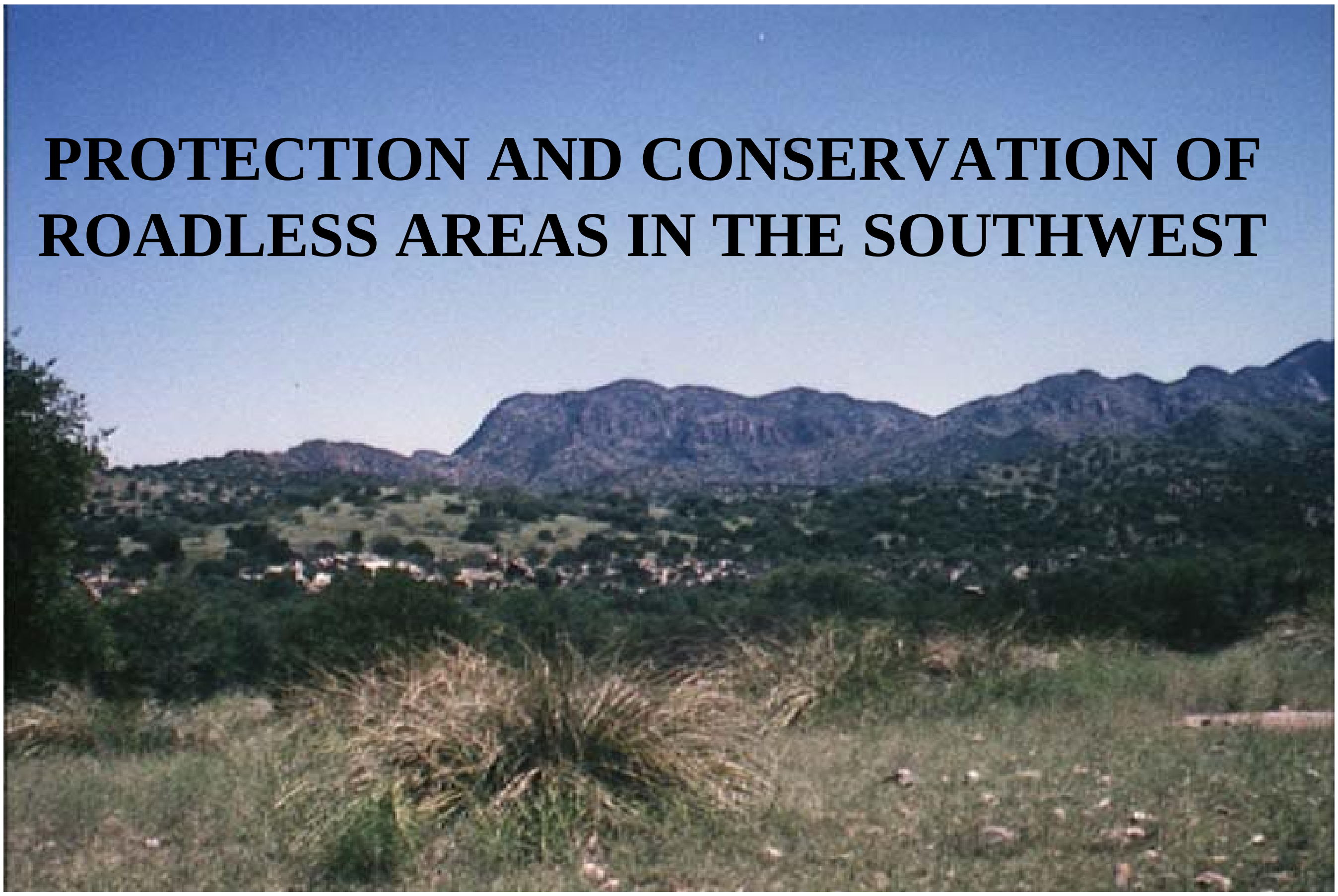
PROTECTION AND CONSERVATION OF ROADLESS AREAS IN THE SOUTHWEST



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Summary

Roadless areas, managed by the Forest Service and Bureau of Land Management in Arizona and New Mexico, are a precious wildlife and human resource. Unfortunately, they are poorly defined, inadequately inventoried, and threatened by logging, road construction, mining, livestock grazing and outdated fire policies:

- Forest Service Roadless area surveys in the 1970's inappropriately excluded areas under 5,000 acres and are now outdated.

- Road construction and logging continues to threaten roadless areas, such as Eagle Peak and Mt. Graham.

- Livestock grazing is degrading roadless areas and designated wilderness throughout the Southwest.

- Mining claims blanket both roadless areas and designated wilderness and active mines are degrading many areas, such as the Arizona Strip near the Grand Canyon.

Despite these threats, remaining roadless areas provide valuable habitat for numerous species teetering on the edge of extinction. As an example, In early 1998 several endangered Mexican gray wolves were released into a large roadless complex in the Apache-Sitgreaves and Gila National Forests. Were it not for this complex, recovery of the gray wolf would be all but impossible. Return of the Grizzly bear to the Southwest is equally dependent upon maintaining the integrity of large roadless areas. Many other species not yet extirpated from the wild are closely associated with the pristine conditions only found in roadless areas. These include the endangered Gila trout, the threatened Mexican spotted owl, and the imperiled Rio Grande cutthroat trout and northern goshawk

Humans benefit from roadless areas as well. Roadless areas maintain healthy watersheds, free from sediment and pollution, providing a source of clean drinking water for numerous municipalities across the nation. They provide recreation opportunities that can't be duplicated by the hand of humanity, offering solitude, fishing and hunting opportunities, and a chance to perceive America as it was prior to industrial scale logging, grazing and mining. Because of the ecological and human value of roadless areas, the Southwest Forest Alliance presents ten management recomendations to conserve this precious resource, including the following:

- Inventory and protect all roadless areas greater than 1,000 acres on National Forest and Bureau of Land Management Lands.

- Prohibit road construction in roadless areas for any purpose.

- Cease ongoing and planned logging, including salvage, in roadless areas.

- Remove domestic livestock from roadless areas with excessive tree regeneration, altered fire regimes, degraded watershed conditions, and/or declining native species attributable to livestock impact.

- Withdraw all roadless areas from mineral extraction.

Impacts of Roads

Over 380,000 miles of roads- eight times the 47,500 miles of U.S. Interstate Highways- have been constructed on our National Forest Lands at a tremendous cost to the taxpayers, to fish and wildlife, to water quality, and in lost opportunities for solitude and recreation. Roads through loss of habitat, increased human access and habitat fragmentation are devastating to numerous fish and wildlife species, particularly those dependent on large blocks of undisturbed, interior habitat.

Effects on Wildlife

Roads directly eliminate wildlife habitat by destroying a substantial amount of habitat and by altering adjacent habitat; a 10 m wide road covers 10,000 m^2 for every kilometer of its length and a much larger area is influenced by edge-effects (Schonewald-Cox and Buechner 1992). Roadside habitats experience increased temperature extremes and solar input, and pollution from exhaust, herbicides, garbage, and noise (Noss 1996, Schonewald-Cox and Buechner 1992, Van Dyke et al. 1986, Yahner 1988). These factors increase habitat disturbance a minimum of 500-600 m on either side of a small rural road and a much larger distance for highways (Van Der Zande et al. 1980).

By altering adjacent habitat, roads attract animals and plants adapted to open, disturbed habitats that are often distinct from those found further from roads. In many cases, these species are competitive, parasitic or predatory on interior species. For example, Small and Hunter (1988) and Yahner and Scott (1988) found increased nest predation on both ground and arboreal nesting birds near roads from various predators. Similarly, cowbird brood-parasitism, which is contributing to drastic population declines for several rare neo-tropical migratory birds, has been connected to roads and other human disturbances (Rothstein et al 1980). Roads provide a highway for exotic plants, which frequently out compete natives. For example, both spotted knapweed and tansy ragwort, exotic plants dominating huge expanses of western land, spread along roadways and compete with or displace native plants. These plants provide poor habitat for native wildlife, which generally are adapted to utilizing native flora.

Roads also provide access for poachers, which are a serious threat to many wildlife species. For example, illegal shooting was found to be the primary and only cause of death for two small populations of grizzlies in Montana over 4 years of study, resulting in mortality for 5 out of 19 radio-collared bears (Knick and Kasworm 1989). The extent of grizzly shooting lead the authors to conclude that:

> "Human-caused mortality of grizzly bears may be the primary factor impeding their recovery. We hypothesize that the ability of regions to sustain viable populations of grizzly bears may be related to road density and human access."

Similarly, the Mexican gray wolf recovery program is being derailed by the senseless shooting of four of the first eleven released wolves. Likely, none of these shootings would have occurred if there were no roads into outer portions of the "wolf recovery zone".

Besides poaching, hundreds of thousands of animals are killed on our nations roads by cars every year. Bears, raptors, snakes, deer, small birds, small mammals are all victims of roadkill, resulting in significant population declines. For example, an estimated 7,100 animals are killed each year on just 50 miles of road in Saguaro National Monument outside of Tucson (Kline and Swann 1998). This includes desert toads, javelinas, snakes and others.

Roads lead to extensive habitat destruction by providing access for numerous other activities, such as logging, mining, grazing, development, ORV joyriding and poaching (archeological and wildlife). Resulting habitat destruction has caused the loss of over 90% of all pristine forests in the U.S. (Femat 1993). Roads and habitat destruction form a positive feedback loop; once in place, roads lead to habitat destroying activities, which when exhausted require new roads to reach ever more remote areas to conduct the same activities. Foreman and Wolke (1992), sum up the destruction wrought by roads eloquently:

> "Napoleon's army may have marched on its stomach, but the army of wilderness destruction travels by road and mechanized vehicle."

Because of changes to the environmental and danger resulting from roads, many wildlife species have learned to partially or completely avoid roads. Grizzlies, elk, mountain lions, small rodents and likely many other animals all show partial or total aversion to roads, to the extent that they either will not cross roads at all, creating a complete dispersal barrier, or use roadside habitat less extensively, effectively reducing total habitat area (Garland and Bradley 1984, Kozel and Fleharty 1979, Lyon 1979, Mclellan and Shackleton 1988, Van Dyke et al. 1986). Thus, high road densities are a known cause of extirpation of wildlife species. For example, elimination of wolves in Northern Wisconsin by 1960 was correlated with a road density threshold of .94 miles/mile^2 (Thiel 1985). Similarly, habitat models for elk have shown that road densities higher than 1 mile/mile^2 reduces effective habitat to zero (Lyon 1979).

Roads, by destroying habitat and creating dispersal barriers, are the single greatest cause of habitat fragmentation. This is likely the most devastating impact of roads and is a recipe for extinction for numerous species that avoid or are unable to cross roads. For these species, a road effectively divides their population in two. More roads divides their population into ever smaller and more isolated groups, each one vulnerable to extinction from all the problems associated with small populations, such as inbreeding, demographic stochasticity (i.e. chance variation in age and sex ratios), environmental stochasticity and anthropogenic habitat loss. The severity of habitat fragmentation towards causing extinction lead two prominent conservation biologists to conclude:

> "Habitat fragmentation is the most serious threat to biological diversity and is the primary cause of the present extinction crisis." (Wilcox and Murphy 1983)

Effects on Fish and Streams

Road construction, by altering the hydrology of watersheds, is well proven to be deleterious to fish and other aquatic lifeforms. Roads increase surface runoff, sedimentation

Figure 1, Road eroding into a stream in the Huachuca Mountains Arizona.

and debris avalanches, destroy riparian vegetation and often require in-stream structures, such as culverts and bridges, that remove aquatic habitat and are barriers to fish.

Numerous studies have shown that increased surface runoff and decreased slope stability caused primarily by road building, but also activities associated with roads, such as logging and grazing, increases sediment production and the likelihood of major landslides (Figure 1) (Amaranthus et al.1985. (Megahan and Kidd 1972). For example, a summary of seven studies in Oregon found increases in slide frequency caused by roads, ranging from 15-850 times greater than natural (Amaranthus et al. 1985). In the Southwest, roads and associated activities are the primary cause of extensive arroyo cutting during this century (see Bahre 1991).

Increased sediments from roads are devastating to the stream environment. Sediments raise stream temperature and decrease dissolved oxygen, stressing or killing fish and aquatic invertebrates. For example, Leedy (1975) found a 94% reduction in numbers and weight in large game fish due to sedimentation from roads. Sediments bury spawning beds reducing or eliminating reproduction for many fish, particularly fish that lay their eggs in gravel or fine rubble, including most species of trout (Stowell et al. 1983). As a result of problems related to increasing sedimentation, virtually all fish native to the Southwest have declined drastically (USFS 1996).

The decimation of native fisheries by roads has been extensive, leading Noss (1996) to conclude:

> "If the fishing public was adequately informed of the negative effects of roads on fisheries, perhaps all but the laziest would demand that most roads on public lands be closed and revegetated!"

Status of and threats to Roadless Areas

Inventory

Lack of reliable data on the distribution and extent of roadless areas is a serious concern. Inventories conducted during the Forest Service's RARE II and the BLM's "Wilderness Study Area" review were based on faulty survey techniques and an inadequate definition of roadless area size and condition. The 1964 Wilderness Act arbitrarily specifies 5,000 acres as the minimum size for wilderness inclusion in the National Wilderness Preservation System. Since then, roadless inventories on Federal Lands, such as the Forest Service's RARE II inventory, have continued to use this number. Given the extent of fragmentation on the landscape and the rarity of roadless areas, however, areas as small as 1,000 acres are critical to preserving ecologically valuable traits, such as rare flora or fauna (Beschta et al. 1995, Henjum et al. 1994).

Additionally, past inventories of roadless areas on Federal Lands, such as RARE II, were marred by subjective criteria that allowed significant areas to be excluded, despite absence of roads. For example, factors such as human "sights or sounds" within a roadless area were grounds for exclusion. Given advances in GIS technologies, a new survey for roadless areas on federal lands, using 1,000 acres as the minimum size, is feasible and, also, biologically necessary. In conducting this inventory, the only criteria for inclusion as a roadless area should be size (>1,000 acres) and presence or absence of roads.

Though flawed, RARE II is the only existing survey of Forest Service roadless areas. According to this survey, roadless areas, including designated wilderness areas, make up less than 29% of all Southwest National Forest lands. The remaining 70% has been degraded by the direct effects of roads or the access provided by roads for logging, mining, poaching, grazing and development. Remaining National Forest roadless areas are desperately in need of protection. On most forests less than half of all roadless areas are protected wilderness (see Table 1). Seven of the eleven Southwest National Forests have less than 10% wilderness; three of the remaining four have less than 20%. Only the Gila National Forest approaches 30% wilderness designation. Is it any wonder that the Gila is the last, best refuge for so many of the region's endangered species? Managing the remaining unprotected roadless areas as wilderness, would in most cases, involve additional protection of only an additional 5-15% of National Forests. Most roadless areas in Arizona and New Mexico are low productivity sites with little timber value. As a result, protecting roadless areas will cause little short-term economic impacts, which quickly will be compensated for by elimination of road construction costs and government subsidies.

Table 1. Roadless Areas greater than 5,000 acres in Southwest National Forests.

National Forest	Unprotected Roadless Area acres/percent			Wilderness Areas acres/percent		National Forest
Arizona	**Acres**	**% of forest**	**% of roadless**	**Acres**	**% of forest**	**Total Acres**
A-S	311,250	12	61	197,071*	7.5	2,640,352
Coconino	136,660	7	44	173,616	9.4	1,846,049
Coronado	405,550	24	55	339,323	19.8	1,718,326
Kaibab	54,560	4	32	116,424	7.5	1,558,926
Prescott	160,860	13	69	72,928	5.9	1,239,016
Tonto	312,310	11	35	589,320	20.5	2,873,234
Total	1,381,190			1,488,682		11,875,903
Average		12	49		12	
New Mexico	**Acres**	**% of forest**	**% of roadless**	**Acres**	**% of forest**	**Total Acres**
Carson	101,450	7	55	84,697	6.1	1,391,485
Cibola	177,110	11	56	138,378	8.5	1,630,893
Gila	753,195	28	49	789,193	29.1	2,708,314
Lincoln	200,190	18	71	82,856	7.5	1,103,629
Santa Fe	279,670	18	49	292,329	18.6	1,569,687
Total	1,511,615			1,387,453		8,404.008
Average		16	56		14	

*Includes Blue Range Primitive Area

Logging

National Forest logging programs and associated road building are the single largest cause of habitat fragmentation and destruction of forested ecosystems in the Southwest. These activities increase erosion and sedimentation to the detriment of aquatic habitat; act as dispersal barriers for many wildlife species; increase wildlife mortality through roadkill and poaching; provide habitat for invasive and exotic plant and animal species; and destroy or degrade the habitat of interior-dwelling species through fragmentation and edge effects.

Logging in roadless areas comprises approximately .1% of currently proposed harvest in Region 3. Even at this level, however, logging and road building continue to dissect remaining roadless areas to the detriment of fish and wildlife habitat, and recreation. For example, the Gila National Forest built four miles of new road to log 30 acres of the Eagle Peak Roadless Area in the early 1990's, despite the fact that this area is sacred for the Zuni Pueblo and of great ecological importance. Following a fire in 1996, the Forest Service again tried to enter the Eagle Peak Roadless Area for salvage logging. Massive public protest slowed the project which was eventually stopped by an administrative directive banning virtually all salvage logging in roadless areas under the Salvage Logging Rider.

Following fires and insect epidemics, the Forest Service frequently argues that salvage logging is needed to protect the health of the forest. The scientific credibility of this practice, however, is very much in question within the agencies themselves, and even more so within the scientific and conservation communities (e.g., Beschta et al 1995). In fact, dead trees left on site are important for many species of birds and other wildlife (Block and Finch 1997). Faced with overwhelming biological research and public opposition to entering roadless areas, the timber industry and certain elements withing the U.S. Forest Service have seized upon "salvage logging" as reason to log roadless areas. Though salvage logging produces the same side-effects as logging, such as road building, soil disturbance and habitat degradation, the Forest Service has continued to propose salvage in ecologically sensitive areas like the Eagle Peak Roadless Area. There is no justification for entering roadless areas for salvage.

Figure 2, Before and after logging for a road for telescopes in a Mt. Graham roadless area.

Livestock grazing

Livestock are a well-documented threat to the integrity of aquatic communities, and riparian and upland forest. By degrading soil conditions and radically altering hydrologic and natural fire regimes, livestock undermine natural ecosystems at the most fundamental levels. Numerous species have declined or been extirpated because of grazing, including the Southwestern willow flycatcher, Mexican grey wolf, grizzly bear, loach minnow, spikedace and Rio Grande cutthroat trout.

Livestock are particularly damaging in riparian areas, where they eliminate riparian vegetation, erode streambanks, pollute water, alter channel morphology, increase peak flood volumes and reduce summer flows. Over 90% of all Southwest riparian areas have been degraded by cattle grazing. Removing cattle from roadless areas that have experienced watershed degradation is a good start towards restoring Southwest ecosystems. This is supported by a recent report by four Southwest Forest Service biologists:

> "Recovery of riparian areas with cattle hasn't worked in the past, is not working now, and won't work in the future. And this is where a change in management attitude is necessary. The only practical way to restore riparian areas supporting endangered species is through removal of cattle impact. And based on experience, we advocate that prescriptions that call for complete rest or nonuse be the first step. A change in attitude to recognize that other multiple uses in riparian areas are more beneficial to the greatest number than a few AUM's is necessary." (USFS Seven Species Project, Fish Team 1997)

A December 1997 poll demonstrates that every sector of the Arizona public- Democrats, Republicans, liberals, moderates, conservatives, urbanites and rural people- all support reducing commercial livestock to protect wildlife and natural conditions (Arizona Daily Star, Nov 23, 97).

Mining

Because of excessive allowances under the 1872 Mining Act, thousands of mining claims blanket roadless and wilderness areas throughout the Southwest. If acted upon, mines and mine tailings piles severely degrade the wilderness character of effected areas; pollute streams to the detriment of native fish and recreation; and dissect roadless areas with access roads, resulting in habitat fragmentation and degradation. The 1964 Wilderness Act recognizes all mining claims made before December 31, 1983, allowing mining, road construction, timber harvest and any other activity justified to extract mineral resources (The Wilderness Act § 3 (d)). Any and all mining claims are allowed in non-wilderness roadless areas. For example, roadless areas contiguous with the Grand Canyon National Park, which are similarly awe inspiring as the park, are being decimated by uranium mining, resulting in radiation poisoning and road building. Mine roads have allowed access for poachers (both archeological and wildlife), trappers and ORV joyriders (Foreman and Wolke 1992). Mining should not be tolerated in or near Grand Canyon or any other wilderness/roadless areas.

Development

Urban and rural development poses direct and indirect threats to roadless areas and wilderness tion of roads or structures in non-wilderness roadless areas decimates the character of the area, disqualifying it from roadless status. For example, the Forest Service and BLM regularly construct stock tanks for cattle in wilderness areas, resulting in concentrated livestock impacts, often denuding an area to barren ground.

Dams, diversions and other water projects for urban and agricultural development are currently allowed in wilderness and non-wilderness roadless areas, resulting in destruction of pristine habitat from road construction, flooding under reservoirs, changes in water quality and loss of habitat-regenerating floods. A prime example is the Glen Canyon Dam, which has altered flooding and water temperatures in Grand Canyon National Park, resulting in loss of beach habitat and major declines in native fish, such as the Colorado River squawfish.

Roadless/wilderness areas need protection from the constant and growing encroachments of society. This, in fact, was the original purpose of the Wilderness Act:

> "In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness" (Wilderness Act 16 U.S.C., § 2(a)).

Fragmentation

The ecological value of any given roadless areas is related to its size and position on the landscape *vis a vis* other roadless areas. Restoration of roaded areas to roadless, therefore, must be planned at the landscape level, taking into account the need to increase the size of existing roadless areas and restore new roadless areas in places where connectivity is inadequate. Such a planning effort should be conducted in parallel with roadless area inventories.

Fire Suppression

Fire suppression activities, including creation of fire breaks, road building, thinning, snag removal and use of fire retardant slurries, should be prohibited in roadless areas, unless it can be conclusively shown that one or more of these activities are absolutely necessary to save human life. Prescribed fire should be limited to fires ignited under natural conditions without prior site preparation and left to burn, unless human life is seriously endangered.

An Ecologically Sound Roadless Area Policy

1. Roadless areas are defined as any area 1,000 acres or greater that contain no surfaces improved or maintained by mechanical means to insure relatively regular and continuous use by standard low clearance vehicles. A way maintained solely by the passage of vehicles does not constitute a road. Areas smaller than 1,000 acres, if pristine and of ecological or cultural value, should also be considered for protection as roadless areas (Beschta et al. 1995, Henjum et al. 1994).

2. Comprehensive inventories of all roadless areas 1,000 acres or greater on National Forests and Bureau of Land Management Districts in the Southwest should be conducted immediately.

3. Manage all roadless areas as officially protected wilderness areas until such time as they are designated as wilderness.

4. Road construction, for any purpose, should be prohibited on all Federally owned roadless areas greater than 1,000 acres or smaller if of ecological significance.

5. Cease ongoing and planned logging, including salvage logging, in all Federally owned roadless areas, including all those identified in the inventories listed above.

6. Remove domestic livestock from roadless areas with excessive tree regeneration, altered fire regimes, degraded watershed conditions, and/or declining native species attributable to livestock impact.

7. Withdraw all roadless areas from mineral extraction.

8. Halt all developments and "improvements", including water projects, in all Federal roadless and wilderness areas, including all those identified in the inventories listed above.

9. Obliterate roads in areas connecting existing roadless areas to create the largest road free areas possible.

10. Limit fire suppression activities to areas surrounding human settlement and riparian areas with imperiled native fish stocks, and use the least intensive means possible. Use only "prescribed natural fire" to restore forest conditions in all forest types with control of these fires limited to the least intensive means possible to secure human life.

11. Restore the native flora and fauna of existing roadless areas through species reintroduction, habitat improvement, removal of harmful non-native species, and cessation of non-native stocking programs.

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Cover photo and eroding streams by Sky Island Alliance; Mt. Graham photo Dr. Robin Silver.