

# Livestock and the Coronado National Forest

Larry S. Allen

Although livestock were first brought to Southern Arizona by de Niza and Coronado in the mid-1500s and stock raising for subsistence and profit was introduced by Padre Kino prior to 1700 (Bolton 1936, Corle 1951), cattle did not produce significant ecological changes in the region until about 1870. Following the Civil War large numbers of cattle were moved into Arizona, mostly from Texas. Cattlemen from more moderate climates in the east failed to recognize the potential problem from regularly occurring drought in the Sonoran Desert. They stocked the ranges during an unusually wet period, and paid the price in the following inevitable droughts and floods (Allen 1989). (Personal communication, Jerry Cox, 1985).

As the twentieth century began, range and watershed conditions throughout most of Arizona south of the Gila River were at an all time low point. Protective vegetation had died along the streambanks and in the desert valleys. Cattle died by the thousands during the severe drought of 1982-'93 (Allen 1989, Wagoner 1952, Hastings and Turner 1965).

Scientists with viewpoints as diverse as their academic backgrounds have long debated the causes of the turn of the century ecological decline. Hastings and Turner (1965), Cook and Reeves (1976), and Dobyns (1981) analyzed a number of complex factors leading up to desertification in Southern Arizona and the attendant arroyo cutting. Factors identified include:

- Physical Modification of Channels
- Wagon Road Construction
- Grazing and Hoof Impact
- Elimination of Trees for Fuel and Mines
- Beaver Trapping
- Placer Mining
- Cultivation
- Abandonment of Ancient Check Dams
- Confining Indians to Reservations and Elimination of Fire Hunting

Also well documented is the fact that encroachment of shrubs on rangelands has been almost universal throughout Southern Arizona (Hastings and Turner 1965). The interrelationship between livestock grazing and shrub invasion is a "chicken and egg" situation; but there is no doubt that shrubs are presently inhibiting forage production on thousands of acres. Historian Jay Wagoner (1952) commented, "In summarizing the evidence...no conclusions can be reached except that the range country was misused." It is not the intent of this paper to fix blame for these events, but to document the fact that range and

watershed conditions were in a deplorable condition about the turn of the century and the livestock industry was in severe financial straits.

## Establishment of National Forests

Throughout the United States forest resources were suffering similar depletion due to over-exploitation and lack of knowledge of forestry. By about 1900 eastern forests had been cut over with little thought for the future and timbering was making inroads in the Lake States. Wisconsin's Peshtigo fire of 1871 burned more than a million acres including several towns and killed 1,500 people. This conflagration focused attention on the need for forest conservation (Ames 1967).

In 1886 the Division of Forestry within the Department of Agriculture (USDA) was given statutory rank. This forerunner of the Forest Service was a research, educational, and advisory organization with no land to administer. In response to a growing public demand, Congress established the Forest Reserves in 1891, with management responsibility assigned to the Department of Interior's General Land Office (present Bureau of Land Management). The first Forest Reserve was the 1.2 million acre Yellowstone Timberland Reserve, near Yellowstone National Park which had been established nineteen years earlier (Ames 1967, Chase 1986, Rowley 1985).

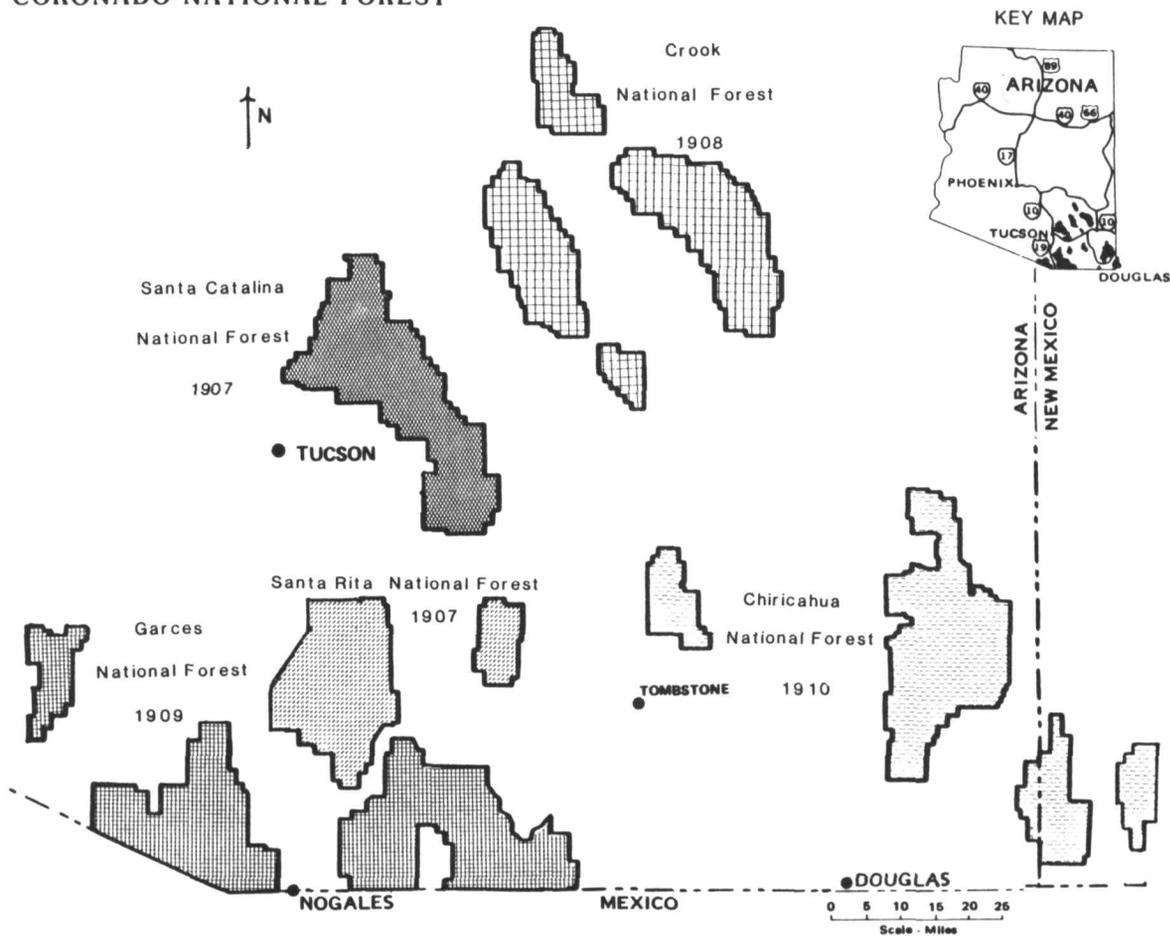
At the urging of the American Forestry Association and others, the Transfer Act of 1905 placed administration of the Forest Reserves under USDA. The name Forest Service first appeared in the 1905 Agriculture Appropriation Act, and in 1907 the Reserves were designated National Forests. This transfer of responsibility was made by Congress after assurances from President Theodore Roosevelt and Chief Forester Gifford Pinchott that the objective of the Forest Service was not to "lock up" resources, but to combine use with preservation (Ames 1967). This "wise use" definition of conservation continues to generate controversy among the Forest Service's widely divergent clientele.

## Origins of the Coronado

Between 1902 and 1907 ten Forest Reserves were established in Southeastern Arizona and Southwestern New Mexico. The Santa Catalina National Forest resulted from combination of 3 Forest Reserves in 1907. Other Reserves were combined in 1908 to form the Garces, Chiricahua, and Crook National Forests; and at that time the name of the Santa Catalina National Forest was changed to Coronado. The Coronado was expanded by combination with the Garces in 1911 and the Chiricahua in 1912. A portion

## Origins

## CORONADO NATIONAL FOREST



of the Crook was added in 1953, establishing the present 1.7 million acre Coronado National Forest (Harrison 1972).

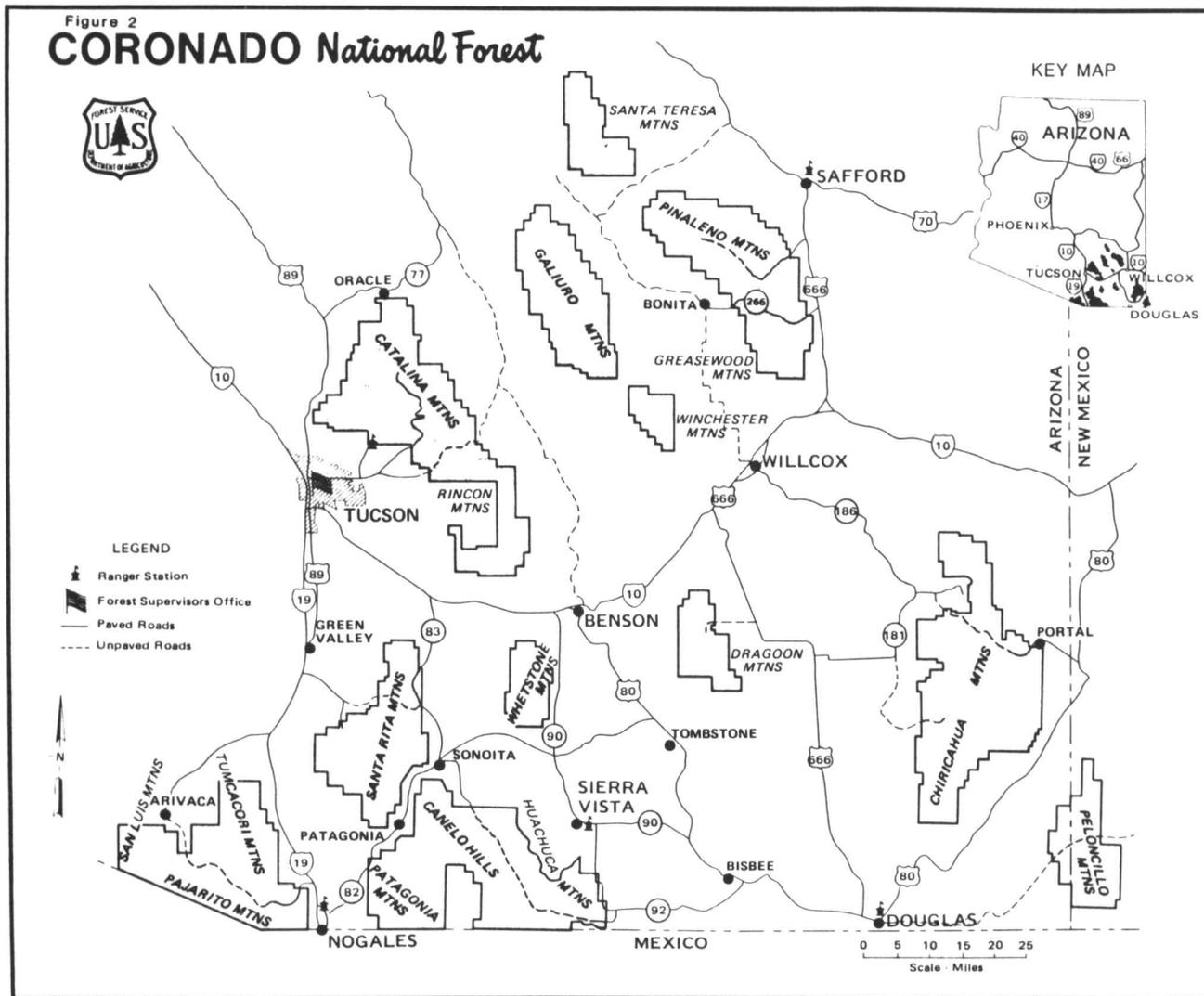
The Baboquivari Mountains near Sasabe became a Forest Reserve in 1906, and were incorporated into the Garces National Forest in 1908. A year before the 1911 combination of the Garces and the Coronado, Congress added the Baboquivaris to the Papago Indian Reservation, returning the Papago's sacred peak to Indian control.

A 1910 proclamation by President William Taft removed National Forest Status from the southern portion of the Animas Mountains, a part of the Chiricahua National Forest. A land exchange with George Breece Lumber Company for an 80,000 acre addition to the Cibola National Forest in the Zuni Mountains of New Mexico eliminated the remainder of the Animas range in 1951. (Coronado N.F. files).

Multiple use of renewable natural resources has always been the philosophy and policy of the Forest Service, even though it was not legislatively validated until the Multiple Use-Sustained Act of 1950. One of many challenges facing the new agency was regulation of livestock grazing. Forester Paul Roberts (1963), an early Arizona Forest Ranger, said, "The Forest Service was born during the years of most savage competition for grass on the

western frontier." In the aftermath of the disastrous events of the late 1800's, range conditions were at an all time low. As the Forest Service began to tackle the task of range allocation, it became apparent that there were more livestock than the land base could support (Barker 1976). The Forest Service policy of prioritizing permit issuance was endorsed by President Roosevelt who wrote, "In granting grazing permits you give preference first to the small nearby owners; after that to all regular occupants of the Reserve range; and, finally, to the owners of transient stock" (Roberts 1963).

Ranges were subdivided into grazing "allotments" with a great deal of on-the-ground negotiation between neighbors and Forest Rangers. To this day, many descendants of the original permittees continue to question the range allocation process and the location of boundary fences. Spanish settlers in the Southwest introduced a "commons" concept of communal land usage, which was consistent with the life style of the more pastoral native Americans. This tradition of the "ejido" made the concept of community grazing allotments more readily acceptable than in other parts of the United States. Much of Arizona was settled by Mormon immigrants from Utah and Chihuahua. This society also practiced a form of shared resource use.



Many ranges were first placed in community allotments with numerous small permittees on single units. Over the years, economic factors have favored the consolidation of small range units into more efficient sized businesses. Few community allotments survive on the Coronado. The advantages of control over breeding stock, supplemental feeding, and movement of stock motivated even small operators to lobby for exclusive range use. In some cases, units too small for efficient management were created and presently pose serious challenges to management. Land areas involved are too small to produce enough income to absorb the cost of needed improvements for rotation grazing. As land managers propose the logical solutions of combined management plans and shared range use, a great deal of permittee resistance is encountered.

**Beginnings of Management**

Since virtually every range on the Coronado was overstocked in 1908, emphasis was placed by the Forest Service on reduction of numbers to capacity. A policy of "transfer reductions" required a 10% reduction in permit-

ted numbers each time a permit was reissued. This unpopular, but effective, policy resulted in removal of hundreds of cattle from the Coronado. By the early 1950's, many ranges were no longer overstocked and the policy was rescinded.

Stock numbers declined steadily from the inception of National Forest management (probably about 236,000 on Arizona's National Forests) until World War I (less than 200,000). Demand for the limited permits available became very strong and the Forest Service in 1917 proposed a moderate increase in grazing fees as a device to soften this demand. The agency anticipated a great resistance to increased fees and braced for a rash of protests and appeals. The advent of World War I in April, 1917, created a rapid and dramatic increase in livestock prices, which resulted in ranchers accepting increased fees with less than anticipated protests (Rowley 1985).

In response to the War emergency, the Secretary of Agriculture relaxed administrative controls and made all grazing lands available for production of livestock products (Rowley 1985, Roberts 1963). Numbers on the National Forests of Arizona quickly rose over 270,000.

Arizona cattle numbers closely paralleled national trends as follows:

**Table 1. National Forest Cattle Permitted (Arizona).**

Year	Permitted Number
1909	236,000
1914	271,000
1939	172,000
1958	145,000

(Baker et al. 1986)

This short-sighted over stocking on many ranges lost resource gains made from the initial regulation of grazing. A miniscule contribution to the war effort resulted in lasting ecological damage and long-term economic loss to the stockmen (Baker et al. 1986, Barker 1976). By World War II the art of range management and its supporting sciences had progressed to the point that the Forest Service was able to resist pressures to repeat the mistakes of the previous war effort (Rowley 1985).

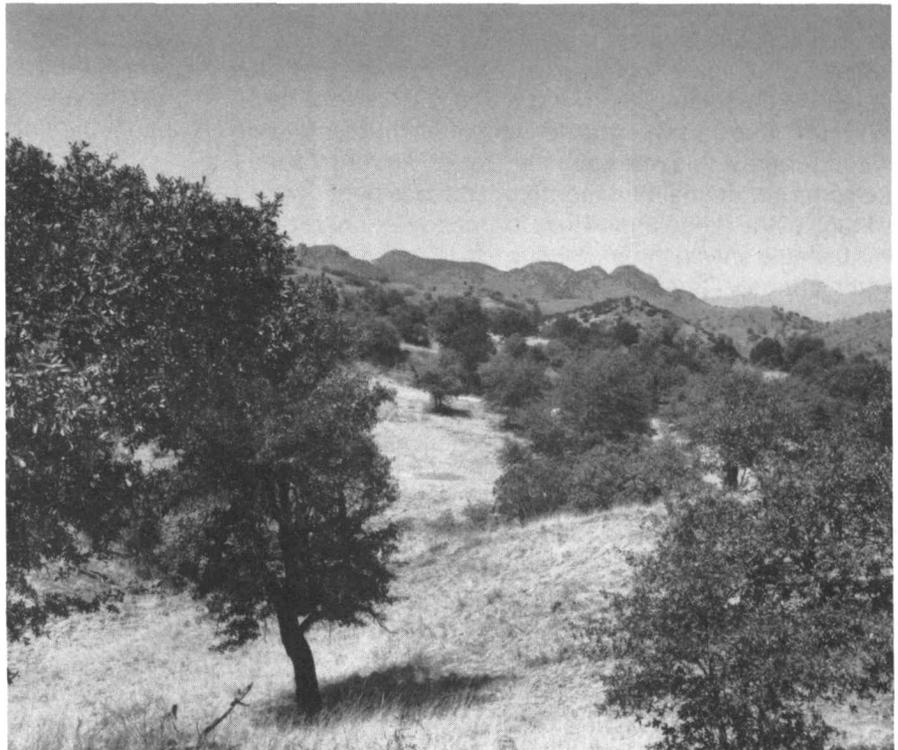
### Range Improvements and Livestock Control

In spite of greatly liberalized regulations, the Coronado recorded 17 grazing trespass cases in 1918. The original Arizona permittees had used the ranges before the existence of the Forest Service so they and their descendants were slow to accept the authority of the new agency. In spite of the fact that Forest Service grazing regulations had the full force and effect of federal law, it was long considered socially acceptable to exceed permit numbers. When a stockman was caught in violation, he was considered a martyr. The largest unauthorized use case in Forest Service history occurred in the Grahams a few years after that portion of the Crook was added to the Coronado.

Acting Regional Forester M.M. Cheney reported on a 1930 inspection of the Crook National Forest as follows:

Through lack of control and the consequent competitive grazing use by individuals, this area consisting of 2,100,000 acres has greatly suffered. Its grazing value has decreased over one half and it has become a menace to lands and interests which lie below it. (Coronado Files).

This report is particularly alarming in light of Forester Rex King's 1915 establishment report, which indicates that the Mt. Graham Forest Reserve was established as a result of a petition from Gila Valley residents who were concerned



*Rangelands of the Coronado.*



about protection of the watershed.

By 1930 the Coronado National Forest supported approximately 41,000 cattle and the Mt. Graham Unit of the Crook had 34,000 cattle and 5,000 sheep (Coronado

Files). Although this 846,000 animal unit months significantly exceeded any estimate of the land's capacity to support grazing, it was a great improvement over the situation immediately following World War I. With little or no restrictions on areas grazed, other than those imposed by topography, this was a stocking rate of about 1.7 suitable acres per animal unit month or 20 acres per cow.

Much of the rangeland of the Coronado National Forest was useable only in the winter due to a lack of dependable water sources. Riparian vegetation and other areas near springs and streams were severely impacted while much of the range was unused.

The Roosevelt Administration's attempt to solve social and economic problems of the Great Depression provided a source of inexpensive range improvements. The Southwest's first Civilian Conservation Corps (CCC) Camp was located in the Chiricahua Mountains. Men from these camps constructed hundreds of miles of drift fences and numerous water developments on the Coronado, during the largest infusion of range improvement investments in the history of the Forest Service. The CCC spent an estimated 5,517 man months on water developments in the Southwestern Region (Rowley 1985, Otis et al. 1986).

Water developments were intended to increase range capacity through improved distribution of livestock. Some fencing accompanied the water developments, but it was done primarily to separate allotments or facilitate livestock handling. Little attention was given to improved distribution through fencing or rotational grazing. The end result in many cases was an increase in the overgrazed area through attracting cattle to previously unused areas. This heavy use in new areas brought about significant forage competition with resident wildlife. Allotments with relatively light stocking rates showed marked improvement with better distribution.

In his 1936 report to the Senate, Secretary of Agriculture H.A. Wallace stated, "There is perhaps no darker chapter nor greater tragedy in the history of land occupancy and use in the United States than the story of the western range." He reported, "...range depletion so nearly universal under all conditions of climate, topography, and ownership that the exceptions serve only to prove the rule." Wallace estimated that a range once capable of supporting 22.5 million animals would carry only 10.8 million in 1936. This serious problem was due to a lack of knowledge of basic principles of range management and capacity estimation. The report contended that the only other possible explanation of the serious state of affairs was climate, but there is more evidence that the western climate has not changed than that it has. It also mentioned numerous cases of well-managed ranges where forage conditions were improved, while adjacent overstocked ranges continued to deteriorate under an identical climate (Wallace 1936). The Wallace report presents a strong case for the view that the Forest Service was in a position of leadership in range management and that the best range conditions in the West were on National Forest

land with a 19% improvement in capacity since 1910. Critics of this document see it as a self-serving production of the Forest Service (Rowley 1985). To this day, Forest Service personnel point with pride to the comparative condition of National Forest ranges.

### Capacity vs. Stocking Rate

A 1947 compilation of range reconnaissance data provided the first known Forest-wide range capacity estimate. Areas that currently make up the Coronado National Forest were estimated to have a capacity of 534,367 animal unit months. Small areas had been closed to grazing for watershed protection, but the land available for grazing was not significantly less than in 1930. The 1947 estimate indicated a capacity of 3.2 suitable acres per AUM or 31 acres per cow. Use continued to exceed capacity estimates in spite of significant reductions in cattle.

Numbers continued to decline during the 50s, 60s, and 70s, but a combination of overstocking, lack of intensive management, and climatic factors combined with a decline in available acreage decreased capacity estimates faster than numbers were adjusted. From 1956 through 1964 permit reductions totaled 1,873 cattle. A 1976 report indicates permit adjustments totaling 977 cattle.

As numbers declined, those allotments which combined proper stocking with improved range management began to exhibit a significant upward trend in range conditions. Where reductions were not combined with management changes, overused areas became somewhat smaller; but the loss of forage productivity continued.

**Table 2. Stocking Rates and Capacities, Coronado National Forest.**

Year	Estimated Capacity		Actual Stocking Rate	
	AUM	Suitable Acres/AUM	AUM	Suitable Acres/AUM
1930			846,000	1.7
1947	534,367	3.2		
1956			384,256	3.9
1964			364,250	4.1
1980	340,000	4.4	413,000	3.6

Note: Low stocking rates in 1956 and 1964 result from voluntary nonuse of permitted range.

### The Coronado Plan

In 1975 an analysis was made of available data, in preparation for the Coronado Forest Plan. Forty-two percent of the Forest's grazing allotments continued to be overstocked at the current management level. Over 80% of the acreage was found to be in a satisfactory condition with most "problem allotments" exhibiting severe distribution problems. Forest Service personnel began to shift emphasis toward improved management practices, while continuing to recognize the significant factor of proper stocking. Permittees were given the option of low level management, with attendant low stocking rates or attempting to support more animals through intensive management.

As management improved, permittees continued to fund most maintenance work and the Forest Service

contributed over half the cost of new or reconstructed improvements. Most plant control and revegetation was done at government expense. High inflation in the 70's and early 80's coupled with increasingly tight federal budgets caused a marked decline in the Coronado's ability to contribute to range improvement work. Unfortunately, this period of limited federal budgets coincided with a time of generally poor economic returns for the livestock industry. As a result, a significant number of permittees chose low intensity management with a resultant decline in stocking rates.

In 1980, available data was reexamined and a capacity estimate made for the Coronado Plan. Capacity under current management was estimated at 340,000 AUMs. Range suitable and available for grazing had decreased to about 1,500,000 acres and estimated proper stocking was 4.4 suitable acres per animal month (over 50 acres per cow). Term grazing permits allowed 413,000 AUMs, but an average voluntary nonuse of 15 to 20% resulted in actual stocking near the estimated capacity.

Balance between obligation (permitted livestock numbers) and grazing capacity (ability of the resource to support grazing without resource impairment) can be achieved by increasing capacity, decreasing obligation, or some combination of these. An environmental impact statement for the Coronado Forest Plan examined several alternative management strategies. All alternatives were designed to bring about balance between capacity and permitted numbers in 20 years and to maintain all range in a satisfactory condition.

The livestock number at which the desired balance can be achieved varies with 2 factors; (1) relative emphasis placed on range management in the overall resource mix, and (2) funding levels including personnel and investment in range improvements. The same factors, along with climate, influence long-term capacity of the land. The selected Coronado Plan projects balance by the year 2006 at 340,000 AUMs and predicts a long-range capacity of about 360,000 AUMs.

A 1987 review (Allen and Tippeconnic 1987) indicates that progress is ahead of the schedule in the Coronado Forest Plan. Proper management on every allotment, including balance between capacity and obligation, is now anticipated by 1993.

### Current Environmental Concerns

As the basic challenges of stocking rates, capacity, and productivity are met, several factors are coming together to bring about a changing emphasis by the Forest Service. Population shifts from rural to urban and from east to west are resulting in a changing public perception of the purpose of National Forests. The trend is toward more value placed on amenities at the expense of traditional commodity production.

Americans have more leisure time than ever before and more disposable income to enjoy this new freedom. One result of this social trend is an increasing demand for outdoor recreation on the public lands. Where livestock

and recreational activities come into conflict, recreationists can be expected to demand more stringent control of the stock.

Another result of increased leisure time and affluence is a significantly increased knowledge and interest in environmental, ecological subjects. Increasing numbers of citizens are educated, informed, and active in environmental causes. Environmental organizations often question the motives of resource users and the Forest Service and what they perceive as an overemphasis on commodity production. This basic mistrust has persisted in spite of the Forest Service's leadership in the establishment and management of wilderness areas. That many of the founders of the wilderness movement, including Aldo Leopold and Bob Marshall, were Forest Service employees, has not affected the environmentalist's attitudes toward present administrators.

The basic concept of grazing the public lands is currently being challenged in Southern Arizona. Opponents of grazing are quick to point out what they perceive as unreasonably low grazing fees; rancher subsidies through range improvements; damage to the vegetation through overgrazing; and environmental degradation from grazing, plant control, and chemical use. Much of this controversy focuses around riparian plant communities and the Coronado National Forest's unique wildlife resource.

### Conclusions

The Forest Service remains committed to the principle of multiple use and to basic goal of management of renewable natural resources for production of goods and services, including livestock grazing. The challenge of the remainder of the twentieth century is twofold:

1. Adjust program emphasis and budget mix to respond to increasing public demand for recreational opportunities and amenity values. This will include modification of range management plans to minimize conflict with other resources and uses.
2. Communicate to a wide spectrum of publics and user groups that the Coronado National Forest is indeed well-managed and adequate consideration for all the multiple uses is displayed.

History will indicate that this land is resilient and productive and the Forest Service is capable of continuing to meet the challenges of management.

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# BIG SAGEBRUSH SUBSPECIES and Management Implications

Harmon S. Hodgkinson

Each sagebrush species and subspecies has a unique place in our plant communities. Management alternatives chosen for sagebrush sites depend on the species and the desired goals or objectives of the user. Before management is applied, the livestock, wildlife, watershed, aesthetic, and recreation values must be considered and evaluated. For land users and managers to make the proper management decisions (like whether to control brush or not) for big sagebrush plant communities, proper identification is essential. The lack of information and a need to identify the distribution of Wyoming, mountain, and basin big sagebrush subspecies in Arizona prompted this study.

Both Wyoming and mountain big sagebrush have good wildlife-livestock forage value, especially for deer, antelope, and sheep. Where the density of these species has increased in excess of the site's potential, control measures should be considered with wildlife and livestock needs in mind. Many control measures can be applied with success. Burning, chemical and mechanical methods are practical on the moderately deep to deep soils. Where grasses and forbs are lacking, seeding of adapted species following the control measures will be needed. After treatment, deferment, intensity and season of use will extend the treatment life. The shrubs should not be controlled on the shallow soils.

Basin big sagebrush has a low wildlife and livestock forage value, except for some shelter in winter months. Because of the few isolated locations of this subspecies and its relationship to drainages, no control measures

should be applied. The chance of increasing erosion of the washes' sides would be great.

Northern Arizona, where big sagebrush species occur, has a semiarid climate and is in the Colorado Plateau physiographic province. Average annual precipitation ranges from 8 to 17 inches, with 60% occurring in the fall, winter, and spring months. Elevations range from 4,500 to 7,600 feet. The soils have a mesic soil temperature regime and a Ustic Aridic to Typic Ustic moisture regime (Hendricks 1985).

Northern Arizona was traversed by using roads to obtain the boundaries of each subspecies. Topographic maps with a scale of 1:250,000 were used. At 195 locations, plant height, leaf shape, growth form, soil surface texture, associated species, elevation, and precipitation were recorded. Although morphological characteristics were used to identify each subspecies, a sample was gathered at each location so that the chemical method as described by Winward and Tisdale (1969) could be used to confirm identification for each subspecies.

After summarizing all data, a distribution map of the three subspecies was developed.

**Wyoming big sagebrush** was the most abundant subspecies, occurring on mesas, undulating plateaus and high alluvial terraces. Of the 136 samples taken, 85% were on moderately deep to deep, well-drained soils with textures of sandy loam, loam, and sandy clay loam. The remaining 15% were on shallow soils with textures of very gravelly loam, loam, and clay loam. Wyoming big sagebrush was associated with pinyon pine-Utah juniper woodlands at elevations of 5,000 to 7,600 feet with an average of 6,300 feet. Annual precipitation averaged 13