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# THE RE-ESTABLISHMENT OF THE COYOTE IN THE EDWARDS PLATEAU OF TEXAS

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**Abstract:** In the early 1900s organized predator control was initiated to remove coyotes (*Canis latrans*) and wolves (*C. lupus* and *C. rufus*) from the sheep and goat producing areas of Texas. Operations were begun in the Edwards Plateau, the largest area of sheep concentration. By the 1920s, many of the inner Edwards Plateau counties were considered to be almost free of coyotes and wolves. In the 1950s coyotes and wolves were extirpated from most of the Edwards Plateau. After a coyote population irruption in the early 1960s, coyotes began to re-establish themselves on the periphery of the Plateau. This encroachment process has accelerated in the 1990s and thus continues to expose more sheep and goats to predation by coyotes.

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In the early 1900s, organized predator control was initiated to remove coyotes and wolves from the sheep and goat producing areas of Texas. Operations were begun in the Edwards Plateau, the largest area of sheep concentration. The Edwards Plateau and, to a lesser extent, portions of other adjoining ecological areas presently (1995) account for 19% (1.7 million head) of the sheep and 90% (1.95 million head) of the goats in the United States (USDA 1995) (Fig. 1). The Edwards Plateau itself encompasses about 24 million acres of "Hill Country" in west-central Texas, comprising all or portions of 37 counties (Fig. 2). By the 1920s, many of the interior Edwards Plateau counties were considered to be practically free of coyotes and wolves.

In 1950, there were 33 counties covering nearly 24 million acres which were considered to be coyote free (Fig. 3). This area remained virtually void of coyotes for several decades until their encroachment began in the 1960s. This process has been described by several authors (Caroline 1973, Shelton and Klindt 1974, Hawthorne 1980, Nunley 1985). The purpose of this paper is to review and update the progress of the re-establishment of coyotes into the Edwards Plateau of Texas. This area is historically and currently unique because of its unsurpassed intensive level of coyote control over such an extensive area.

## Organized predator control

The predecessors of what is now known as the cooperative Texas Animal Damage Control Program

have been involved in providing predatory animal control services for the last 80 years. This cooperative wildlife damage management agency is comprised of the Animal Damage Control Program of USDA's Animal and Plant Health Inspection Service, the Texas Animal Damage Control Service of the Texas A&M University System, and the Texas Animal Damage Control Association.

One of the functions of the cooperative program is to conduct direct control operations for the protection of sheep and goats from depredation by coyotes and other predators. Historically, the program's primary control strategy has been to attempt to prevent the infiltration of coyotes into the major sheep and goat production areas.

## Extirpation of coyotes

The coyote and wolf take by county of the organized control program during fiscal year 1950 is reflected in Fig. 4 (Landon 1950). This categorized illustration of the number of animals taken per county provides a relatively representative picture of the re-establishment of coyotes into the Edwards Plateau when examined every tenth year. Those counties within the sheep and goat production areas which indicate no "take", either had no program or had a program and did not take any coyotes. In either case, this usually indicated that few coyotes, if any, were present in those counties at that time.

In the predatory animal control agency's 1958 annual report, the status of coyotes and wolves in the Edwards Plateau in the 1950s was reported as

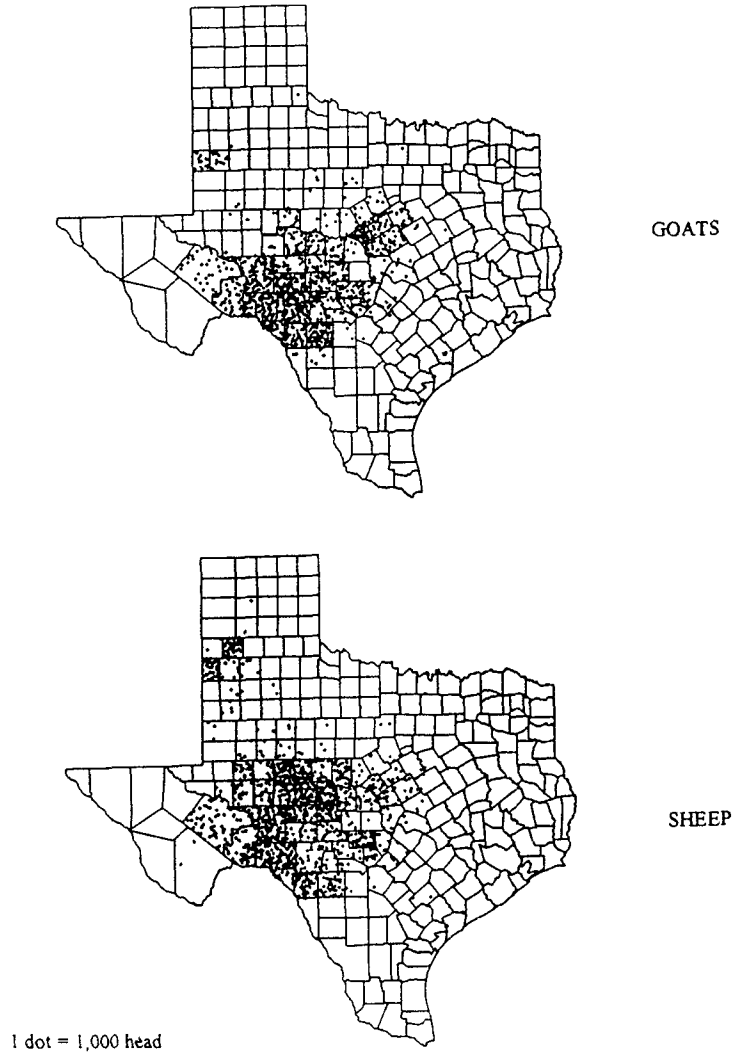


Figure 1. Distribution of sheep and goat numbers in Texas (Texas Crop and Livestock Reporting Service 1994).

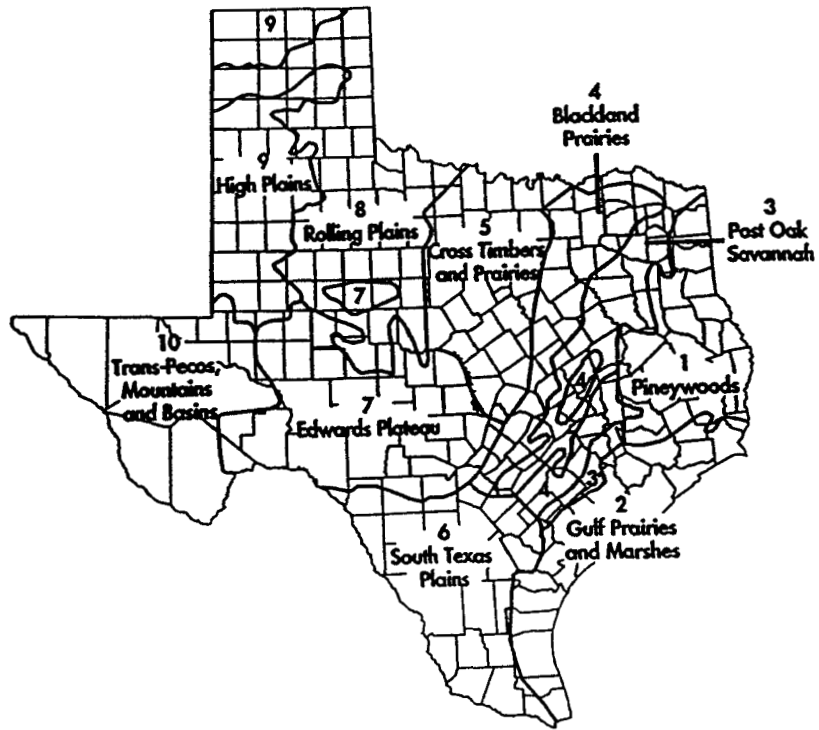


Figure 2 Texas ecological regions (F. W. Gould, Texas Plants, 1969 revised).

follows (Landon 1958):

*In those counties where the sheep and goat industry is a major importance the coyotes have been practically eradicated, and they were well under control even in the border counties. The gray or lobo wolf is no longer found in Texas. The Texas red wolf of central and east Texas is no longer numerous where the hog, turkey and cattle raisers show much more interest in control than formerly.*

Caroline (1973) cited several reasons why this early control work in the Edwards Plateau was successful:

- (1) the wild canid population contained a large proportion of red wolves or hybrids which were relatively easy to capture;
- (2) many ranchers participated with professional ADC staff;
- (3) the increased use of net wire fencing;
- (4) many ranchers kept hounds to remove coyotes;
- (5) economic incentives to ranchers; and
- (6) extensive use of traps

Shelton and Klindt (1974) suggested that the success of early control work resulted from a "massive human effort using all of the tools and techniques which could be brought to bear."

### **Re-establishment of coyotes**

In 1960, 118 coyotes were taken from within the former coyote-free area. Nearly 31,000 coyotes were taken from throughout the coyote's range in Texas during that same year, double the amount taken in 1958. This very conspicuous upswing in coyote take was in response to the drought-breaking rains of the late 1950s. This increase was even more evident when an unprecedented 34,754 coyotes were taken in 1962. The relative intensity and distribution of the coyote and wolf take by the organized control program during FY1960 is reflected in Figure 5 (Caroline 1960). Thus, with the breaking of what was commonly called the "7 year drought" , the re-establishment of the coyote in the Edwards Plateau was underway in the early 1960s

In 1970, 420 coyotes were taken from within the formerly coyote-free area, and the distribution of coyotes within the Edwards Plateau continued to expand (Caroline 1970) (Fig. 6). In 1972, the use of chemical toxicants for predator control such as strychnine and Compound 1080 (sodium monofluoroacetate) were canceled by EPA. The use of Compound 1080 on the periphery of the major sheep and goat production areas was employed successfully to prevent the infiltration of coyotes into these regions. The protection of sheep and goats from predators has since been limited to more labor-intensive control tools, including traps, snares, shooting, calling, aerial hunting and M-44 devices utilizing sodium cyanide.

Caroline (1973) described the status of the coyote within the Edwards Plateau in 1973 as follows.

*In 1950, coyotes were a rarity in the heart of the Hill Country. On occasion, a single animal would appear in the western part of the area but it was soon removed. Along the South Pacific tracks west of San Antonio ranchers to the north were interested in control south of the tracks, and for many years this was sufficient. However, when the severe drought of the 1950s came to an end, and after many ranchers cleared off their cedars and established more waterings, coyotes began to move in. Although much land improvement took place, "wolf-proof" fences were allowed to deteriorate. Coyotes could enter any pasture. (This is an important part because removal of the wolves was half due to fencing and half to organized control). For some time there was no one who recognized this fact. Losses were light and what were found were usually attributed to bobcats, foxes, and raccoons. By the time it was known that coyotes were present, there were far more of them than anyone expected. Consequently, today and in some cases as late as this year, there are coyotes in every formerly coyote-free county in the heart of sheep and goat country.*

The re-establishment of coyotes within the Edwards Plateau had further progressed by 1980 (Fig. 7) (Hawthorne 1980). A total of 637 coyotes was taken from within the former coyote-free area. This continued encroachment of coyotes into the sheep and goat production areas had become a serious concern. In 1981, a request for the emergency use of Compound 1080 bait stations as per Section 18 of FIFRA was prepared and

submitted to EPA for consideration (Nunley 1981). The request was eventually denied by EPA after a lengthy administrative hearings process.

### **Present status of coyotes**

In 1990, 2,168 coyotes were taken from within the former coyote-free area and the predators further ingressed into the Edwards Plateau (Nunley 1990) (Fig. 8). In 1994, coyote activity within this area continued to increase as reflected by the take of 2,594 coyotes (Fig. 9). Also, in 1994 the cooperative program worked on 7,552,000 acres from within the former coyote-free area. This was a 64% increase over the acreage worked in 1984. There was a corresponding increase from 1.5 million to 2.2 million sheep and goats protected in 1984 versus 1993.

The primary reason behind this surge in control effort is related to the increasing exposure of additional livestock to coyote predation. This exposure is directly related to the relative degree and geographical distribution of the coyote's movement into the Edwards Plateau. This can be further illustrated by the graduated average coyote take for every 10 square miles worked within each county (Fig. 10).

### **Factors responsible for coyote re-establishment**

The range expansion of coyotes within the Edwards Plateau is directly related to the presence, viability, and geographical distribution of the sheep and goat industry. Gee et al. (1977) surveyed former sheep producers in Colorado, Texas, Utah, and Wyoming who had terminated sheep production. Factors which they rated of greatest importance in their decisions to discontinue sheep production were high predation losses, low lamb and wool prices, shortage of good hired labor, the sale of their land, and their own age. The sheep and goat industry is also now faced with the loss of the wool and mohair incentive program which will eliminate some additional producers.

A major factor for declining sheep and goat production on the eastern periphery of the Edwards Plateau has been the changing land use away from sheep and goat production. This occurs through the sale of properties due to economic pressures, especially near urban centers and recreational areas. It often follows that the new land managers or

absentee landowners do not pasture sheep or goats. Further, they often do not engage in, or in many cases even allow, coyote control activities on their properties. Consequently, sheep and goat producers who border, or are surrounded by properties where coyote control is not conducted, bear the brunt of the coyote's tendency to depredate sheep and goats. These producers on the fringe of the sheep and goat production area find that it especially difficult to control losses to predators on their ranges (Nunley 1995).

Predation losses due to the limitations and cost of the application of current predator control techniques have also contributed to the decline in the number of sheep and goats in Texas. The loss of toxicants in 1972 greatly reduced the efficiency and effectiveness of coyote control over large areas.

### **Prognosis**

In their discussion of eradication or control for vertebrate pests, Bomford and O'Brien (1995) provided 6 criteria to determine whether eradication is preferred over continuing control. Since there was no end point to control, the historical events in the Edward Plateau do not meet their specific definition of eradication. However, the criteria are still important when attempting to extirpate coyotes from a given area, thus allowing control efforts to concentrate on the area's periphery to prevent infiltration.

These essential criteria include (1) rate of removal exceeds rate of increase at all population densities, (2) immigration is prevented, (3) all reproductive animals must be at risk, (4) animals must be detected at low densities, (5) discounted benefit-cost analysis favors eradication over control and (6) suitable socio-political environment including access to private property. Bomford and O'Brien (1995) indicate that a negative in any 1 of the first 3 criteria will doom an eradication attempt; a negative in criteria 4-6 will greatly reduce the feasibility and desirability of eradication. Considering the difficulties in achieving all of these criteria, it is likely that the re-establishment of coyotes within the Edwards Plateau will continue.

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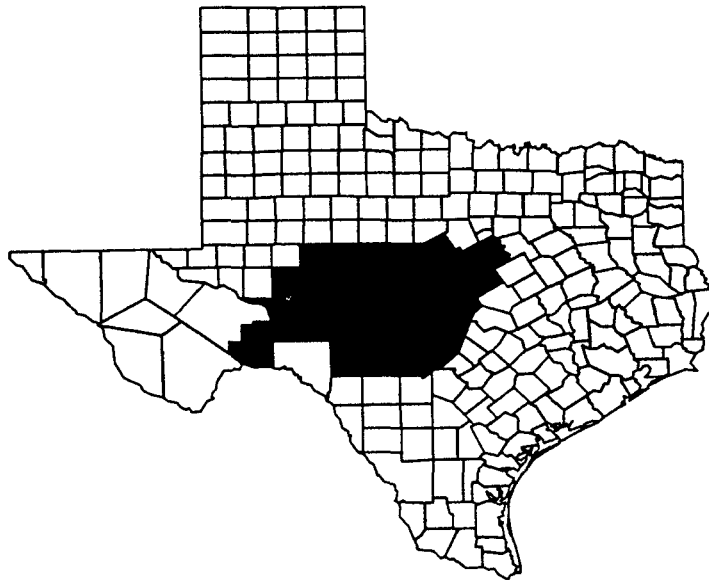


Figure 3. Coyote-free counties in 1950 (about 24 million acres).

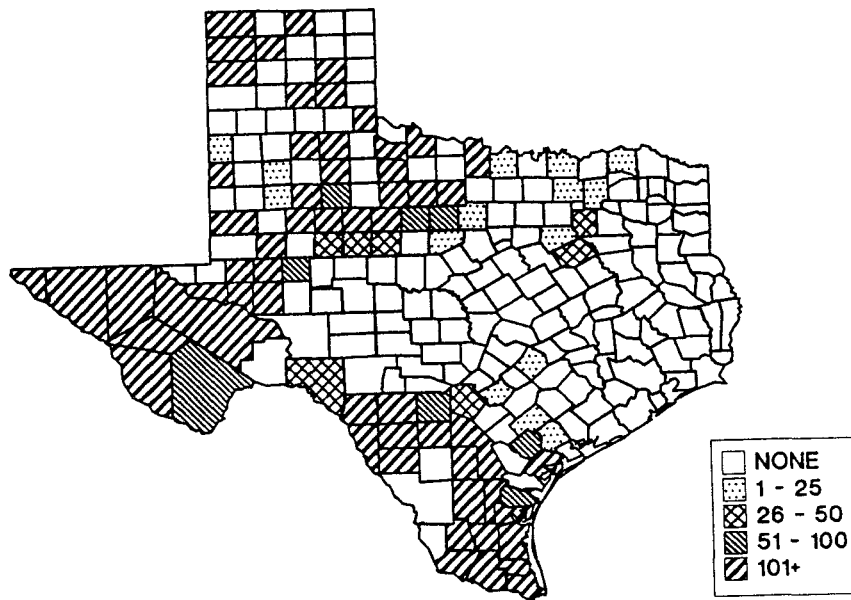


Figure 4 Coyote and wolf take of the cooperative animal damage control program in 1950.



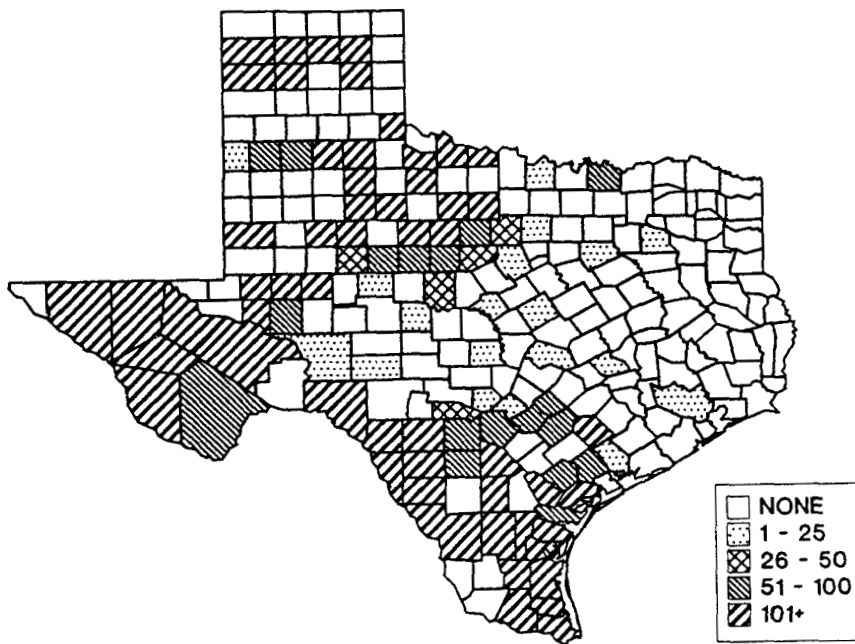


Figure 5 Coyote and wolf take of the cooperative animal damage control program in 1960

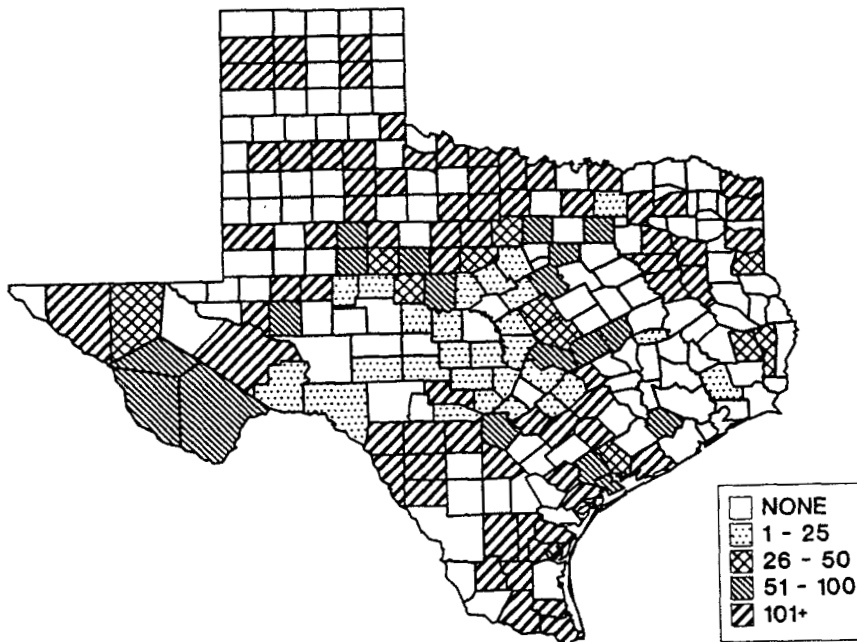


Figure 6. Coyote and wolf take of the cooperative animal damage control program in 1970.

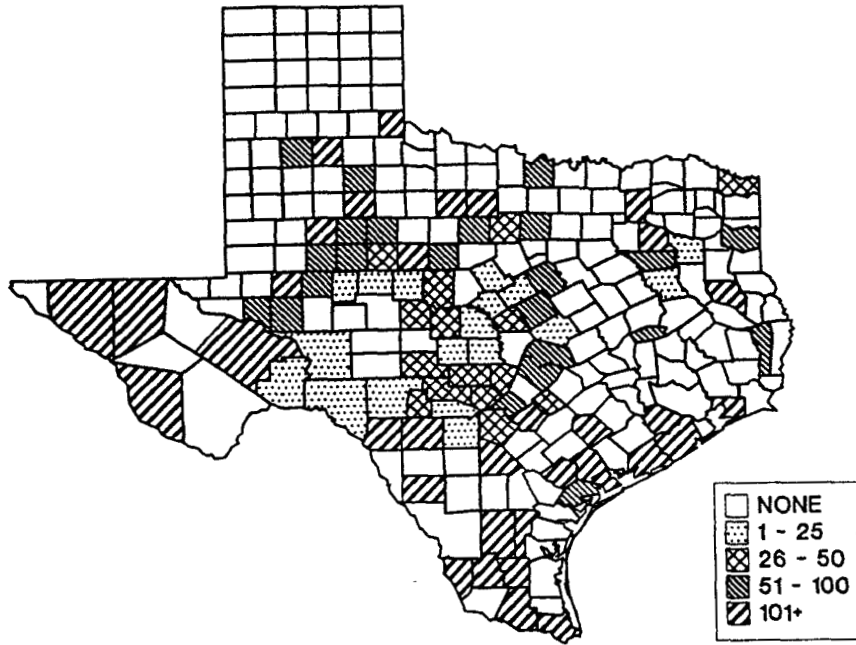


Figure 7. Coyote take of the cooperative animal damage control program in 1980.

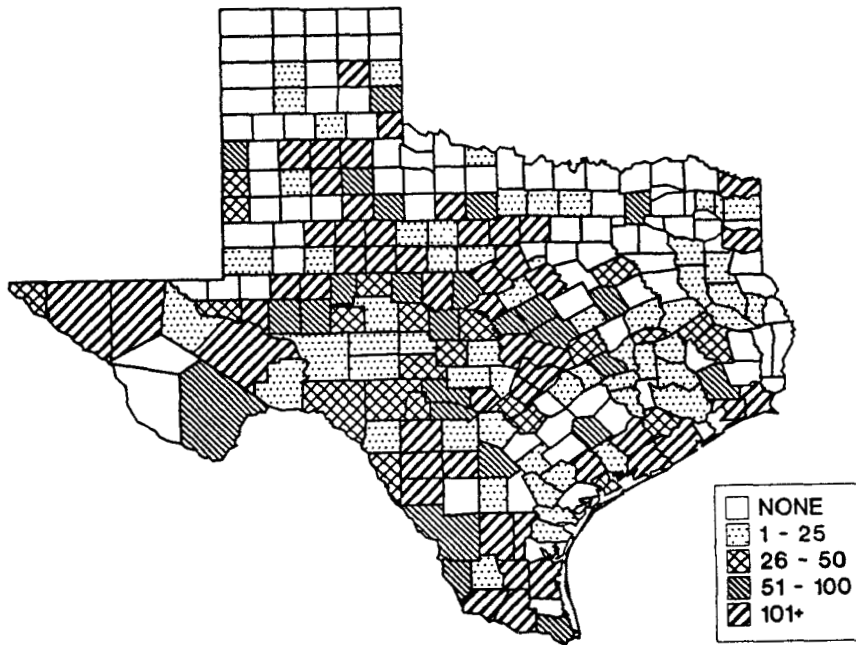


Figure 8. Coyote take of the cooperative animal damage control program in 1990

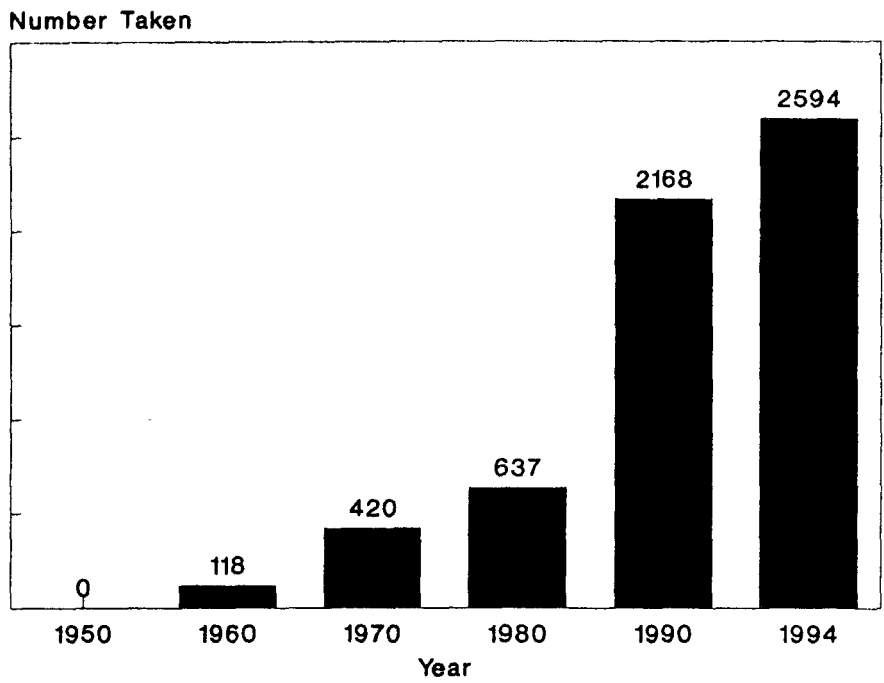


Figure 9. Trend in number of coyotes taken within the former coyote-free area shown in Fig. 3

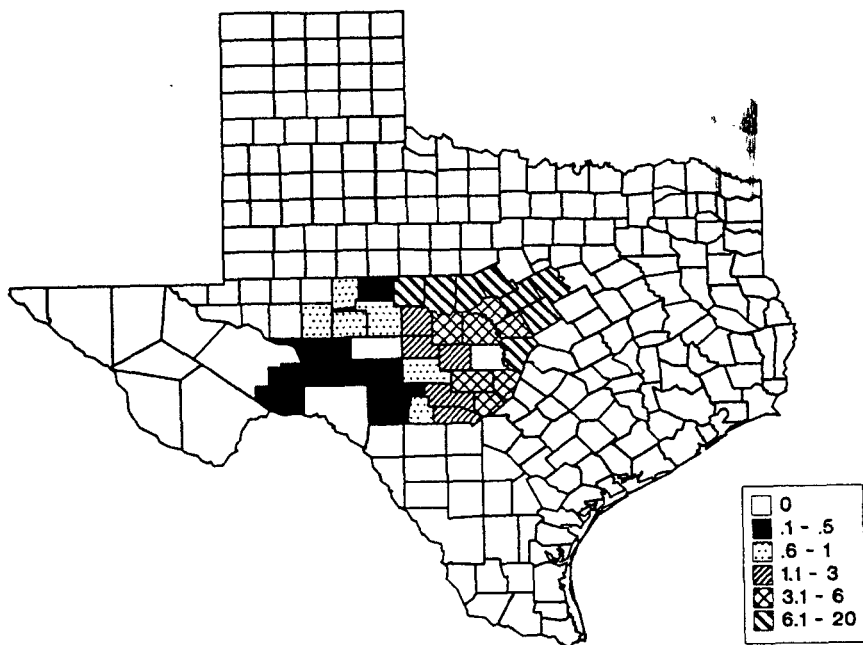


Figure 10. Coyotes taken per 10 square miles worked by cooperative animal damage control program, 1994.