲The United States Congress designated the Little Wilson Creek Wilderness in 1984 and it now has a total of 3,613 acres. All of the wilderness is in Virginia and is managed by the Forest Service. Adjoining Grayson Highlands State Park, Little Wilson Creek Wilderness is within the Mount Rogers National Recreation Area.

▲ The United States Congress designated the West Sister Island Wilderness in 1975 and it now has a total of 77 acres. All of the wilderness is in Ohio and is managed by the Fish & Wildlife

▲ Pelican Island Wilderness (Florida) is only six (6) acres!

Thus, many of the categorical exclusions of public wilderness proposals by BLM' WOPR DEIS are contrary to established precedent in the application of The Wilderness Act.

2. The BLM's WOPR DEIS has also (according to its own language) omitted/excluded various public wilderness proposals due to noticeable human impact (present of future). In fact, the Wilderness Act states that an area suitable for wilderness: "generally appears to have been affected ***primarily*** by the forces of nature, with the imprint of man's work s***ubstantially*** unnoticeable".

The designation of wilderness (the Shenandoah Wilderness) within Shenandoah National Park can be employed as a guiding precedent as to what is meant by the foregoing language of the Act. Shenandoah National Park's "recycled" wilderness demonstrates the recuperative powers of natural processes in eastern deciduous Appalachian forest. Nearly all of the Park's land area, including that now designated as wilderness, was once cleared and inhabited, farmed, logged and burned. The Park was established in 1936 and natural regeneration to the "wilderness" conditions which followed encouraged National Park Service officials to recommend and eventually designate 42% of the Park as wilderness.

The BLM's omission of areas with wilderness potential due to "noticeable human impact" is a device long employed by self-interested federal agencies to exclude Wilderness Study Areas. It is without merit and contrary to the previous

Congressional and Presidential determination. Let Congress and the president make the policy, not bureaucracy.

Public Law 96-622 (Known as the Eastern Wilderness Areas Act) (1975) was passed to direct agencies to consider such “non-pristine areas” as wilderness. During the debates leading up to passage of this law the Forest Service took the position that few if any areas in the east qualified as wilderness because they were not 'pristine' or 'untouched'. Congress did not accept this argument and directed the Forest Service to let go of this doctrine and follow through with inventory and recommendation of lands for Congress to consider designating as wilderness. Congress directed the National Park Service to do the same. The act added 16 National Forest areas to the National Wilderness Preservation System and directed that 17 areas should be studied in eastern National Forests and within five years the Secretary of Agriculture should recommend additions to the wilderness system. Condemnation authority was provided. Congress debated the issue of adding areas that had been severely modified. They chose to do so and declined to establish a separate "Eastern Wilderness" category.

3. The BLM’s WOPR DEIS agrues that even among the nine areas determined to have wilderness characteristics (as detemined by the extraordinarily narrow definitions of BLM), four would be excluded since they were to be determined to have sustainable logging potential and therefore excluded from wilderness by the O & C Act.

In the first instance, it is to be noted that the O & C Act does not rump all other federal laws such as for instance the Endangered Species Act. Thus, a decision as to the future of these lands should rest with the American people, acting through Congress and the Whitehouse.

In the second instance, BLM’s interpretation of the O & C Act is biased and incorrect.

1. The O & C Act lists five different purposes (timber economic watershed, stream flow) recreation and gives no indication of an assignment of priority to any of them. Nothing in the statute indicates that the BLM should focus on one of the purposes in a way that harms any of the other purposes. In fact, choosing timber production as the dominant use, without regard for the other uses, conflicts with the environmental purposes listed in the plain language of the Act, such as protecting watersheds, regulating stream flow, and providing recreation. By inexplicably choosing to highlight two purposes of the Act, timber supply and economic contribution, the BLM has violated principles of statutory construction that every clause and word of a statute should be given effect ([1]*Massachusetts v. Morash,* 490 U.S. 107, 115 (1989) (“…in expounding a statute, we [are] not ... guided by a single sentence or member of a sentence, but look to the provisions of the whole law, and to its object and policy.") ; *United States v. Menasche,* 348

U.S. 528, 538-39 (1955) (quoting *Montclair Tp. v. Ramsdell,* 107 U.S. 147, 152 (1883) ("It is [the court's] duty to give effect, if possible, to every clause and word of a statute …").

2. The BLM's argument that the presence of O & C Lands makes wilderness designation impossible is flawed. BLM has, in fact, designated two other wilderness areas in the vicinity of the Zane Grey Roadless Area. The Kalmiopsis Wilderness in southern Oregon has included O & C land since its establishment in 1964.[1] In 1978, Congress enlarged the Kalmiopsis, adding substantially more O & C Lands after the FLPMA was enacted. **Congress also created the Wild Rogue Wilderness, including O & C Lands managed by the BLM.** Although it might be argued that the Kalmiopsis was established before the FLPMA came into effect and that is why it was exempted from the interpretation that the FLPMA does not control O & C Lands, it does not explain why the Kalmiopsis Wilderness was expanded to include more O & C Lands or why the Wild Rogue Wilderness was established after the FLPMA was enacted.

3. The BLM has argued for years that the O & C Act requires it to elevate timber production above the other stated purposes of the Act even though nothing in the Act indicates this is appropriate. In fact, the plain language, the legislative history, the Solicitor's Opinions and the recent court cases, indicate that the O & C Act is not, in fact, a timber dominant statute. As such, the O & C Lands could be managed in order to recognize the O & C Act's *multiple* use intentions, including wilderness study area designations. In fact, these issues of wilderness designation on BLM lands are too important to be left to the BLM.

ORV SPECIAL EMPHASIS AREAS: ADMINISTRATIVE DESIGNATION OF NATIONAL SACRIFICE AREAS.

The WOPR's preferred alternative would designate 11 new "OHV Emphasis Areas." These would assign over 100,000 acres of public lands to condemnation and destruction.

I am adamantly opposed to ANY public lands being designated (or used in any fashion) by off-road vehicles. Only designated roads, used by all vehicles, are suitable for ORV use, conditioned that they follow the same regulations as any licensed passenger automobile. I outline my reasons below. ***The BLM has failed to consider and analyze accurately these issues. You have not even defined specific criteria for the lands you have chosen to be targeted for creation of "NATIONAL SACRIFICE AREAS".***

You say that you must find a balance. I disagree that you must balance between land destruction and conservation. You have only one choice in all your deliberations – CONSERVATION!

1***. It is grossly unethical to enable this misuse of public lands at a time when US military men and women are dying in Iraq to secure future petroleum reserves. It is also grossly unethical to allow the pursuit of this extremely wasteful activity at a time when responsible world citizens are trying to find ways to counter global climate change.***

2. ***Currently, hundreds of thousands of miles of routes give off-road vehicles abundant access to our parks, forests, and other public lands and waters creating an imbalance between the amount of land available to off-road vehicles and the amount of land available to non-motorized users.*** For example, off-road vehicles are allowed on 93% of the 264 million acres managed by the Bureau of Land Management. Although ORV users represent only a small percentage of the total number of people recreating on public lands they are having a disproportionately large and harmful impact. Since the roar of motors can be heard by people and wildlife miles away, these vehicles can ruin the experience for those who choose to experience the outdoors without motorized vehicles***. I vehemently object to your plan to "dissuade" other non-motorized users. Even our wilderness areas do not prevent access to anyone who wants to use foot or horse travel. No one person is "dissuaded" from entering a wilderness, only their mode of travel. How can you discriminate against the very people who own the land. How can you turn public lands over to a destructive form of "wreckreation"?***

3. ***Federal agencies have failed to enforce laws designed to protect our wildlands and drag their feet on implementing important new regulations***. Exacerbated by inadequate or no route planning as well as severe lack of monitoring by these agencies, illegal and inappropriate off-road vehicle use has

continued largely unchallenged. Americans want to experience natural quiet to camp, hunt, hike and fish with their families on their national public lands free from the roar of engines and the pounding of pistons.

The Federal government has an abysmal record of enforcement of even established regulations barring ORV use. My personal experience comes from Arizona and the Coconino National Forest where ORV users transit signed/prohibited areas regularly. Repeated calls to Forest Service Law Enforcement brought zero results. The excuse given was insufficient resources. There is NO reason to believe that the situation for BLM is any different. Now in Willaims, I hike an area where it is clearly signed "No Motorized Access", but ORV use takes place there regularly. ***Your designation of ORV EMPHASIS AREAS will result in the attraction of more and more riders, more and more problems and violations, and more and more damage to the interests of non-riders and the environment.***

A quote form the New Yok Times (30 Dec 2007):

> **To keep the lawbreakers in check, said Don Banks, the deputy state director in Salt Lake City for the federal Bureau of Land Management, the biggest land owner in states like Utah and Nevada, "You'd have to have Patton's army."**

4. ***ORVs also emit large amounts of pollution, including carbon monoxide, hydrocarbons, and carcinogens such as benzene. The small, inefficient two-stroke engines of some of these machines spew out as much as 30 percent of their fuel unburned polluting the soils, air, and water of our National Forests, National Parks, and other public lands including Oregon BLM holdings.***

With 36 million registered all-terrain vehicles and 12 million registered snowmobiles in the U.S. alone, these machines are a significant source of pollutants. They run on inefficient two and four-stroke engines that emit several dangerous gasses and chemicals including carbon monoxide (CO), hydrocarbons (HC), nitrogen oxide (NOx), and particulate matter (PM) (US DOT 2001). These emissions have all been shown to affect human health. Despite this fact, the U.S. Environmental Protection Agency (EPA) has yet to establish emission standards for off-road vehicles.

Carbon monoxide binds to the hemoglobin molecule in blood and inhibits the transportation of oxygen in the body. High levels of carbon monoxide exposure have been shown to lead to visual impairment, reduced work capacity and mental dexterity, poor learning ability, nausea, headaches, dizziness, and even death (USEPA 1991). Carbon monoxide is especially dangerous to the elderly, people with cardiovascular disease or other circulation disorders, anemic individuals, young infants, and pregnant women (USEPA 1991). Hydrocarbons

are volatile organic compounds that include benzene, toluene, ethylbenzene, and xylenes. While these compounds can cause dizziness, headaches, and loss of consciousness, the EPA has also identified benzene as a carcinogen and those exposed to benzene have an increased incidence of leukemia. Nitrogen oxides can cause shortness of breath and chest pains and increase a person's susceptibility to respiratory infections and asthma. Long-term exposure can cause chronic lung disease.

Particulate matter, also found in off-road vehicle emissions, is detrimental in fine and coarse forms as it accumulates in the respiratory system, and can lead to decreased lung function, respiratory disease and even death (Janssen and Schettler 2003). Of the pollutants emitted by ORVs, particulates are of special concern because their small size makes them easily respirable and thus deliverable directly into the lungs, causing any number of the aforementioned maladies (NPS 2000).

The EPA found that ATVs emit more than 381,000 tons of hydrocarbons, 1,860,000 tons of carbon monoxide, and 11,000 tons of nitrogen oxide each year across the country (USEPA 2001). While emissions from on-road vehicles decreased 56 percent over the last 20 years as a result of emission control programs, there was a 42 percent increase in ATV emissions during the same time period (Grambsch 2002). The list of greenhouse gases continues to show the impact of these vehicles. For example, on-road vehicle emissions of nitrogen oxide were virtually unchanged during the same twenty-year span, while emissions from off-road vehicles increased 56 percent (Grambsch 2002). Anthropogenic emissions of nitrogen oxide account for a large majority of all nitrogen inputs in the environment and off-road emissions are a large contributor (Grambsch 2002).

The EPA went even further to research individual ATVs: they showed that a two-stroke ATV or motorcycle could emit as much pollution as more than thirty automobiles operating in the same time frame. Even more shocking is that the ATV took a distant second from two-stroke snowmobiles, which can emit as much as nearly one hundred automobiles in the same time frame (USEPA 1996).

It is well-established that off-road vehicles contribute a large amount of pollution to the air. According to the EPA, if left uncontrolled, off-road vehicles will contribute 33 percent of hydrocarbon emissions, nine percent of carbon monoxide, nine percent of nitrogen oxide, and two percent of particulate emissions nationally by 2020 (USEPA 1996). The Environmental Protection Agency has yet to establish emission standards for off-road vehicles and the engines on which they run. The off-road vehicle industry has been slow to adopt technological changes that could lessen the impact of its machines on air quality at the local and, even the global, level. And while the industry has been sluggish, government regulatory and enforcement agencies have been all-too complacent in allowing continued degradation.

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[1] http://www.womenandenvironment.org/Health_Imp_snow.pdf
[2] http://www.deq.mt.gov/cleansnowmobile/solutions/fuels/oxygenated.htm
[3] http://deq.mt.gov/CleanSnowmobile/solutions/engine/modifications.asp
[4] http://deq.mt.gov/Energy/bioenergy/biofuels.asp
[5] http://climate.volpe.dot.gov/national.html

5. ***I agree with and incorporate here by reference the conclusions of the recommendations of Jackson County Commissioner Dave Gilmour who determined that ORV riding areas Johns Peak, Lake Creek, Worthington Obenchain, East Howard and Anderson Butte, have high fire risks, sensitive environmental areas, and, in some cases, too many conflicts with nearby landowners to continue to be used by off-road enthusiasts.***

> I emphasize that he was quoted (Mail Tribune, 14 Dec 2007) as saying "There are so many negatives for Johns Peak and for Anderson Butte. They've been using those areas like private playgrounds for several years." *Where has the BLM been all this time? PLM has been complicit in the destruction of public property.*

6. ***The idea that most ORV riders obey the laws and regulation is patently FALSE, and additional designation of ORV areas will NOT solve the problem. It will only exacerbate it. I incorporate, for the record, the following research article.***

Just a Few Bad Apples: Research Shows Many Off-Roaders Break the Law. Jason Kiely and Chris Kassar

Introduction
The ecological impacts of off-road vehicles on water, air and land have been well documented. In the past five to ten years, however, these issues have taken on social dimensions, and social scientists have begun exploring the attitudes and behaviors of off-road vehicle drivers.

Countless newspaper articles are peppered with myths perpetuated by off-roaders, such as: "elite environmentalists are locking the public out of public lands;" "the old and infirm need vehicles to explore the forest;" "if you give folks a place to ride their ATVs, they won't break the rules;" and "it's just a few bad apples riding where they're not supposed to and causing damage."

This article examines important social science research that debunks the "few bad apples" myth. Analysis includes a review of three state-level surveys revealing that a majority of off-roaders break the law. These studies point to the failure of this myth and show a pronounced preference and practice among off-road vehicle recreationists to travel cross-country and ride off of legal routes.

Montana
In 2006, Montana Fish, Wildlife and Parks received survey responses from 446 owners of registered off-road vehicles. Among the full sample of respondents, 23% "always or sometimes" ride cross-country even though off-route riding is against the rules in Montana and has been since 2001. Over 28% "sometimes or never" avoid riparian areas and wetlands, in violation of rules for federal and state public lands in Montana.

Sixty-four percent of those surveyed have used an off-road vehicle while hunting. The majority of this hunting subset admits to riding cross-country — over 58% have traveled off of legal routes to retrieve downed game.

Colorado
A 2001 Colorado study cited the state of Montana's off-road vehicle public education program as a model to emulate. According to the Colorado study, Montana's "On the Right Trail" program "provided a list of key behavioral traits that define an 'ethical hunter' — with several of these related to proper OHV use." However, as discussed above, the more recent Montana study revealed a significant disregard for the rules among many off-road vehicle riders, pointing to the ineffectiveness of the state's education program. This supports the key conclusion of the Colorado study: "information and education per se – will not result in substantial behavioral change" (emphases in original).

Monaghan and Associates, a marketing research firm, conducted the 2001 study at the behest of the Colorado Coalition for Responsible OHV Riding, a coalition

of off-road vehicle representatives, environmentalists and public officials. Researchers surveyed Colorado off-road vehicle riders through a series of three focus groups.

Monaghan and Associates found that the majority of off-roaders understand that staying on designated routes is "fundamental trail etiquette" and that going off trail is not "correct" off-road vehicle behavior. The survey revealed, however, that regardless of this knowledge "as many as two-thirds of adult users go off the trail occasionally." A significant percentage of riders, 15-20%, admitted to frequently breaking the rules and riding off of legal routes often. Survey participants also stated that "others" ride off-route and cause most of the damage.

Utah

In a separate study, the Utah Division of Parks & Recreation commissioned Utah State University to survey riders to determine their "OHV uses and owner preferences." The university conducted a telephone survey of 335 riders from a random sample of the 50,676 people who registered off-road vehicles with the state in 2000.

The Utah report reveals that a high percentage of riders prefer to ride "off established trails" and did so on their last outing. Of the ATV riders surveyed, 49.4% prefer to ride off established trails, while 39% did so on their most recent excursion. Of the dirt bike riders surveyed, 38.1% prefer to ride off established trails, while 50% rode off established trails on their most recent excursion.

When surveyed on issues affecting off-road vehicle use in Utah, survey respondents recognized the need for enforcement but not the need for protecting the natural resources where they ride. This questions the assumption that off-road vehicle riders will stay on-route if educated that cross-country travel is illegal or damaging. One-third of the respondents said there should be more law enforcement presence in OHV areas. Only 6% cited "resource management conservation" as the most important issue affecting off-road vehicle use in Utah.

Nevada

The U.S. Fish and Wildlife Service found a near universal disregard for motorized guidelines when the BLM experimented with a "voluntary off-road vehicle route system" in Nevada. The area in question serves as a refuge for the disappearing Sand Mountain Blue butterfly, a species proposed for listing under the Endangered Species Act. A 2006 monitoring report compiled over a three-year period found that "98 percent of all existing routes continued to be used and new routes were created, indicating an ongoing expansion of habitat degradation." The study also found that half of the places where riders violated guidelines were near signs that discouraged them from proceeding into sensitive butterfly habitat. The cumulative impacts of such "noncompliance points" were four-fold as each discouraged route experienced multiple incursions.

Conclusion

One can assume that many folks will not tell the truth when asked if they participated in a behavior known to be illegal or generally perceived to be in conflict with social norms. This tendency is known as the "social desirability bias" and defined as under-reporting undesirable attributes and/or over-reporting desirable attributes due to the tendency to present oneself in a favorable light (Groves et. al. 2004). Therefore, the percentage of off-roaders who violate the rules is likely even higher than revealed in the survey results discussed above.

Many public land managers assume that designating additional off-road vehicle routes will lead directly to greater compliance, less cross-country travel and, as a result, less resource damage and fewer conflicts among incompatible uses. Some believe that off-road vehicle riders will quit creating renegade routes once more routes are designated "open" and riders are educated as to where they are and are not allowed to ride.

In contrast, the research above shatters the myth that damage and conflicts are being caused by an insignificant percentage of off-road vehicle riders. The findings of these studies suggest that even if the "demand" for more off-road vehicle riding opportunities is met, riders will continue to fulfill their preferences by riding off legal routes. They also conclude or at least strongly suggest that education and information alone are not effective strategies for changing off-road behavior.

Instead, Monaghan and Associates offers the following recommendation: "In order to be successful and actually influence behavior, OHV users must be motivated to behave properly."

While more social science research is needed to determine what will motivate users to behave properly, anecdotal research (Wildlands CPR 2007) argues most strongly for increasing enforcement, and especially increasing the consequences for breaking the law, through mechanisms like vehicle confiscations, increased fines, and closing areas to all motorized users when motorized trespass occurs.

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[1] http://www.wildlandscpr.org/Reports/EnforcementReport.html
[2] http://extension.usu.edu/iort/files/uploads/pdfs/revisedOHVreport.pdf
[3] http://www.wildlandscpr.org/status-and-summary-report-ohv-responsible-riding-campaign
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A second article excerpt I submit from a recent (Sunday 30 Dec 2007)New York Times article makes it clear that the problem is ***NOT lack of ORV riding areas but rather the mindset of the rider.***

> Surge in Off-Roading Stirs Dust and Debate in West
>
> In the San Juan National Forest here, an iron rod gate is the last barrier to the Weminuche Wilderness, a mountain redoubt above 10,000 feet where wheels are not allowed.
>
> But the gate has been knocked down repeatedly, shot at and generally disregarded. Miles beyond it, a two-track trail has

been punched into the wilderness by errant all-terrain-vehicle riders who have insisted on going their own way, on-trail or off."

7. *The BLM has failed to analyze sufficiently the negative effects of ORVs (and their created roads) on reptiles.*

Effects of Roads and Off-Road Vehicles on Reptile Populations (Allison Clark)

Much of the existing literature examining the effects of roads on wildlife communities has tended to focus on ungulates or large carnivores, perhaps because they tend to cause the most damage when involved in vehicular collisions. Roads and off-road vehicles (ORVs) also have a profound impact on other species, however, including reptiles. Roads and ORVs result in direct mortality, reduced habitat and fragmentation, and behavioral and physiological changes in reptiles. This paper reviews recent literature examining road and ORV impacts on reptiles and assesses proposed methods of mitigating negative impacts.

Roads and ORVs are directly responsible for the death of many reptile species (Garber and Burger 1995, Gibbs and Shriver 2002, Luchenbach and Bury 1983, Maxell and Hokit 1999, Spellerberg 1998, Rudolph 2000.) Reptiles on roads obviously risk being struck by cars (Spellerberg 1998, Maxell and Hokit 1999), but ORVs also contribute directly to reptile mortality. For example, in a 1983 study of ORV effects on the biota of Algodones Dunes in Imperial County California, Luchenbach and Bury (1983) determined that there were frequent encounters between ORVs and reptiles that resulted in the animal's death. Also, although most incidences of roadkill are accidental, it should be noted that one researcher "demonstrated that people will often turn their vehicles towards . . . turtles to hit them intentionally." (D. Sheppard, pers. comm., in Boarman et al. 1997)

Effects on Habitat

ORVs can also reduce the quality and quantity of habitat. A 2003 study found a direct connection between disruption of native vegetation caused by ORV use and decline in reptile populations on the Owyhee Front (Munger et al. 2003). Heavily used ORV routes disrupted the native vegetation on which reptiles depend and caused a subsequent increase in dense nonnative species like cheatgrass that are known to favor disturbed habitats. In addition, the dense nature of the supplanting cheatgrass hindered reptile movement, making foraging, escaping from predators, and moving through habitats more difficult. ORV use can also destroy the preferred food sources of reptiles like the tortoise that are highly selective foragers (Jennings 1997).

Roads, too, can have undesirable consequences for reptile habitat. A recent study on turtle nesting habitat found that roads created barriers through previously contiguous habitats, fragmenting them and separating female turtles from their preferred nesting habitats (Baldwin et al. 2004). Roads also help spread other dangers, such as exotic vegetation, raven predation, and collection by humans (Boaman et al. 1997).

In addition to the fragmentation of habitat and destruction of food sources, roads and ORVs contribute to a general degradation of conditions that affect all species in an ecosystem, including reptiles (Spellerburg 1998, Maxell and Hokit 1999). Soil disruption from road construction, runoff, and ORV use causes increased sedimentation in adjoining aquatic habitats, impacting water quality (Maxell and Hokit 1999). Cars and ORVs can also contribute to chemical contamination of the ecosystem (Maxell and Hokit 1999).

Effects on Populations

When habitats become fragmented, populations become isolated and face a higher risk of local extinction. Shine et al. (2004) found that if reptile species actively avoid roads (which they may do because of the dangers roads pose to individual survival) highway mortality may be minimized, but fragmentation of local populations will occur. A study on the efficacy of mitigation efforts on desert roads similarly pointed to studies that had determined roads were barriers to tortoise populations (Boarman and Sazaki 1996). Other studies have also noted the dangers of inbreeding depression for populations isolated by roads and road activity (Boarman et al. 1997, Spellerberg 1998.) Roads may also be more dangerous to breeding females because of higher rates of movement associated with their nesting migrations (Steen and Gibbs 2004).

Other Effects

A number of other indirect impacts have also been documented. Luchenbach and Bury (1983), for instance, found an increase in the frequency of tail loss among lizards following an increase in ORV activity in the area. Tail loss is an escape mechanism usually correlated to predator density. This impact is significant because females without tales produce fewer eggs than those with tails. Tail loss could likely lead to reduced survivorship and fecundity (Luchenbach and Bury 1983).

Maxell and Hokit (1999) also point to the noise generated by ORVs as a potential problem. This noise may induce fear in many reptiles, whose instinctual response is to freeze, thus increasing the likelihood they will be run over. Constant exposure to loud noises may also result in hearing loss, making the animals less fit to survive in the wild (Maxell and Hokit 1999).

Roads can also alter reptile behavior. Roads attract reptiles because the cold-blooded animals are attracted to the heat of road surfaces (Rosen and Lowe 1994). In desert ecosystems, roads are known to be favored by reptiles

(especially snakes) as thermoregulation sites (Rudolph 2000). This attraction to roads obviously puts reptiles at risk for vehicle mortality. Other studies have demonstrated that male iguanas are attracted to roads as display sites (Rodda 1990) and that female turtles may be attracted to them for nesting purposes (Wood and Herlands 1997, Marchand and Livatis 2004). However, although some of these effects could be argued to be beneficial, Rudolph (2000) points out that: "they also have the potential of increasing road related mortality and exposure to pollutants to the detriment of populations."

Strategies for Mitigation

There have been a number of studies in recent years assessing the viability of strategies to mitigate the effects of roads. At present, there seem to be few or no studies suggesting mitigating strategies for ORVs; presumably then, at present the only way to mitigate ORV effects is to limit ORV use in reptile habitats.

In general, the two methods of mitigation most discussed in the literature are using fencing to prevent reptiles from getting onto roads and using culverts and underpasses to allow them to move from one side to the other without being exposed to roadways. Barrier fencing can reduce the number of roadkills by preventing reptiles from getting onto roads, but must be properly designed and maintained to be effective (Boarman and Sazaki 1996, Dodd et al 2003.)

Using barrier fencing alone might mitigate the direct mortality of roadkill, but would only serve to enhance the population-fragmenting effects of roads. It is therefore important that tunnels and culverts be used in tandem with fencing to allow immigration and emigration. These, too, must be carefully designed, considering such factors as size, shape, light needs or preferences, temperature, noise, depth, approaches, fencing, human disturbance, and interaction with other species (Jackson and Griffin 2000; Hartman 2002). However, more limited movement and a lower capacity for learning may make underpasses less useful for reptiles than for other small animals (Rudolph 2000).

In Conclusion

Roads, road construction, and off-road vehicle use all pose significant dangers to wildlife. Though most studies have focused on mammals, these forces also have consequences for reptiles. The best proposal for protecting reptiles, if preventing road construction or removing roads are not options, seems to be a combination of barrier fencing to prevent reptiles from getting on to roads, and underpasses and/or culverts to allow individuals free movement between habitats and populations. This, coupled with mitigation methods for other species, seems to represent the best way to protect wildlife from the detrimental effects of roads. However, further study is necessary to determine the real efficacy of these methods.

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8. ***The BLM has failed to address adequately the effects of ORV-induced stress on wildlife populations***.

Impacts of Stress on Wildlife
Author:
D.J. Schubert
May/June 2000, Volume 5 #3

Stress is a consequence of disturbance which can, if prolonged, cause substantial adverse impacts on individual animals. Stress may be caused by both physical and psychological factors, but, in either case stress results in physiological changes to the animal. ORV use may cause both physical and psychological stress to a wide range of animals as a result of noise impacts, pollution impacts, activity patterns, and direct and indirect harassment or disturbance. The effects of recreation-induced stress, including lower reproductive output (Geist 1978), may not be evident immediately, but may appear days to years after disturbances (Gutzwiller 1991). Moreover, recreation-induced stress exacerbates the effects of disease and competition, leading to higher mortality well after disturbances occur (Gutzwiller 1991).

The physiological impact of stress on animals has been the subject of many studies which have somewhat conflicting results. Selye (1950), suggested that an exhaustion of the adrenal cortex occurs during prolonged stress exposure while others concluded that prolonged exposure to acute stress results in a decline in adrenal sensitivity (McNutty and Thurley 1973, Ader 1975). Alternatively, Sapolsky (1983) suggested that chronic stress may cause a decline in cortisol production as a result of impairment of pituitary ACTH production, while others (Friend et al. 1977, 1979, Paul et al. 1971, Barrett and Stockham 1963) provide data which demonstrates that stress tends to increase adrenal sensitivity to an acute stressor. If chronic exposure to stressors causes sustained elevated glucocorticosteroid levels, impairment of immunodefensive mechanisms in affected animals may occur making the animals more susceptible to disease (Jensen and Rasmussen 1970, Paape et al. 1973, Hartman et al. 1976, Stein et al. 1976). In their study of acute and chronic stressors in domestic sheep, Harlow et al. (1987) determined that mild, medium, and severe stress events resulted in heart rate and plasma cortisol changes. Heart rate during mild stress events returned to resting values by 10 minutes post-stress event, while medium and severe stress events resulted in elevated heart rates for 20 and 60 minutes post stress event, respectively. Plasma cortisol levels were significantly elevated above resting values within minutes post-stress, with cortisol levels returning to pre-stress levels 30 minutes after removal of the mild stressor; as compared to continuously elevated cortisol levels from 90 to 180 minutes for both the medium and severe stressors. During chronic stress events, cortisol levels in the sheep

were significantly elevated from day 5 through day 24 at which time the random noise generator used to create the stress event failed. Once the generator was repaired and restarted, cortisol levels increased to previous chronic stress values.

The results of Harlow et al. (1987) do not support the concept of adrenal exhaustion or hypersensitization nor suggest that habituation to stressors occurred, perhaps because of the irregular, unpredictable interval of the noise stimuli. As indicated by Harlow et al. (1987), chronicallyelevated blood cortisol may adversely impact the efficiency of animal production by reducing weight gain and otherwise affecting animals in captivity (Van Mourik and Stelmasiak 1984, Van Mourik et al. 1985) and decreasing antibody production, thereby inhibiting or suppressing the body's ability to resist disease (Roth 1984, Jensen and Rasmussen 1970, Huber and Douglas 1971, Revillard 1971, Paape et al.1973, Hartman et al. 1976, Stein et al. 1976).

These impacts, particularly if chronic, can result in: increased sickness, disease, and death; a decrease in animal productivity (Knight and Cole 1991, Anderson and Keith 1980); and ultimately result in population declines (Anderson and Keith 1980).Harassment of mule deer by all-terrain vehicles, for example, resulted in reduced reproduction the following year (Yarmaloy et al. 1988). Common loons experienced reduced productivity with increased human contacts (Titus and VanDruff 1981).

Many studies have been published documenting the adverse impact of human disturbance on wildlife. Several examples from the scientific literature summarized in our Petition provide additional details about the impacts of disturbance on wildlife. In some cases, the summary references several studies which document similar impacts in the same habitat type or provides a brief explanation of a particular impact attributable to recreational disturbance. Since there are relatively few studies in the literature which directly evaluate the impacts of ORV disturbance on wildlife, the majority of the studies summarized in the Petition reflect the impact of other forms of recreational disturbance on wildlife. There is no legitimate evidence to suggest that the disturbance impacts caused by motorboats, hikers, anglers, or automobiles are not similar to those which are inherent to ORV activity. Indeed, considering the noise, pollution, mobility, speed, physical impacts, and general disruptiveness of ORV use on the landscape, it is quite probable that ORVs result in more, not less, disturbance impacts to wildlife.

Case Studies

In birds of prey, nesting failures (Boeker and Ray 1971), lowered nesting success (Wiley 1975, White and Thurow 1985), displacement (Andersen et al. 1986), and changes in wintering distribution and behavior (Stalmaster and Newman 1978) were documented in response to human disturbance. In their study of home-

range changes in raptors exposed to increased human activity levels, Andersen et al. (1990) documented that increased military use in a site previously subject to low human use resulted in a shift in home range and activity areas for several raptorial species including red-tailed hawks, golden eagles, ferruginous hawks, and Swainson's hawks. In addition, the raptors increased the size of the area used and increased movements outside of the previously used areas, except during military use activities when several birds remained in isolated areas within their home ranges. Two birds, a ferruginous hawk and a Swainson's hawk completely abandoned the area not returning until the following spring. Repeated hazings like this have led to premature labor, excessive stress resulting in death, and other impacts.(See also, White and Thurow 1985). Besides the obvious impacts of habitat abandonment, the changes in home range size, activity areas, and use of habitats subject to increased human disturbance may adversely impact an individual bird's energy budget, and productivity might decrease with subsequent impacts at the population level. If different raptor species demonstrate different levels of tolerance of human activities, in time continued human disturbance could result in a shift in the species composition in the area in favor of the more tolerant species (Voous 1977, Craighead and Mindell 1981, Andersen et al. 1990).

Other scientists have determined that human disturbance also affects peregrine falcons (Fyfe 1969, Enderson and Craig 1974, Dekker 1967), red-shouldered hawks (Portnoy 1974), and osprey (Swenson 1975, 1979, Zarn 1974, Dunstan 1968, 1973, Levenson and Koplin 1984).

For birds, Bury et al. (1977) documented a decrease in bird abundance as ORV use increased. Of the birds seen foraging on the ground, 62, 19, and 1 individuals were observed in the control, moderately-used, and heavily-used sites, respectively. At his Barstow study site, Bury et al. (1977) found a reduction in the number of breeding species, breeding pairs, and biomass of 50, 24, and 22 percent, respectively, as a result of moderate ORV use compared to the control site. The heavily used site had no breeding birds and received essentially no foraging use. Not surprisingly, a positive correlation was observed between shrub abundance (primarily creosote) and faunal species diversity, abundance, and biomass emphasizing that ORV damage to vegetation adversely impacts local faunal assemblies. Similarly, in two ironwood washes in California, Luckenbach (1978) reported that breeding bird density and the number of breeding species was 23 and 90 percent greater in the control wash compared to the impacted wash.

Clearly, ORV induced stress is a major factor in the success of wildlife populations of all kinds. Stress can be exacerbated by the time of the year, weather patterns, or during reproductive and rearing times. As ORV and recreational use increases, we must pay greater attention to how this increased stress impacts wildlife populations.

—This was excerpted from the "Petition to Enhance and Expand Regulations Governing the Administration of Recreational Off-Road Vehicles on National Forests." The 188 page petition is available on our web site or from our office.

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9. ***The BLM has failed to analyze adequately the effects of noise form ORVs on wildlife.***

The Impacts of Off-Road Vehicle Noise on Wildlife
D. J. Schubert and Jacob Smith
Road-RIPorter Issue:
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The noise of off-road vehicles is among their least-endearing qualities to hikers, mountain bikers, and other non-motorized recreationists. The noise of ORVs can do more than simply annoy humans, however. ORV noise can cause significant adverse impacts to wildlife in at least two ways. First, exposure to ORV noise can result in hearing impairment or even loss, with severe consequences for animals dependent on their sense of hearing for finding prey, avoiding predators, and interacting with other individuals of the same species. Second, wildlife exposed to ORV noise often experience stress and other disturbance effects.

Over time, such impacts can lead to altered movement patterns, behavioral changes, and long-term stress impacts, all with potentially significant adverse results.

Hearing Impairment

Animals exposed to ORV noise often suffer from impaired hearing. Studies have documented hearing loss caused by the noise of dune buggies, dirt bikes, and other ORVs that is inflicted on a wide range of species, including Mojave fringe-toed lizard (Bondello et al. 1979, Brattstrom and Bondello 1983), kangaroo rat

(Luckenbach and Bury 1983), and birds (Marler et al. 1973). Several studies have reported bleeding ears and nasal passages after exposure to ORV activity (e.g., Gibson et al. 1975 reporting on small mammals).

Hearing impairment and loss, unsurprisingly, is a very serious concern for most wildlife species. Loss of hearing sensitivity can lead to increased exposure to predation, increased difficulty killing prey, and otherwise significant disruptions in predator-prey relationships (Bondello and Brattstrom 1979, Memphis State University 1971). The impairment of intraspecific communication is another serious concern (Luz and Smith 1976, Luckenbach 1975, Luckenbach 1978, Weinstein 1978). Specific problems can include the inability to recognize mating signals, warning calls, and calls by juveniles (Memphis State University 1971). Gibson et al. (1975), for instance, reported that small mammals became unusually aggressive and disorientated after being exposed to the Barstow to Las Vegas motorcycle race.

Disturbance and Stress

The results of disturbance and stress-related impacts can take longer to materialize but are no less significant. Wildlife disturbance by ORVs is a serious problem for many species, and ORV noise is clearly a major component of these disturbance impacts. Put simply, noise can stress (and thus adversely impact) wildlife (Aune 1981, Baldwin 1970, Burger 1981, Bury 1980, Jeske 1985, Vos et al. 1985, Ward et al. 1973). Wildlife exposed to noise can suffer high levels of physiological stress even if they appear to fully adapt to the noise (Aune 1981, EPA 1971). One potential outcome of disturbance effects is displacement. When a species is dependent on a narrow range of habitat characteristics, displacement into marginal or even unsuitable habitat has lasting effects on survival and productivity. This is true, for instance, for the kangaroo rat (Dipodomys sp.) (Brattstrom and Bondello 1983).

Some research has parceled out the effects of noise, however, and drawn attention to specific ways in which exposure to ORV noise adversely affects wildlife. An Environmental Protection Agency (1971) report argues that noise acts as a physiological stressor producing changes similar to exposure to extreme heat, cold, pain, and other high-stress environmental conditions. One consequence is the alteration of wildlife behavior. For instance, Dufour (1971) concluded that chronic exposure to ORV noise might result in physiological and behavioral changes, warning that these effects are probably cumulative. Manci, et al. (1988) reports that at noise levels above 90 decibels mammals may retreat, freeze or become startled. Brattstrom and Bondello (1983) reported that amphibians, reptiles, and mammals suffered deleterious effects from moderate exposure to ORV noise. These effects included physiological and behavioral hearing loss and the misinterpretation of important environmental acoustical signals.

For some species, the noise of ORVs can directly interfere with critical life history behaviors. For instance, early summer thunderstorms provide an essential environmental cue for the Couchís spadefoot toad (Scaphiopus couchi). The toads, inhabitants of the arid southwestern U.S., emerge from their burrows to mate and lay eggs, and the larvae are born and undergo metamorphosis. All this occurs when the presence of thunderstorms indicates that the appropriate temperature conditions exist (to ensure both suitable conditions for toad survival and adequate availability of prey) and that moisture, another critical ingredient, is sufficient (McClanahan 1967). The toad can mistake the thundering of ORVs across the desert floor for the sound of early summer thunderstorms, however, and emerge during the wrong season and in the absence of water (Brattstrom and Bondello 1983), with significant adverse impacts to the population (McClanahan 1967, Brattstrom and Bondello 1983). Although the mechanisms may vary, a wide range of species may suffer from such impacts. Rennison and Wallace (1976) report the disruption of courtship and breeding by desert birds as a result of ORV noise exposure.

The timing of the ORV use can play an important role as well. Eisenberg and Isaac (1963) reported that infant survival of kangaroo rats is jeopardized by ORV use because adults locate their offspring by responding to repeated scratch-whines. ORV use during the late winter and spring, before the offspring have dispersed, poses the greatest threat. Similarly, when the peak of ORV activity occurs during the peak of lizard reproductive activities, reproductive success can be reduced (Mayhew 1966a, 1966b).

Long-term exposure to the stress of ORV activity (of which ORV noise is typically a major component), is linked to numerous health problems. Baldwin and Stoddard (1973) note that noise exposure is linked to stress, ulcers, tension, and coronary disease in humans, suggesting that similar effects might manifest in wildlife species as well. Rats exposed to high noise levels suffered impacts which included reduced body weight, increased heart rate, and the shrinking of ovaries and kidneys (Geber and Anderson 1967).

Conclusion

When evaluating the potential impacts of ORV use on wildlife, the effects of noise must be considered. Although most of the research into the mechanisms of noise impacts have been conducted on desert wildlife, the considerable literature on disturbance effects across ecosystem types strongly suggests that similar impacts occur in widespread fashion. The specific impact concerns discussed above are exacerbated by four additional characteristics of ORV noise.

For one thing, ORV noise is loud and, under many conditions, can travel long distances (e.g., Rennison and Wallace 1976). For another, a great deal of existing ORV use occurs in fragile habitats, such as desert and wetland ecosystems, which often are home to wildlife species that are especially sensitive

to noise and other human disturbance. Many species live in and are relatively adapted to quiet environments, and ORV noise often greatly exceeds ambient decibel levels. Third, although the displacement effects of noise disturbance can be severe, many wildlife species are limited in their ability to relocate to avoid ORV impacts. Finally, rapidly advancing ORV technology allows for ever-greater penetration into wild and sensitive habitats ó the blanket of ORV noise grows ever-larger.

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10. ***The BLM has failed to adequately analyze the critical negative effects of ORV-induced introduction of exotic invasive plants, pets, and pathogens onto public lands. Nowhere has BLM addressed the cost to the public, now and in the future of exotic invasives as admitted under Alternative 2.***

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Roads and Exotic Plants, Pests and Pathogens
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An exotic "invader" is defined as any organism that is able to colonize and persist in an area where it has never existed before (Mooney and Drake 1986). Exotic species of plants, pests and pathogens are a serious threat to native ecosystems (Liebhold et al. 1995, Vitousek et al. 1996). Invasions by exotic species can reduce biodiversity, spread disease and alter ecosystem processes. They also

can destroy wildlife habitat and damage agricultural crops, rangelands, forests and wildlands (Vitousek et al. 1996).

The continuing establishment and spread of exotic species has severe ecological and economic impacts. Roads provide access for the dispersal and introduction of exotics. Ecosystem disturbance caused by road building provides a perfect ecological climate for the establishment of invasive species. Once an exotic organism takes hold in an area, the options for control are often costly, dangerous and ineffective. To stop the arrival, establishment and spread of exotics, preventing invasions is important. Limiting the construction of roads into undisturbed ecosystems is effective in preventing further invasion.

Damaging Effects of Invaders

In the realm of exotic plants, Spotted Knapweed (Centaurea maculosa) has a severe effect on the grasslands of the intermountain west. Knapweed crowds out the native grasses, damages wildlife habitat and cattle rangelands, and contributes to erosion (Lazell 1989, Lacey et al. 1997). Knapweed spreads, in large part, via movement of seeds on vehicles along roadways.

Perhaps the most well known exotic pest, the Gypsy Moth (Lymantria dispar), has caused massive defoliation of a variety of host trees, especially in the eastern United States (Liebhold et al. 1995). Exotic pathogens also are a problem. For example, Port-Orford cedar root rot (Chamaecyparis lawsonia) is a soil-borne disease that is known to spread by movement of soil infected with the fungus (Castello et al. 1995, Perry 1988). The disease often spreads with the construction of wildland roads.

Exotic Invasions and Disturbance

It is widely accepted that invasions by exotic organisms are facilitated by disturbance (Elton 1958, Mooney and Drake 1986). Pickett and White (1985) define disturbance as "any relatively discrete event in time that disrupts ecosystem, community or population structure and changes resources substrate availability, or the physical environment." Grime (1979) views disturbance as any process that removes or damages biomass. Those involved in the debate on defining disturbance seem to agree that it is a discrete event that changes the conditions in an ecosystem. According to these definitions, roads are clearly a form of human caused ecosystem disturbance. The disturbance caused by roads allows exotic invaders access to undisturbed ecosystems.

Roads and Exotic Plants

Roads foster the entry of exotic plants by providing access for dispersal through human activities. Vehicles and machinery are major transport mechanisms that spread exotic plants. When a vehicle drives through a weed infested area, seeds,

spores or vegetative parts may become lodged in the tire treads and undercarriage. They can travel for miles before becoming dislodged in uninfested areas (BLM 1993, Cale and Hobbs, Sheley et al. 1997). For example, the arrival of Tansy Ragwort (Senecio jacobaea) in Montana is directly attributed to seeds moving in on logging equipment from Oregon (Kollmeyer 1997). Tansy Ragwort is a noxious Eurasian weed that is toxic to livestock, and can outcompete native vegetation. Tansy thrives in grasslands and disturbed sites, including the compacted soil of roadbeds (Kollmeyer 1997).

Soil disturbance plays a major role in the spread of exotic plants (Elton 1958, Mooney and Drake 1986, Hobbs and Huenneke 1992, Pickett and White 1985). Soil disturbance caused by road building changes the microclimate of the area, allowing opportunistic exotic plants the opportunity to colonize. Several studies have focused on experimental soil disturbance (Kotanen 1997, Zink 1996). Both studies found that when soil was excavated and biomass removed, exotic plant species colonized quickly and completely, outcompeting native vegetation. Johnstone (1986) asserts that plant invasion is caused by removing a barrier that previously excluded a plant from a site. An exotic seed or propagule can "wait" as a dormant seed or suppressed seedling until some disturbance destroys its competitors. Roads clearly remove barriers (vegetation/biomass) that exclude plants from a site.

Roads and Exotic Pests and Pathogens

Roads facilitate invasions by exotic pests and pathogens. As with exotic plants, ecosystem disturbance can cause "outbreaks" of exotic pests and pathogens. For example, an exotic species may be present at low levels and not drastically impact the ecosystem. With human disturbance, outbreaks can occur where one or two species rise to higher levels of abundance than in undisturbed areas (Dobson and May 1986).

Roads change the microclimate of the area, causing outbreaks that can have serious ecological implications. Roads also provide access for intentional or unintentional human introduction of exotics. One common method for human transport is in the soil of diseased nursery stock (Liebhold et al 1995). Exotics also can vector each other, causing additional invasions (Lazell 1989). For example, an invading pest might be the vector, or means of transport for an exotic pathogen. There even are soil-borne pathogens, like Port-Orford cedar root rot, which can be spread directly by road construction (Cale and Hobbs 1991).

Conclusion

It is important to note that much of the literature on invasions and ecosystem disturbance does not mention roads directly. The information can be applied to roads, but few studies were designed specifically to study the effects of roads.

More studies need to be conducted. The literature acknowledges that roads contribute to the spread of exotics in a "matter of fact" way, but does not provide suggestions about what can be done. The traditional approach to invasions is retrospective, focusing on control methods, including chemical pesticides, herbicides and biological methods.

The damaging effects of exotics on ecosystems are clear, but the focus on control rather than prevention exacerbates the problem. Managing an area to prevent further disturbance would be most effective in stopping the spread of exotics. This would include a policy to prevent new road construction in undisturbed areas. The ecological costs are too high to allow exotics to spread. Preventing invasions by leaving areas undisturbed is a viable, yet rarely considered alternative.

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11. ***The BLM has failed to analyze adequately the effects of ORVs on soils***.

Soil Displacement and Compaction

Among the most important of the environmental impacts caused by ORVs are soil displacement and compaction.

Soil Displacement

The use of ORVs often causes substantial erosion of the soils on which they travel. This is particularly true on steep slopes and fragile soils. Soil erosion is damaging in many ways. For example, erosion often harms plants by exposing their roots. Displaced soil typically finds its way into waterways, resulting in increased sedimentation and turbidity. This can negatively impact numerous aquatic organisms, including fish species (such as cutthroat trout) that rely on spawning beds that can be covered up by such sediment. Displaced soil can also bury downslope vegetation. Soil erosion is a serious concern in many places where ORVs are used, including the fragile soils of desert ecosystems, the wet soils of riparian and marsh ecosystems, and especially aquatic habitats themselves (for example, ORVs crossing or traveling through streams).

Soil Compaction

Primarily because of their weight, ORVs tend to compact the soils on which they are driven. Plants are directly impacted by soil compaction. First, ORV activities that result in compacted soil certainly cause direct damage to surface vegetation (this is discussed below in the section on plants). Second, as soil becomes more compacted, the ability of roots to penetrate this soil continues to decline. Third, as soil becomes denser and less porous, its permeability to water and air decrease, disrupting critical hydrologic flows and nutrient cycling. All of these factors make the growth of existing vegetation and the establishment of new vegetation increasingly difficult and unlikely. Plants also are affected indirectly. Soil compaction tends to significantly harm the soil micro fauna (such as soil microorganisms) on which plants depend for other nutrient processes and soil fertility.

Such disruptions to hydrological processes also increase the risk of additional erosion, flooding, and landslides. As water is prevented from traveling through soil, and the subsurface flows on which much vegetation depends decreases, surface flows increase in volume and velocity.

12. ***The BLM has failed to address adequately the effects of ORVs on vegetation.***

Vegetation Damage

Off-road vehicles harm vegetation directly through trampling; soil compaction; and air, soil, and water pollution. The result can be devastating: fewer and less vigorous plants, reduced plant cover, lowered plant diversity, adverse changes in plant species composition, and disruptions to plant successional and nutrient cycling processes. The loss of overlying vegetation can result in increased soil temperatures, with negative impacts to soil fauna, soil fertility, nutrient cycling, and hydroponic processes. Vegetation loss also increases the likelihood of erosion.

ORVs frequently trample, crush, uproot, and otherwise directly damage plants and their root systems. In addition to destroying vegetation directly, the weight of ORVs compacts soil, which hinders the ability of roots to penetrate and exacerbates the damage to vegetation. The compaction causes soil to become denser and less porous, less permeable to water and air. These impacts disrupt critical hydrological flows and nutrient cycling, making it more difficult for vegetation to establish and grow.

13. ***The BLM has failed to address adequately the effects of ORVs on habitat.***

As noted above, ORVs can have an enormous impact on vegetation. By reducing the abundance and diversity of many plant species and by changing species composition, the habitat characteristics on which various wildlife species rely can be dramatically degraded. This can result in increased mortality and decreased reproductive success, as wildlife are forced to rely on suboptimal habitat or to exert precious energy in an effort to locate alternate habitat areas.

ORV use also can effectively fragment available wildlife habitat. The fragmentation effects of roads on wildlife are well-documented. Many ORV routes function like roads. ORV routes can impede or prevent dispersal of species, alter microclimates and otherwise reduce habitat quality and reproductive potential, and provide increased access for predators and brood parasites.

Conclusion

Do we really want to waste our time debating where it's okay to trash the public lands and where it isn't? Shouldn't we all be saying that an activity that damages the land and ruins everyone else's experience of nature is an inappropriate use of these lands? At one time, the tobacco companies and cigarette smokers had significant political clout. Over time, the idea that someone had a "right" to smoke in public buildings or public places has given way to restrictions that are based on what's best for the general health and public well-being.

Most private landowners do not and would not allow these kinds of activities on their own property, so why should the public domain suffer what the private sector would not?