Prelude to Catastrophe

Recent and Historic Land Management Within the Rodeo-Chediski Fire Area

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Center for Biological Diversity
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Executive Summary

Burning across 468,000 acres of tribal reservation, national forest and private land, the Rodeo-Chediski wildfire destroyed hundreds of homes and forced the evacuation of over 30,000 people. It was the largest wildfire in Arizona's history. While the intensity of the fires is universally regarded as unnatural, there is much debate over the conditions that caused it. Was it "lack of management" as conservative politicians and the U.S. Forest Service have charged? Did appeals and litigation by environmental groups prevent logging that would have diminished the fire's destructiveness? Or was the area intensively and poorly managed, with few appeals and lawsuits by environmental groups?

To answer these questions, the Center for Biological Diversity obtained documents from the Apache-Sitgreaves National Forest describing forest conditions and management decisions made within what would later become the Rodeo-Chediski Fire. Timber sales and livestock grazing allotments were dated and mapped within the fire zone. Historical documents were also analyzed.

The record unambiguously demonstrates that the Sitgreaves national forest is one of the most heavily logged, grazed and roaded forests in the Southwest Region of the U.S. Forest Service (Arizona and New Mexico). It has less old growth, fewer roadless areas, and fewer wilderness areas than the other eleven forests. Virtually every acre within the Rodeo-Chediski fire area was intensively logged, grazed, and roaded. In the past 13 years alone, the Forest Service conducted ten timber sales within its portion of the fire area. Forest Service employees and the Arizona Game and Fish Department repeatedly warned that the logging levels on the Apache-Sitgreaves were unsustainable and Game and Fish even appealed the Forest Plan. Numerous Forest Service studies in the 1990's warned that overgrazing by livestock within the fire area was causing dangerous fuel loads by allowing large numbers of small pine trees to take root.

No appeals or litigation were filed against thinning projects or prescribed burns by environmental groups. A small proportion of the timber sales within the fire area were appealed or litigated. All these actions opposed the logging of large, fire resistant trees. None objected to the thinning of small trees. Only one protest resulted in a timber sale being halted. All other timber sales were carried out. In some cases, environmental groups agreed to the thinning of small trees within timber sales that otherwise targeted large, fire resistant trees.

Introduction

Using GIS mapping technology and comparison of LANDSAT photos taken in 1972 and 1997, the Pacific Biodiversity Institute[1] came to following conclusions about land management within the Rodeo-Chediski fire area:

Land Ownership. The fire started in and burned through hundreds of thousands of acres of the Fort Apache Indian Reservation before reaching the Sitgreaves national forest. Only 38% of the total fire area was on the national forest. national forest management, whether good or bad, could not have prevented the fire or slowed it prior to becoming a catastrophic blaze. The exclusive concern with national forest management, therefore, is misplaced. Analyses of fires across the West show a similar pattern of national forest acres comprising a relatively small portion of the total burned.

Road Network. Over 2,145 miles of roads, most of them logging roads, weaved through the burn area, making it one of the most heavily roaded forests in the country.

Wilderness Areas. The national forest portion of the fire contained no wilderness or roadless areas. Only a very small portion of the Reservation lands within the fire area was roadless.

Logging. The forest on both the national forest and Reservation was heavily logged over the last fifty years. Very few old growth or unlogged areas existed prior to the fires. Logging operations targeted the largest trees. Heavy logging continued into recent years.

Forest Conditions. Dense stands of young trees were evident in both 1972 and 1997. Heavy logging operations did not result in decreased densities of small trees. Small tree densities increased between 1972 and 1997. Small tree densities increased after logging operations.

Fire Intensity. Analysis of fire "hot spots" shows that some logged areas burned intensely. Data was not available, however, to conduct a systematic analysis of the entire burn area.

Conservation Activities. Intense historic and recent levels of logging and roadbuilding, the complete absence of wilderness areas, the small number of roadless areas, and tiny amount of old growth remaining indicate that environmentalists have done little to control logging levels on the national forest. Since nearly two-thirds of the fire (62%) occurred on private and Reservation lands, environmentalists had no possibility of influencing most of the fire area.

U.S. Forest Service records of timber sales and grazing allotments confirm the LANDSAT-based conclusions of the Pacific Biodiversity Institute. They show that the Forest Service was aware that current grazing practices within the fire area were causing increased densities of small, highly flammable trees, and that the Forest Service conducted ten timber sales within the fire area since 1990. Unsustainable levels of logging on the Sitgreaves national forest have been opposed not only by environmentalists, but also by high-level Forest Service managers and the Arizona Game and Fish Department.

Historic and Present Management on the Sitgreaves national forest

The Sitgreaves and Apache national forests were formerly managed as separate national forests but are now managed together as the "Apache-Sitgreaves national forest." The Apache is in the White Mountains, runs north-south, is very mountainous, and contains a great diversity of forest types ranging from pinyon-juniper woodlands to spruce-fir forests. Large segments of it are unlogged and unroaded. The Sitgreaves is at the eastern end of the Mogollon Plateau, runs east-west, is relatively flat, and is dominated by large expanses of ponderosa pine forests and meadows. It contains very little unlogged or unroaded forest. Because of its different ecology and management history, and because the Rodeo-Chediski fire burned there, this paper treats the Sitgreaves portion of the Apache-Sitgreaves national forest as a distinct national forest.

Traversing the Mogollon Plateau in 1857, First Lt. Edward Beale of the Army Corps of Topographical Engineers described the Mogollon country as "the most beautiful region I ever remember to have seen in any part of the world…a glorious forest of lofty pines…intersected frequently by extensive open glades, sprinkled all over with mountain meadows and wide savannahs, filled with the richest grasses…" Other early explorers described the Sitgreaves forest as "the best large body of ponderosa pine" in the Southwest,[2] with trees averaging 125 feet tall and 18 inches in diameter.[3]

Figure 1. Ponderosa pine forest on the Sitgreaves national Forest at the turn of the 20th century.

The discovery of this forest of glorious trees and grasses led to an intensive logging and grazing industry which has converted much of the plateau to a degraded ecosystem more closely resembling a tree farm.

History of logging on the Sitgreaves Forest

Logging has occurred throughout the Mogollon Plateau for over one hundred years because its relatively flat geography, open forests, and large trees were ideal for railroad logging operations. On the Sitgreaves, however, logging did not reach industrial scales until after World War II.[4] By the early 1970's, it was the most heavily logged forest in the Southwest Region of the U.S. Forest Service, with approximately 100 million board

feet per year being cut off the Apache-Sitgreaves.

By the mid-1980's, most of the old growth forest had been logged off the Sitgreaves and timber volumes were hard to find. The Forest was completing 94% of its planned timber sales, but only obtaining 76% of the planned volume.[5] Pressure to keep up high levels of timber output despite the disappearance of large trees prompted complaints within as well as outside of the Forest Service. The District Ranger of the Lakeside Ranger District (where much of the national forest acreage within the Rodeo-Chediski Fire burned) warned in 1990 that logging potential was being overestimated, too much emphasis was being placed on timber volume, too many areas were being cut, and that wildlife populations were crashing. The ranger concluded: "over cutting remains the District's major concern in Forest Plan implementation and monitoring. That is why we are voicing the concerns for sustained yield and even flow, cumulative impacts on indicator species, frequency of entry, and the short rotation cycle."[6]

Unsustainably high logging levels and their impacts on wildlife also prompted complaints by the Arizona Game and Fish Department (AGFD). In 1988, AGFD took a dramatic and unusual step: it appealed the entire land management plan for the Forest.[7] It is very rare for a state wildlife agency to appeal a federal forest plan. Noting that "the Sitgreaves national forest currently has little remaining or existing old growth" and that this old growth "is generally limited only to the heretofore unlogged steep canyons," AFGD objected to the planned "liquidation" of "any existing old growth" forest.[8]

In 1993, the U.S. Fish and Wildlife Service listed the Mexican spotted owl as a "threatened species," expressly noting the near absence of unlogged forest on the Sitgreaves.[9] In 1998, AGFD issued a report declaring that the northern goshawk population on the Sitgreaves was no longer self-sustaining.[10] Though the Sitgreaves is nearly twice as large as the North Kaibab Ranger District, it has less than half as many goshawks, and those goshawks are not able to sustain themselves in the heavily logged forest.

Figure 2. Logged ponderosa pine forest on the Sitgreaves National Forest.

Thus, the lofty pines that had so enchanted the early explorers were almost entirely gone by the late 1980's. The two species most closely associated with mature forests- the spotted owl and goshawk- were plummeting. It is no wonder that old-growth ponderosa pine is one of the twenty most endangered ecosystems in the United States.[11] Nonetheless, the Sitgreaves national forest has continued logging the remnant large trees to this very day.

Recent logging within the Rodeo-Chediski fire area

According to U.S. Forest Service data obtained through the Freedom of Information Act and the National Environmental Policy Act, a large portion of the forest within the Sitgreaves portion of the Rodeo-Chediski fire area was intensively logged in the past decade. At least ten timber sales were conducted since 1990 (Figure 3). [12]

Eight of the ten Rodeo-Chediski timber sales "high-graded" large trees. That is, they disproportionately logged large trees despite their rarity on the landscape. For example, approximately 75% of the 2,605 acres logged by the *Bunger* timber sale were cut under intensive "final shelterwood removal" and "shelterwood seed cut" prescriptions, which log most large overstory trees. The fires raged through the heavily logged *Bunger* sale area on June 23, 2002.

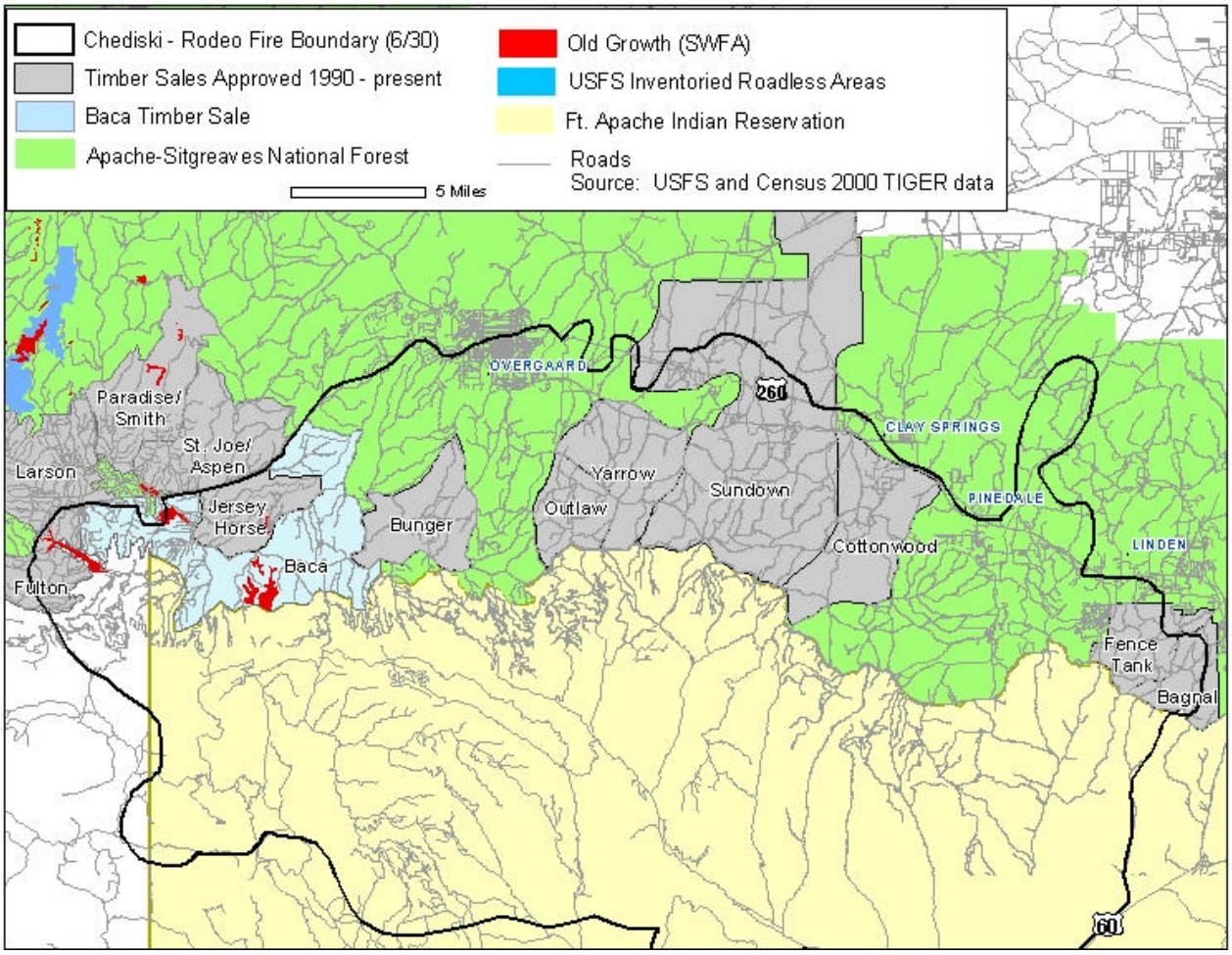

Figure 3. Timber sales and roads within the Rodeo-Chediski fire boundary. Management details are in Appendix A. There are no data for timber sales on the Fort Apache Reservation.

The *Jersey Horse* timber sale focused heavily on the logging of large trees while leaving nearly all small, fire prone trees behind. Eighty seven percent of the volume consisted of trees larger than 16 inches, with 32% of the volume coming from trees larger than 24 inches. The Chediski fire burned through much of the *Jersey Horse* timber sale area on June 22, 2002.

> "timber harvest, through its effect on forest structure, local microclimate, and fuels accumulation, has increased fire severity more than any other recent human activity"
> U.S. Forest Service report to Congress.

Only two of the ten timber sales were appealed by environmental organizations. The *Cottonwood Wash* timber sale appeal resulted in an agreement between the U.S. Forest Service and the Center for Biological Diversity to limit logging to trees smaller than 18" in diameter. *Cottonwood Wash* and the *Yarrow* project are the only two timber sales in the Rodeo-Chediski fire area that avoided logging very large trees. The second appeal, of the *Sundown Timber Sale*, was denied by the Forest Service.

The Jersey Horse Timber Sale mentioned above, was temporarily halted by litigation in 1995, but logging resumed in full after the injunction was lifted.

Only the Baca Timber Sale was completely halted by litigation. Though 96% of the trees within the timber sale area were smaller than 12" in diameter, 26% of the volume was to come from logging of trees greater than 16" in diameter. The Center for Biological Diversity agreed to allow logging of small trees on 1,300 acres within the sale area in order to reduce the fire risk to a rural community. The thinning was partially completed and the Rodeo-Chediski fire did not cross over the thinned area.

These timber sales, which focused on the logging of mature and old-growth trees, did not stop the massive blazes. In fact, these sales may have contributed to both the fires' size and intensity, especially by removing thousands of large, fire-resistant old-growth trees while leaving behind millions of small, unmerchantable and fire-prone small-diameter trees, and by leaving behind slash piles and other logging residue.

The Forest Service itself stated in a recent report to Congress, "timber harvest, through its effect on forest structure, local microclimate, and fuels accumulation, has increased fire severity more than any other recent human activity."[13]

Similarly, the Departments of Agriculture and Interior found in a report under the National Fire Plan that "the removal of large, merchantable trees from forests does not reduce fire risk and may, in fact, increase such risk."[14]

The connection between logging and fire risk has been acknowledged for many years. In the early 20th century, one researcher noted that "a crown fire in mature timber is almost unheard of . . . it is after logging that damage from fire is greatest."[15] A history of Forest Service management in the Southwest found that "fire hazard was extreme in the cutover

areas of the national forests of the Southwest," and that this hazard was five times greater on timber sale areas along the Mogollon Rim than in unlogged areas.[16]

High density of roads did not slow the fire

It is often assumed that fires will tend to ignite and spread faster in roadless and wilderness country. In fact the Rodeo-Chediski fires burned through some of the most intensively roaded and logged national forest lands in the western United States.

Wilderness areas are generally designated in large blocks of roadless lands. A comparison with other national forests within the Southwestern region shows that the Sitgreaves contains the least amount of designated roadless areas, and is the only forest that contains no designated wilderness areas (Fig.4).[17] Two riparian areas flowing through steep-walled canyons—Chevelon Canyon and Leonard Canyon—are the only remaining unroaded areas in the entire Sitgreaves national forest. Each of these areas are smaller than 5,000 acres in size—with the result that little more than 1% of the 818,000 acre Sitgreaves national forest is designated "roadless" by law. As noted in a Arizona hiking guide published in 1985, "you can't hike a quarter-mile without hitting a road" on the Sitgreaves national forest.[18]

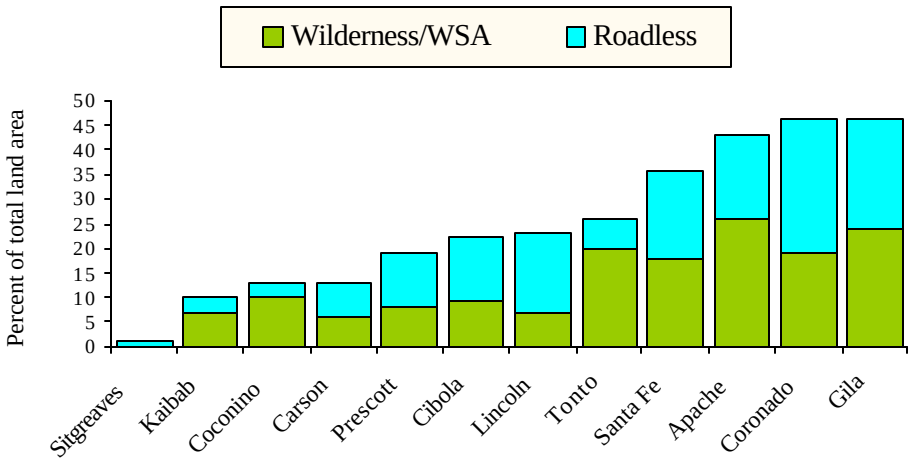

Figure 4. Percent of designated roadless areas and designated Wilderness or Wilderness Study Areas in the twelve southwestern National Forests.

Grazing fostered growth of pine thickets

Livestock grazing is recognized by scientists to be the single most important influence besides climate on vegetation in the Southwest. For nearly 100 years, national forests have been divided into fenced grazing allotments, where privately owned cattle and sheep are permitted to graze. Eight grazing allotments were found to lie substantially within the

area of the Rodeo Chediski fire (Fig. 5).

Although all of these allotments were by law supposed to have completed environmental review by now, only four appear to have been fully completed from records available to the Center. This has had important consequences, because in every case where environmental reviews have been completed the allotments were found to be stocked well over capacity and heavily grazed, resulting in growth of pine thickets with high fuel potential for catastrophic fires.

In a 1998 Environmental Assessment for the Black Canyon allotment, the Forest Service states that "residual herbaceous material that both inhibits tree seedling establishment and that carries periodic fire which can thin and remove increased density of trees," needed to be provided, but was being removed by livestock. The report then concluded that "overstocking and overutilization of vegetation" by cows had left the range in "poor and very poor" condition with "high tree densities [and] overuse of desirable forage" The report recommended a drastic reduction from 213 head down to 60.[16]

Similarly, 100% of pine forest was found to be in poor condition on the Clay Springs allotment due to "dense timber stands." The report recommended thinning of pine thickets and reducing livestock.[17] A 2000 Forest Service report on the Town Tank allotment found the "majority of the overstory is dense" because "livestock grazing and the changes in fire frequency have contributed to the dominance of trees."[18] On the Verde allotment the majority of ponderosa pines were "pole sized trees, with no mature or old growth." These thickets are a result of grazing.

The effect of livestock in turning ponderosa pine forests into highly flammable thickets

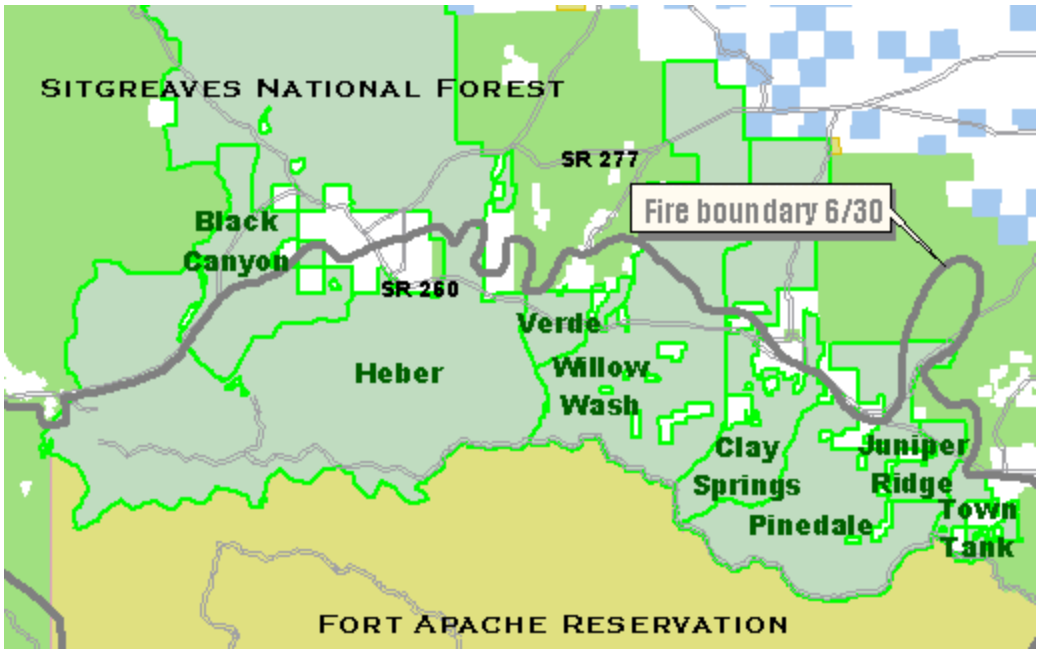

Figure 5. National Forest livestock grazing allotments within the Rodeo-Chediski fire area. Management details are shown in Appendix B.

of spindly pine trees has been long known. Studies from as long ago as 1951 have documented this effect.[19] Recent scientific reviews confirm the role that livestock have in contributing to catastrophic wildfires.[20] This mechanism is recognized and admitted by the Forest Service, but the Service until recently refused to deal with it by reducing livestock.

> "Probably no single land use has had greater effect on the vegetation of southeastern Arizona or has led to more changes in the landscape than livestock grazing range management programs. Undoubtedly, grazing since the 1870s has led to soil erosion, destruction of those plants most palatable to livestock, changes in regional fire ecology, the spread of both native and alien plants, and changes in the age structure of evergreen woodlands and riparian forests."
>
> Bahre, C. J. 1991. *A Legacy of Change: Historic Human Impact on Vegetation of the Arizona Borderlands.* University of Arizona Press.

Several of the allotments, including the largest allotment of Heber have yet to complete environmental review, a review that is likely to recommend reductions in livestock numbers and thinning of pine thickets. The Forest Service's own assessments suggest that reductions or removals of livestock are clearly urgently needed to stop the forests being returned to their hyperflammable conditions after thinning and prescribed burn projects are done.

Conclusion

Politicians and industry have an unfortunate history of attempting to use large and often tragic wildfire events as justification for more intensive management of national forest lands. If the Forest Service would simply permit more logging, grazing and road building, they argue, events such as the Rodeo-Chediski fire would be minimized or avoided entirely. Such assertions are not based in reality.

As demonstrated by this report, the Sitgreaves national forest, where the Rodeo-Chediski fire burned, is the most heavily logged and roaded national forest area in the Southwest. For over 50 years, the once expansive old-growth ponderosa pine stands of the Mogollon Plateau and the Sitgreaves national forest have been logged to the point that virtually no ancient forest remains today.

Such logging practices are not merely historical. Logging throughout the 1990's continued to target large, fire-resistant trees while largely ignoring the proliferation of small-diameter, fire prone forest. At least 10 timber sales were logged within the Rodeo-Chediski fire area since 1990. The best available science shows that these logging practices may well have added fuel to the fire.

Additionally, the Forest Service has recently recognized that much of the land within the fire boundaries was being severely overgrazed, and that these grazing practices were further contributing to extreme fire risk

Clearly, it was not a *lack* of forest management, but the *type* of forest management that contributed to the Rodeo-Chediski fires. Appeals and litigation had little effect on Forest Service management actions within the fire boundaries.

In 1996, the Southwest Forest Alliance, a coalition of more than 50 environmental groups from Arizona and New Mexico, released an ecological and economic plan, which specifically called for fuel reduction measures.[19] Thus, conservation organizations have for many years actively supported fuels reduction by prescribed burning and small-diameter tree thinning, especially where those treatments are focused on protecting communities within national forest lands.

Blaming environmental organizations for the Rodeo-Chediski fires is a convenient game of smoke and mirrors played by opportunistic, cynical politicians and a U.S. Forest Service that refuses to change its paradigm of management. The controversy surrounding the fires has demonstrated that there is ample common ground concerning the need to reduce fire danger, protect communities and restore forests through the use of prescribed burning and small-diameter thinning. Will the U.S. Forest Service and conservative politicians choose to embrace this common ground, or will they continue to choose divisiveness and blame?

Appendix A: Timber sales within the Rodeo-Chediski fire area: 1990-present

Bunger Timber Sale This sale approved the logging of 8.6 million board feet of timber from 2,605 acres within an 8,173 acre analysis acre. Nearly 75% of the area cut was done under extremely intensive logging methods (912 acres of final shelterwood removal, shelterwood seed cut, 1025 acres). The sale's environmental analysis was completed and contract issued in 1990 to Kaibab Industries.

The Chediski fire burned entirely through the Bunger timber sale area on June 22, the third day of the fire. There were no administrative appeals or litigation of this project. Logging was completed in 1992.

Jersey Horse Timber Sale This 1,470 acre timber sale logged 1.5 million board feet adjacent to Black Canyon Lake. The volume removed by the sale was comprised almost exclusively of large, fire-resistant old-growth trees. 87% of the volume removed by Jersey Horse consisted of trees larger than 16 inches, with 32% of the volume coming from trees bigger than 24 inches. The sale's environmental analysis was completed in 1991 and contract issued in 1993 to Precision Pine and Timber.

The Chediski fire entered the Jersey Horse timber sale area on June 22, the third day of the fire. There were no administrative appeals of the project. The sale was temporarily halted in the regional injunction against logging in 1995-1996 but logging was resumed on the sale after this time.

Outlaw Timber Sale This sale approved the logging of 7 million board feet of timber on 2,215 acres, within a 5,476 acre analysis area. Over 60% of these acres were intensive overstory removal. (final shelterwood removal). The sale's environmental analysis was completed in 1989 and contract issued in 1990 to Precision Pine and Timber.

The combined Rodeo-Chediski fires burned through most of the Outlaw timber sale area on June 23, the sixth day of the Rodeo fire and the fourth day of the Chediski fire. There were no administrative appeals or litigation of the project. Logging on the sale was completed in 1994.

Yarrow Timber Sale This sale approved the logging of 900,000 board feet on 301 acres, within a much larger analysis area of 8,320 acres. Its environmental analysis was completed and contract issued to the Fort Apache Timber Company in 1995. Only trees smaller than 16 inches were harvested by this sale.

The combined Rodeo-Chediski fires burned through the Yarrow sale area on June 23, the sixth day of the Rodeo fire and the fourth day of the Chediski fire. There were no

administrative appeals of litigation of the project. Logging on the sale was completed in 1995.

Sundown Timber Sale This sale approved the logging of 6.8 to 9.2 million board feet of ponderosa pine on 3,737 acres. It also included 15,787 acres cutting of piñyon-juniper woodland. The total analysis area was 48,747 acres in size. Its environmental analysis was completed in 1997. It is unclear when the contract for this sale was issued.

The Rodeo fire burned through the Sundown timber sale area on June 20, the third day of the fire. The Center for Biological Diversity appealed the Sundown timber sale in 1997, and offered to drop the appeal if the Forest Service limited logging to ponderosa pine 18 inches and smaller in diameter, but the offer was refused. This appeal was denied and there was no litigation of the sale.

Cottonwood Wash Timber Sale This sale approved the logging of 6.8 million board feet of ponderosa pine on approximately 2,900 acres, on a larger analysis area of 15,841 acres. The environmental analysis for the sale was completed in 1995 and the sale was contracted to Stone Forest Products in 1997.

The Rodeo fire burned through the Cottonwood Wash timber sale on June 20, the third day of the fire. The Center for Biological Diversity appealed the Cottonwood Wash timber sale in 1997, but the appeal was settled when the Forest Service agreed to limit logging to trees smaller than 16 inches, except for one part of the sale where larger trees were logged. There was no litigation of the sale.

Cottonwood Salvage Sale This sale approved the post-fire salvage logging of 215,000 board-feet from 125 acres south of Lakeside. The trees burned in the 1,500 acre Cottonwood fire that burned in the summer. All dead trees on this acreage were logged. The environmental analysis was completed in 1996.

The Rodeo fire burned through the Cottonwood salvage sale on June 20, the third day of the sale. There were no appeals or litigation of this sale. Logging was completed by Stone Container in 1996.

Fence Tank/Bagnal Timber Sales These are two separate sales that were issued in one contract. The Fence Tank sale approved the logging of 2.5 million board feet of ponderosa pine on 1,270 acres. The Bagnal sale approved the logging of 100,000 board feet on 650 acres. The Fence Tank/Bagnal combined contract permitted the logging of 3.9 million board feet. The contract was issued in 1993 to Stone Forest Products and logging was completed in 1997.

The Fence Tank/Bagnal sales focused heavily on the logging of large trees. Over 67% of the volume in these sales consisted of trees larger than 16 inches, with nearly a quarter of the volume comprised of very large trees over 24 inches in diameter.

No appeals or litigation was filed against the Fence Tank or Bagnal timber sales. The combined Rodeo-Chediski fires burned into the Fence Tank sale area on June 23, the sixth day of the Rodeo fire and the fourth day of the Chediski fire. The combined fires burned into the Bagnal area on June 24.

Fulton Timber Sale The Fulton timber sale approved the logging of 4.5 million board feet of ponderosa pine on 2,441 acres. Over half of this logging was intensive logging of nearly all trees (1255 acres of shelterwood cutting) and the sale emphasized logging of old-growth forest (taking VSS 6C from 26% of the area to 20%). The environmental analysis for the project was completed in 1991.

No appeals or litigation was filed against the Fulton timber sale. The combined Rodeo-Chediski fires burned into the Fulton timber sale on June 29. The Fulton timber sale contract was issued to Stone Forest Products in 1992 and logging was completed on the sale in 1993.

Appendix B: Livestock grazing allotments in the Rodeo-Chediski fire area.

Black Canyon. 17, 317 acres. An Environmental Assessment (EA)[6] in 1998 reported "overstocking and overutilization of vegetation" by cows. Range was in "poor and very poor" condition due to "[h]igh tree densities, overuse of desirable forage". The EA identified a need to "provide residual herbaceous material that both inhibits tree seedling establishment and that carries periodic fire which can thin and remove increased density of trees," and recommends cutting from 213 head down to 60.

Clay Springs, 25447 acres. EA in 1995 reports 98% of range in poor-very poor condition due to 47% overstocking. Pine forest 100% poor condition due to "dense timber stands". Recommends thinning and cut livestock.

Heber, 159,399 acres. 453 head allowed. New management plan still not completed.

Juniper Ridge, 3450 acres. 75 head allowed. New management plan still not completed.

Pinedale, 33,757 acres. New management plan 1996. 75 head allowed.

Town Tank, 3616 acres. 14 head allowed. Specialist report in 2000 reports "majority of the overstory is dense" and poor range condition. "livestock grazing and the changes in fire frequency have contributed to the dominance of trees" New management plan still not completed.

Verde, 4956 acres. New management plan 1999, 18 head permitted. Assessment notes "overstocking and overutilization of vegetation" Majority of ponderosa pines are "pole sized trees, with no mature or old growth."

Willow Wash, 42,042 acres. New management plan 1999 cut stocking rate in half to 210 head May-Nov. Assessment notes "overstocking and overutilization of vegetation"

Endnotes

[1] Morrison, P. and K. Harma. 2002. *Analysis of Land Ownership and Prior Land Management Activities Within the Rodeo & Chediski Fires, Arizona*. Pacific Biodiversity Institute, Winthrop, WA. Available at www.pacificbio.org

[2] Pearson, G.A. and R.E. Marsh. 1935. *Timber growing and logging practice in the southwest and in the Black Hills region*. U.S. Forest Service Technical Bulletin No. 480

[3] Plummer, G.F. 1904. *Forest conditions in the Black Mesa forest reserve, Arizona*. U.S. Geological Service Professional Paper No. 24.

[4] Arthur R. Gómez. "Industry and Indian self-determination: Northern Arizona's Apache Lumbering Empire, *1870-1970*," in *Forests Under Fire: A Century of Ecosystem Mismanagement in the Southwest*. Edited by Huggard and Gómez (University of Arizona Press, 2001).

[5] *Ibid*.

[6] *Timber Sale Monitoring Spreadsheet*. Memo from Lakeside District Ranger to Apache-Sitgreaves Forest Supervisor. November 17, 1989.

[7] Arizona Game and Fish Department. 1988. *Statement of reasons in support of an appeal of the Apache-Sitgreaves National Forests land and resource management plan.*

[8] *Id*. at p. 25-26.

[9] U.S. Fish and Wildlife Service. 1993. *Final Rule Listing the Mexican Spotted Owl as a Threatened Species.* Federal Register, March 16, 1993, 58 FR 14271.

[10] Ingraldi, M. 1998. *Population biology of northern goshawks in east-central Arizona.* Technical Report 133, Arizona Game and Fish Department, Phoenix, AZ.

[11] Noss, Reed F., and Robert L. Peters. 1995. *Endangered ecosystems: A status report on America's vanishing habitat and wildlife.* Washington, D.C.: Defenders of Wildlife. 132 pages.

[12] The White Mountain Apache reservation, where both fires ignited and over half of the Rodeo and Chediski fires burned, is an intensively logged area and both fires clearly burned through many past and recent timber sales. The Center for Biological Diversity, however, does not have detailed information on management practices on the Apache reservation.

[13] *Status of the Sierra Nevada. Volume I: Assessment Summaries and Management Strategies. Sierra Nevada Ecosystem Project, Final Report to Congress.* Wildland Resources Center Report No. 36. University of California, Davis, page 62. 209 pages.

[14] *A Report to the President in response to the wildfires of 2000*: *Managing the impacts of wildfire on communities and the environment*. September 8, 2000. Jointly prepared by the Departments of Agriculture and Interior.

[15] Woosley, T.S. 1911. Western yellow pine in Arizona and New Mexico. *Forest Service Bulletin* 101.

[16] Baker, R.D. *et al*. 1988. *Timeless heritage: A History of the Forest Service in the Southwest.* United States Department of Agriculture, U.S. Forest Service.

[17] *Wilderness and primitive areas in Southwestern national forests.* 1995. Prepared by United States Department of Agriculture, Forest Service, Southwestern Region.

[18] *The Sierra Club guide to the natural areas of New Mexico, Arizona and Nevada*. 1985. Sierra Club Books, San Francisco. 412 pages.

16 U.S.D.A. Forest Service. 1998. *Environmental assessment for the Black Canyon and Wildcat allotments*. Chevelon/Heber Ranger Districts, Apache-Sitgreaves National Forest.

17 U.S.D.A. Forest Service. 1995. *Environmental assessment for the Clay Springs allotment management plan.* Heber Ranger District, Apache-Sitgreaves National Forest.

18 Adams, S. and J.P. Moore. 2001. *Town Tank allotment specialist report*. Lakeside Ranger District, Apache-Sitgreaves National Forest.

19 Rummell, R. S. 1951. Some effects livestock grazing on ponderosa pine forest and range in central Washington. *Ecology* 32, 594-607.

[20] Belsky, J. and Blumenthal, D. M. 1995. Effects of livestock grazing on stand dynamics, and soils in upland forests of the Interior West. *Conservation Biology* 11, 315-327. online at www.onda.org. The Center also did a review in 1998 of this phenomenon posted online at http://www.biologicaldiversity.org/swcbd/Programs/grazing/fire.pdf

[19] *Forests Forever!: A Plan to Restore Ecological and Economic Integrity to Southwestern National Forests and Forest Dependent Communities.* 1996. Southwest Forest Alliance.

Acknowledgements

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GIS mapping done by Curtis Bradley of the Center for Biological Diversity.