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AN HISTORICAL LOOK AT THE MEXICAN GRAY WOLF

(Canis lupus baileyi)

IN EARLY ARIZONA TERRITORY AND SINCE STATEHOOD

A Review

Of

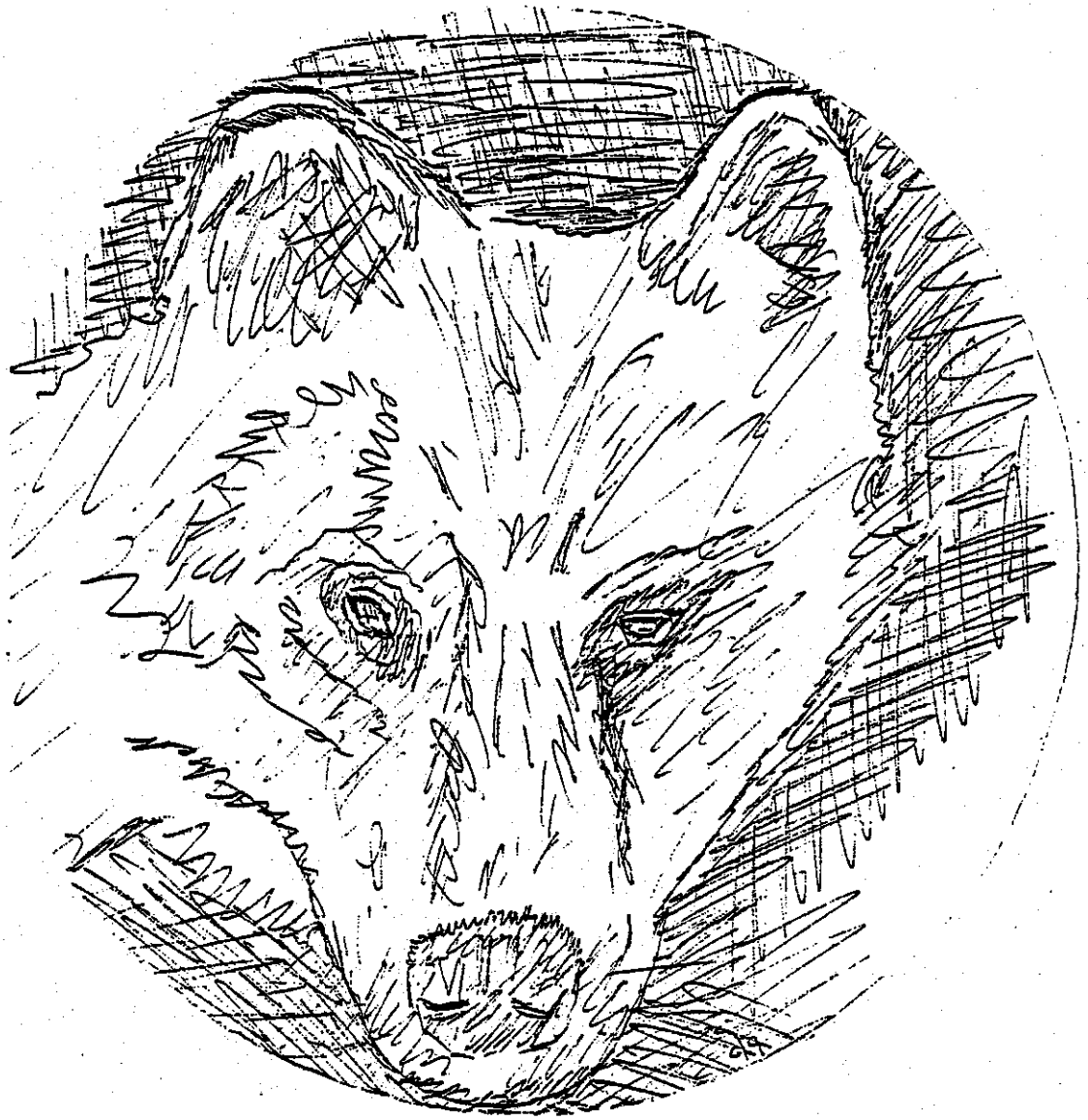
Available Documentation

And

Personal Records

By

Dan Miles Gish



To Everett M. Mercer

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BY WAY OF PREFACE

. . . It took only eight years for a few Biological Survey hunters, working under a well-planned program, to completely eliminate resident wolf populations in Arizona. In doing so, they virtually did away with a problem that had plagued stockmen ever since livestock were first brought into the State.

. . . The responsibility of the Fish and Wildlife Service did not end, however, with elimination of resident wolves. These predators continued to enter the State from time to time from Mexico, and Service hunters have taken an average of five wolves per year since 1926. The animals have been prevented from reestablishing themselves on their former range.

Annual Report, Arizona District, Branch of Predator and Rodent Control, July 1, 1951 to June 30, 1952.

Everett M. Mercer, District Agent.

Figure 1.

The entire story of what happened to the resident and migrant gray Mexican wolves in Arizona is recapitulated in this excerpt, quoted verbatim from Mercer's 1952 Annual Report.

U. S. DEPARTMENT OF AGRICULTURE
Predatory Animal Control

U.S. Biological Survey and New Mexico State Council of Defense Co- operating.

State.

REPORT OF OPERATIONS

Feb. 6, 1918 to December 31, 1919.
—J.S.Ligon, Inspector.

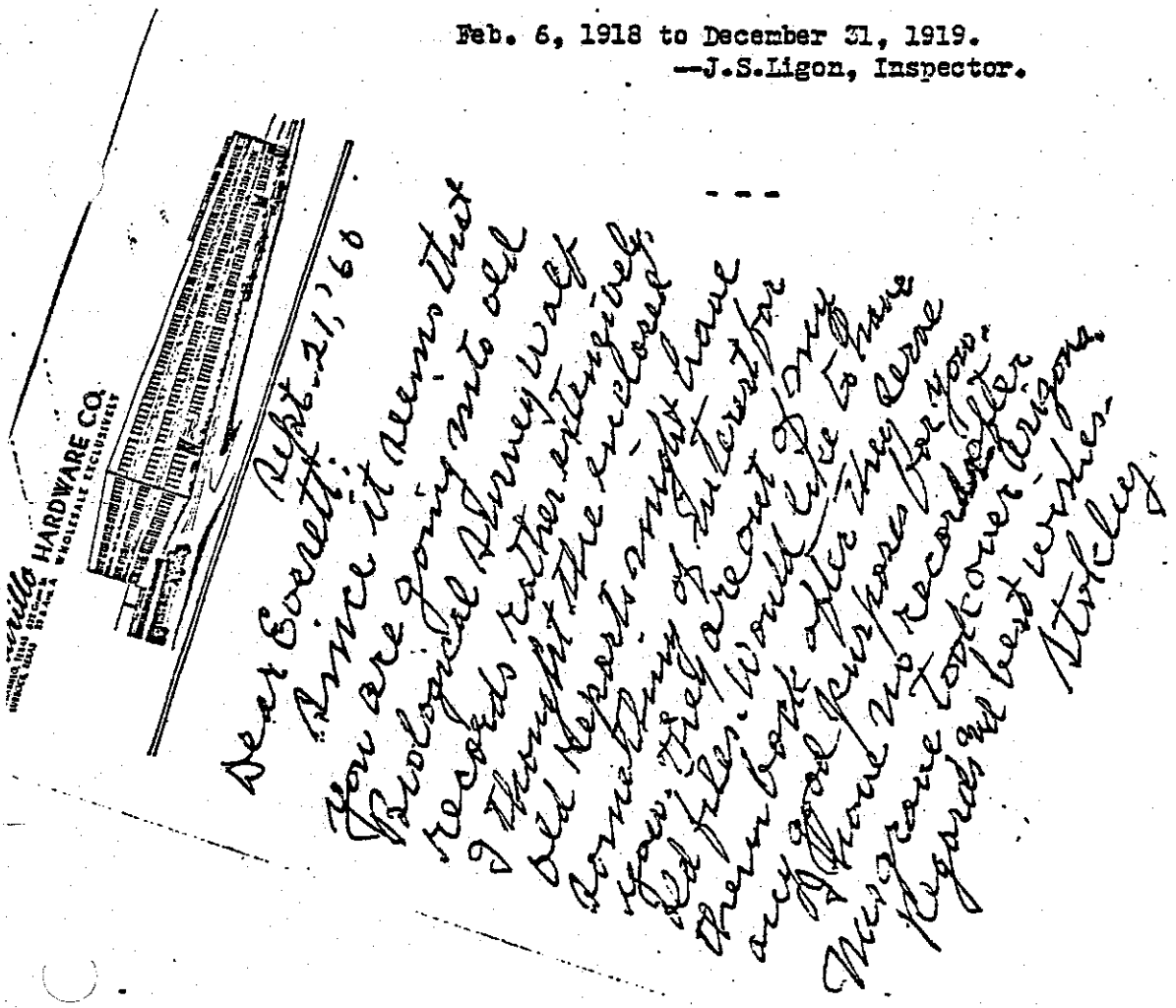


Figure 2. Photocopy of title page from Ligon's 1919 Council of Defense report and Ligon's note of transmittal of his personal files to E. M. Mercer - loaned by Mrs. Helen Mercer.

Definitions

For the purposes of this report, the term PARC and the term Bureau refer specifically to the original Bureau of Biological Survey, United States Department of Agriculture, commencing with its inception on September 15, 1915, up to and including through all of its successive nomenclature the present United States Department of Interior, Fish and Wildlife Service, Animal Damage Control.

By whatever title, at any point in time, this agency will be forever known by those who first served her, as "The Bureau" and/or PARC. They earned that right.

The titles of "Inspector", "Leader", "Supervisor" and "District Agent" are used interchangably, according to the custom of the day, to refer to the administrator in charge at the Arizona District level, Predatory Animal Control.

Certain other terms included herein that may not be generalized lexicon, were common usages of the era of the Mexican gray lobo in Arizona that may have drifted off into the mists of time with the great wolves and the men who knew them.

No attempt has been made herein to distinguish precisely between the three scientifically recognized subspecies of gray wolves known to have inhabited Arizona territory in modern times because the written documents from which this report is essentially drawn makes no such distinction.

Every effort has been made, however, to point out the accepted specific ranges of each of the three subspecies of wolves in Arizona, with accompanying reference as to time and place to focus attention as much as possible as to which were logically Mexican gray wolves (Canis lupus baileyi) where mentioned in this report.

The terms wolf, wolves, lobos, loafers and gray wolves are used interchangably herein.

dmg

Chapter 1

INTRODUCTION

The suspected and probable, if undocumented, history of gray wolves in North America prior to the introduction of domestic cattle (Wellman, 1939), may forever remain a mystery. We do know that wolves inhabited this continent as early as Pleistocene times. (Young-Goldman, 1944).

There is another and fascinating record, only partly written, to indicate that Mexican lobo wolves (Canis lupus baileyi) migrated northward following early herds of Spanish-mission cattle up into Texas, New Mexico and, for our purpose here, the valleys of the Santa Cruz and San Pedro Rivers into Arizona as early as the late 16th Century (Wellman, 1939).

But the documented history of the Mexican gray lobo wolf in Arizona commences with the increased world demand for beef and other food-fiber materials brought about by World War I and the consequent legislation that created the original Bureau of Biological Survey, United States Department of Agriculture, September 15, 1915 (Ligon, 1916).

This sketch of that spellbinding record deals with known facts as written down by those men professionally responsible for the hunting down and extirmination of wolves and other predatory animals in Arizona and adjacent southwestern United States territories.

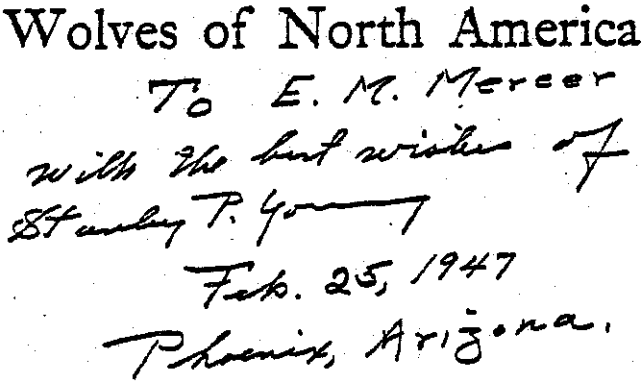


Figure 3.

Photocopy facsimile from the flyleaf of Mercer's personal copy of The Wolves of North America autographed by Stanley P. Young - loaned by Mrs. Helen Mercer.

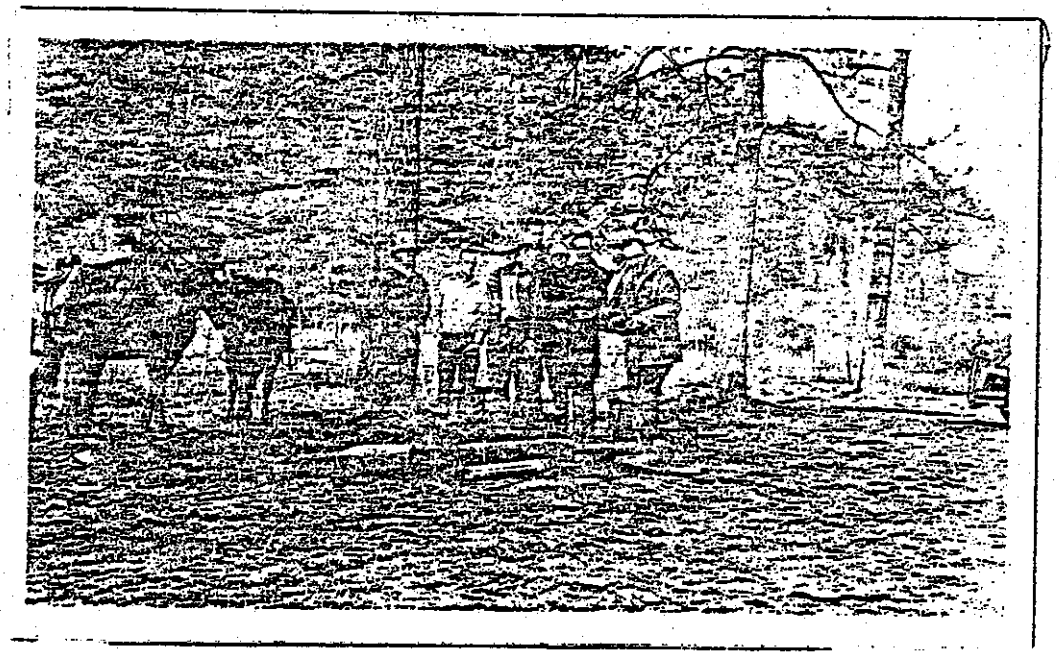


Figure 4: PARC Field Conference in Apache County, Arizona - October 22, 1929. From left: Bill Ramsel, a PARC hunter; Bud Davis, PARC hunter; Mark E. Musgrave; Arthur Young; a Mr. Brown; Paul G. Redington, PARC chief, Washington, D. C.; R. Lee Bayless, State Game Warden; Stanley P. Young (at far right).

Photo by Donald Gilchrist - Bureau of Biological Survey. From E. M. Mercer collection - loaned by Mrs. Helen Mercer.

The key period is the four years, 1916 through 1920. Prior to that time, Mexican wolves probably inhabited only the southernmost fringes of Arizona (Young-Goldman, 1944). But as the other two resident gray-wolf subspecies (Canis lupus youngi and C. l. mogollonensis) were hunted out, restless (usually young two-year old males) Mexican lobos drifted northward into those bio-territorial "vacuums" to become a comparatively new, added, economic factor in livestock operations across most of the biotic communities above the Lower Sonoran zone in Arizona for another four decades.

Moving swiftly - capable of 100 miles or more per day (Musgrave, 1919) - the gray brujos of the Sierra Madre inflicted a guerilla warfare upon livestock raisers of the southeastern three-fourths of Arizona. They preferred the higher elevations, but were not averse to crossing the desert floor in moving from one mountain range to another.

Geographical Distribution

Historical: (Young-Goldman, 1944)

> "Sierra Madre and adjoining tableland region of western Mexico, formerly extending north to southeastern Arizona (Fort Bowie) ...; still living in the northern part of the Sierra Madre..."

However, dating from the year 1926 when the Bureau of Biological Survey (Musgrave, 1926) officially reported that:

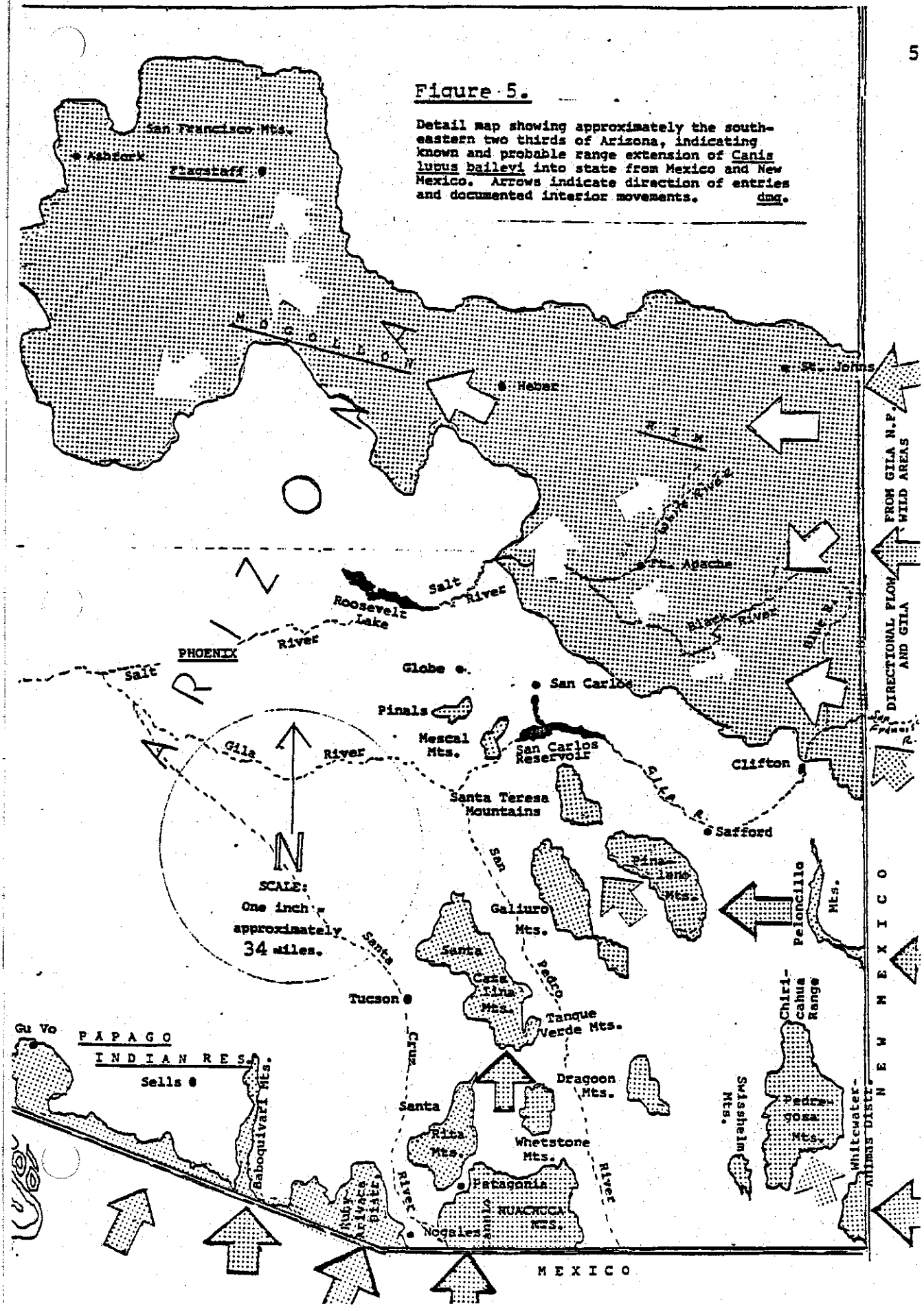


Figure 5.

Detail map showing approximately the southeastern two thirds of Arizona, indicating known and probable range extension of Canis lupus baileyi into state from Mexico and New Mexico. Arrows indicate direction of entries and documented interior movements. dmg.

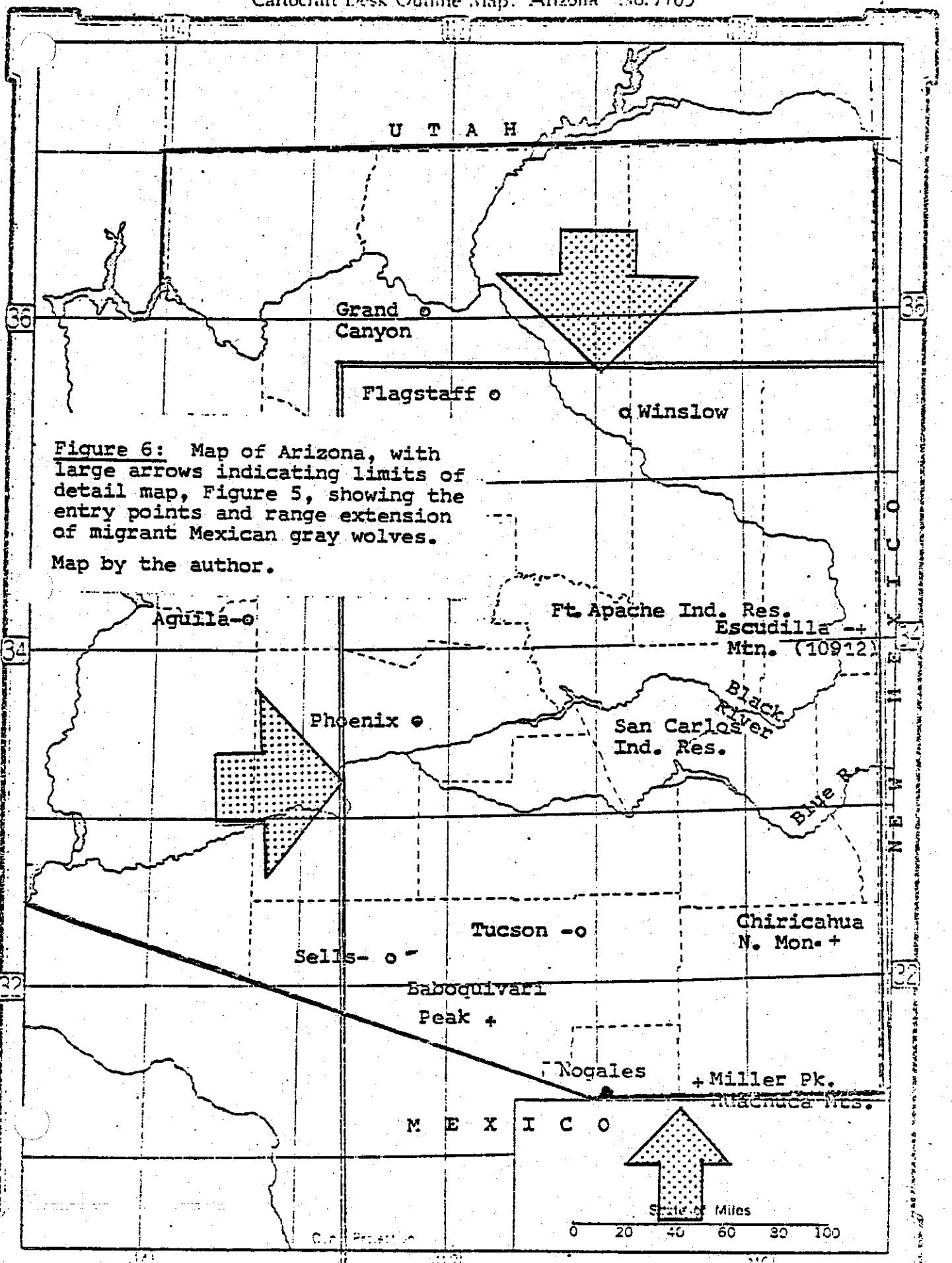


Figure 6: Map of Arizona, with large arrows indicating limits of detail map, Figure 5, showing the entry points and range extension of migrant Mexican gray wolves.

Map by the author.

"This year marks the end of the lobo
wolf, for there are no more wolves
left inside the borders of this state",

it is biologically reasonable to assume that all of the gray wolves which continued to appear, kill and be caught inside Arizona borders for another four decades were, indeed, C. l. bailevi - migrant Mexican gray wolves from below the border.

Musgrave's 1926 report, however, was premature.

For those gray wolves which continued to appear occupied ranges extending several hundred miles north and west of Fort Bowie until they were virtually extirpated in the mid-1960's. (See map - Fig. 5)

Principal points of entry were: north and westward through the Animas-Cloverdale-Whitewater traditional wolf runs in southwestern New Mexico (Young-Goldman, 1944); through the Peloncillo Mountains and into the Graham-Galiuro-Winchester ranges; westward from the Gila Wilderness-New Mexico Rockies regions into the Blue and Black and White River drainages and westward across the Mogollon Rim as far as the Hualpai Range (Meyers, 1963) in western Mojave County, with distrubution across the Arizona Mogollon Plateau in all but the Lower Sonoran life zones; with heavy penetrations northward into the Canelo-Huachuca areas and extending northward into the Chiricahuas, Swisshelms, Dragoons, Whetstones, Santa Ritas as far north as the Santa

Ritas-Catalinas; and northward through the Ruby-Bear Valley-Altar Valley region into the Baboquivari range and all surrounding mountains as far west as the extreme southwestern corner of the Papago Indian Reservation (Gu Vo) (Day, 1955) and possibly into the tinajas of the Sand Tanks and Growlers (Ajo-Organ Pipe) region inhabited by desert bighorn sheep (Ovis canadensis gaillardi) (Ladd, Segundo, Day, Supernaugh - 1950-1955).

Habitat Type

From the Upper Sonoran vertical zonation (See Figure 7), about 3,000 feet above sea level, to the 11-12 thousand foot elevations, including chaparral-desert scrub and grassland to the spruce-fir Hudsonian zonation.

Typical gray wolf (cattle) range included the Canelo (Canille) Hills grassland-oak-woodland western slope of the Huachuca and eastern slope of the Santa Ritas, east of Nogales, Arizona. Also typical are the Blue and Black River regions along the western slope of the New Mexico Rocky Mountains and Mogollon Mountains Plateau of east central Arizona, including oak-pine woodland, one of the largest Ponderosa pine forests in the world, and extensive fir and spruce-fir forestlands.

Only rarely is there a record of Mexican lobos attempting to den or establish "territory" in the desert-scrub elevations below 3,000 feet.

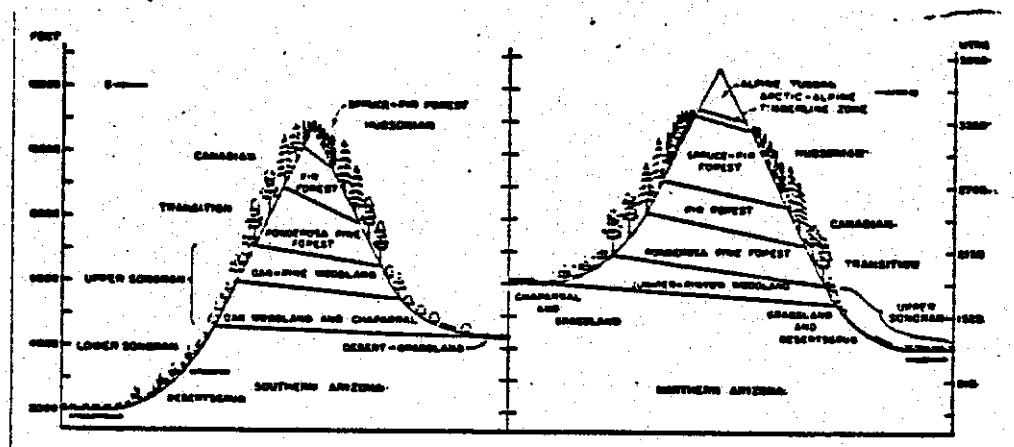


Fig. 2. Diagrammatic profiles of hypothetical mountains, indicating the vertical zonation of biotic communities in southern Arizona (left) and in northern Arizona (right). See Table 3, and text, for the corresponding life-zones.

The elevation of the zone is from 100 feet to 3,500–4,000 feet according to slope exposure; all of the life-zones extend to higher elevations on south-facing slopes than on north-facing slopes (Fig. 2). Precipitation (average annual) varies from approximately 3 to 11 inches; to about 12 inches in parts of the Chihuahuan Desert in the elevated southeastern corner of the state. It is distributed (1) primarily in winter (Mohave Desert; and Sonoran Desert, western part), or (2) more bi-seasonally (Sonoran Desert, eastern part) with somewhat more or less than half of it falling during the southwestern summer monsoon, or (3) primarily in summer (Chihuahuan Desert), with about three-quarters of the total yearly precipitation falling during the monsoon.

Desert vegetation often merges gradually, even imperceptibly, with desert-border vegetation and usually no real "line" of demarcation exists.

Fig. 7. Reproduced from page 18 The Vertebrates of Arizona. Charles H. Lowe, Editor. 1964. The University of Arizona Press. 270 pp.

Arizona gray wolves of three known subspecies, ranged all of the diagrammed biotic communities of southern and northern vertical zonations except in the southwestern one-third of the State. They preferred the elevations from Oak-Woodland and Chaparral to the Spruce-Fir Hudsonian zonations.

(Courtesy Ward Brady, Ph. D. Arizona State University)
Provided to the author by B. Ira Judd, Ph. D., Professor Emeritus, Arizona State University.

CHAPTER II

METHODS AND MATERIALS

Review of Literature

From its publication by the Wildlife Management Institute in 1944, Stanley P. Young's and Edward A. Goldman's The Wolves of North America has been the biologists' "bible" of North American wolf information. This is particularly true concerning wolves of the southwestern United States, there being little work done on these wolves since Young's studies in Arizona except the unpublished compilations by this writer of his own research and the papers of the late Dr. Charles T. Vorhies, University of Arizona, and the late Everett M. Mercer, for twenty-five years the District Agent for Predatory Animal and Rodent Control in the Arizona District, and the better-known if much-quoted and little-published papers of the late J. Stokley Ligon.

To quote Ligon himself (1918):

> "I should say that Inspectors (Bureau of Biological Survey district supervisors) should be an executive, but not necessarily a scientist..."

As an admirer of Ligon, I must disagree, because the expediencies of executiveness lost to us for all time invaluable data that cannot ever be at our fingertips as

it was to the Ligon-Musgrave era.

Fortunately for posterity, however, there were those like Charlie Vorhies, William Casto, A. A. Nichol, Theodore Knipe, Everett M. Mercer and a few others who understood what they saw on the Arizona landscape while a few Mexican wolves remained, and were scientist enough to record some of the facts contained herein.

In addition to personalized lay research into wolves from Oregon, Montana, Idaho, Washington and Wyoming, including Yellowstone, Glacier and Bob Marshall areas, to Old Mexico, the author has also accompanied a variety of "old-timer" professional wolfers in the field over a period of thirty years.

Also, the author has in his possession an invaluable collection of personal correspondence and notes accumulated in interview with many individuals as listed under "Bibliography and Reference Sources - Literature Cited and Personal Interview".

Most of the specific history re-documented in this report includes the official annual and other reports of J. Stokley Ligon, Mark E. Musgrave, Donald Gilchrist, Ben E. Foster, Everett M. Mercer, John Meyers, Donald Donahoo and the skillful scientist, Robert V. Shiver.

It was Ligon who saw the inception of the Bureau of Biological Survey, and Mercer, who saw the time come when

he could be the first to report, for the first time, that: "No more wolves were caught this year in Arizona (1950).

From Ligon-to-Shiver covers a span of more than fifty years, during which time all resident and invading migrant Mexican gray wolves were extirminated in Arizona. This report also includes direct quotes from various letters on file in the Arizona District office of the PARC.

The author first became acquainted with wolves in the field during assignments in the fall-winter 1945-1946 co-operative predatory animal control operations with the Arizona Game and Fish Commission, working with the U. S. Fish and Wildlife Service, the Arizona Livestock Sanitary Board, The Arizona Cattle Grower's Association, the Arizona Wool Grower's Association, the United States Forest Service, the Papago Tribal Council (of which this writer was an honorary member in 1949-1950), the San Carlos and Fort Apache Indian Reservations, a number of cooperating livestockmen and certain Sonora, Mexico cattlemen who must remain anonymous. He was variously associated in this work with all of the above agencies, with special mention of Mrs. Abbie Keith and Mr. Henry C. Boice of the Arizona Cattle Grower's Association, and their field personnel for a number of years in the area of all phases of predatory animal control, and was assigned with William S. Casto, Douglas Fanning, Cy Mangun, Ollie Grimes, "Gyp" Cloudt, C. Jay Klaus and others to investigate

wolf, lion, bear, coyote and bobcat "damage" complaints, with specific field experience over all of the areas from the Grand Canyon-North Kaibab on the north to northern Sonora livestock ranges as indicated as Mexican gray wolf penetrations into Arizona as shown on the map, Figure 5.

Wolves were to continue to venture into Arizona for at least another twenty years after that first October, 1945, field experience. During which time the author learned to distinguish wolf tracks and other sign and to locate "scratches". "kicks" and scent posts of wolves and lions from men who had worked this trade their entire lives.

From which, certain "conclusions" are included in this report.

The author was also able to substantiate to his own satisfaction, certain truths or conclude as to many myths about wolves.

The use of steel, leg-hold traps - primarily the No. 14 Newhouse - arsenic in a few instances (particularly in the possession of Basque sheepherders in Arizona and Mexican vaqueros in Sonora), strychnine tablets in "drop bait" technique application, cyanide "Coyote Getters", thallium sulphate and "1080" (sodium monofluoroacetate) were variously employed by the author in pursuing verified wolf and other predatory animal "damage" complaints, in addition to the annual "winter" predatory animal control programs.

After a series of encounters with transient Mexican wolves venturing into Arizona, the author also came to a conclusion that such migratory wolves were apparently not as keen in avoiding the variety of steel and chemical-controls as were the earlier-day "pack" wolves of those recorded in Ligon and Musgrave reports.

Most later wolves were what Arizonians call "spooky", while in unfamiliar territory where their own scents were not established, and highly nomadic, making it extremely difficult to "get out ahead" of one or two wolves moving, as they often did, 100 or more miles a day. Most later wolf "runs" were circuitous in nature when within one-hundred miles or so of the Mexican border. Other migrant wolves, however, particularly those entering the state from the east, would follow mountainous streams like the Black, or high, forested ridges and plateaus for several hundred miles or more.

One wolf in the author's field experiences with fast-moving Mexican <u>loafers</u> is perhaps typical: a "calf" (a long-yearling, weaned Brangus heifer) was killed on an upper Sulphur Springs Valley range in Cochise County. The rancher and his family had been on the range for several generations, and recognized the kill as "wolf". It had not recently rained, and the beaten-down soil around the watering "tank" where the kill was made revealed the scat (black) and the large tracks of a wolf in which the

author's four-inch Craftsman pocket knife lay with room to spare lengthwise. One pad and claw (the "middle finger") were missing on the right forefoot.

The kill was made by "flanking". Several large bites had been ripped from the left flank. The calf had moved about considerably while the kill was being made, and, evidently, while the feeding bites were being ripped out. The entrails had come out and were entangled in the calf's legs.

The killer had not returned for a second feeding when the flyblown carcass was discovered by a ranch hand.

The author went to the site with PARC hunter Casto, sign was read, but due to the unusually warm early-winter weather, strychnine was not larded into the carcass.

A scent post was located, and several unscented traps were set by position to the scent post. One baited "Coyote Getter" was set at about four feet above ground on an old fence post near the waterhole "cattle trap" gate.

That same week, a wolf was reported having been seen by a rancher on the northwest slope foothills of the Peloncillos, but no significant sign was found.

One month later, State Game Ranger Charles Luster of Pima, working on Mount Graham, nearly a hundred miles from the Sulphur Springs Valley kill, found the tracks and scent-post scratches of a large canid at the site

of a long-buried garbage dump near an abandoned Civilian Conservation Corps wood-cutting camp. Luster set a trap he got from PARC hunter Earl Long, also of Pima, and baited it with scent Long gave him (Luster later told me he believed the bait to be rotted canned sardines mixed with coyote and fox urine).

Two days later, Luster returned to check the trap. The trap was gone and drag marks went on a straight line into heavy brush about fifty yards from the set. Luster got his Winchester 30-30 from the saddle scabbard mounted on the left front door of his Chevrolet, followed the drag marks and shot the large male wolf at a range of about ten feet where the drag had hung up in the dense brush. One toe claw and pad were missing on the right forepaw.

This wolf had apparently travelled about 200 miles from his point of entry into Arizona on the east side of the Peloncillas, made one kill in the Sulphur Springs Valley, and was caught on the Graham Mountains. His tour in Arizona had lasted about 35 days.

Such typical fast-moving, far-ranging Mexican gray wolves were particularly difficult to get out ahead of with traps or chemical poisons.

During the author's active involvement, a number of wolves raided with diminishing frequency up into Arizona

by way of the traditional wolf runs (Young-Goldman, 1944) east and west of Nogales, Arizona. Most such wolves came through the Huachuca-Canelo Hills-Parker Canyon area, but a surprising number also came up through the Ruby-Altar-Baboquivari district west of Nogales, and wolves frequently killed Papago Tribal cattle as far west as the Gu Vo area, at least as late as 1955 (Day, 1955).

Such personal encounters as the author had with these swift raiders left an impression of high respect for the Mexican lobo. The late Jay Klaus called them "spooks".

A number of reported "wolf damage" claims turned out to be caused by packs and single stray dogs - especially in the region north and west of the Fort Huachuca military reservation. One such "wolf" was a half-starved St. Bernard.

It was during this period (1945-1960) that wolves virtually disappeared from the old wolf runs along the Arizona-Mexico border country.

In the author's experience with wolves, the basic control materials and methods included the swiftest possible response to each telephoned complaint; setting of steel traps (almost entirely the No. 14 Newhouse); a variety of bait scents (although it was repeatedly proven that the location and techniques of setting the trap was far more critical than which lure-scent was used); often, one-grain alkaloid tablet strychnine "drop baits", used mostly in seasonal

periods of low temperatures; sodium cyanide "Coyote Getters" (later officially termed the "Humane Coyote Getter"), usually baited with sheep's wool and soaked in sheep's fat; a modified Morton "Meat Gun" to inject the compound 1080 (monosodium fluoroacetate) into the still-warm 1080 "Station" animal carcasses (most often wild range burros and "broomie" wild horses); and a variety of tools and miscellaneous equipment including shovels, trowels, tweezers and surgical forceps, number 9 steel wire, diagonal wire cutters and bolt cutters, trap (bear) setting clamps, and the trappers inevitably-necessary "numbing club".

To give perspective to the "numbing club", I relate the incident of many years ago when Bill Casto and Everett Mercer went out to check one of Casto's wolf-trap sets in Mercer's Model T. Ford touring car.

When the pair arrived at the site of the trap-set, a raging male wolf was found to have been caught and the drag hung up in a crack between large boulders.

The problem was how to get the wolf out of the trap without shooting a valuable fur and also not getting eaten alive during the process.

The Model T removable crank turned out to be the only available tool for the purpose, creating one of the most hilarious campfire legends in the southwest.

It was a contest that the wolf nearly won, and a story that a modern generation with push-button and turn-the-key electric starters cannot fully appreciate.

Over a period of long association with many "old timer" trappers, it was also learned that most of them were childishly, if militantly, secretive concerning their own special trapping techniques -- perhaps even more so about their own "bait scent" recipes.

But the essentials of such recipes are fairly uniform, in which various canine and feline urines and well-rotted genitalia predominate. The inherent instincts of territory and sexual drive form the basic philosophies for most scent baits for trappers.

Several such "recipes", especially for wolves (and coyotes) are detailed in the chapter titled "Methods".

CHAPTER III

RESULTS

Physical Description

According to Stanley Young (Young-Goldman, 1944), the Mexican gray wolf Canis lupus baileyi is the smallest of the twenty-six subspecies of gray wolves inhabiting the North American continent.

In perspective, the largest North American wolves are the giant Arctic Wolf, C. l. alces; the Interior Alaskan Wolf, C. l. pambasileus; and the Mackenzie River Wolf, C. l. occidentalis. Some of those wolves may weigh as much as 175 pounds, stand four feet high at the shoulder, measure up to 8½ feet from nose to tip of plumed tail, eat over thirty pounds of raw meat at a meal, and leave a front-paw print in snow, dust or mud as large as the hand print of a good-sized man. Their teeth are massive, easily capable of dismembering the largest of prey animals and crushing its strongest bones.

The Mexican gray wolf is about one-half the size of the large arctic wolves listed above. Even so, most adults of this subspecies grow to the size of the average German Shepherd Dog so popular today.

Campfire legend seldom wasted its time with runty wolves or timid wolves or wolves without solid reputation for cunning, and woe to the wolf with all his toes or

feet.

Few wolves, indeed, that were not at least referred to as "Big" and/or "Old" -- or both.

Consequently, documented fact as to size of Mexican lobos is particularly valuable today.

By way of a starting point, Casto is on record in personal correspondence with the author (Casto, 1965) as recalling that his first (probably a C. l. youngi), shot at dusk, April 4, 1909, along the banks of the San Miguel River in southwestern Colorado:

> "Weighed one-hundred and twenty-five pounds (ungutted, on the Club Ranch scales). Biggest wolf I ever saw."

The statement is important because Bill Casto caught many wolves during the next half-century, most of them in Arizona and Sonora, and most of those were almost undoubtedly the Mexican gray wolf, Canis lupus baileyi.

The late Charlie Gillham also caught a lot of wolves, including "Old Aguila", and preferred that his wolves be recorded on the "large" side. Charlie later caught wolves in Alaska, and learned what "large" wolves really were.

Also in perspective is the famous Currumpaw Wolf of New Mexico that reigned between 1889 and 1894 (Young-Goldman, 1944). Legend has it that the Currumpaw (probably either C. l. mogollonensis or C. l. monstrabilis) weighed an unlikely 150 pounds. Currumpaw is also supposed to have

destroyed more than a million dollars worth of livestock (at 1977 prices). Both Currumpaw statistics seem unlikely.

Young (1944) also lists one male Mexican lobo wolf taken in Arizona's Canelo Hills just west of the Huachucas, with an "official" body weight of 98 pounds. Young commented that it was a rare size for a Bailey wolf.

Mercer, at the instigation of one of the most astute taxonomists (Vorhies) in the southwest, set out to dispel myth and establish creditable wolf weights. It was not easy - professional wolf hunters were seldom interested in scientific data.

One incident, however, is memorable: when he became Arizona District Agent (1937) for the PARC, Mercer was prodded into checking the true weights of wolves taken by government hunters by the late Dr. Charles T. Vorhies, University of Arizona.

Vorhies (Mercer, personal correspondence with author) called Mercer's attention to PARC hunter Bill Knibbe's consistent reports of "heavy" wolves caught along the border country near Knibbe's home in Amado. According to Knibbe's reports (Mercer, 1966), the hunter had never caught a wolf that weighed less than 125 pounds, and the heaviest he listed at 165 pounds! Mercer (and Vorhies) knew better.

Vorhies, a capable southwestern biologist and professor at the University of Arizona and an official of the

National Wildlife Federation and one of the founders of the Arizona Game Protective Association, questioned Bill Knibbe's figures. So Mercer sent out a district circular to all PARC fieldmen, instructing them to get accurate weights on each wolf caught. This had never been "officially" done before, other than certain personal notes taken by Ligon that do not appear in the records.

Soon after Mercer's directive, a Williams, Arizona, schoolboy, trapping for coyotes two miles southeast of town, caught a two-year old male wolf (a migrant Bailey that had travelled over 200 miles from his home territory in Mexico), that weighed 58 pounds (Mercer, 1966).

A few weeks after that incident, veteran trapper John Ehn caught one male and one female wolf in the Santa Rita range of southeastern Arizona that he reported to have weighed 120 and 115 pounds, respectively. (Figure 8).

Before nightfall, Mercer had travelled from his Phoenix office and was in Ehn's Santa Rita camp to look into the matter.

Ehn swore that he had weighed the wolves according to Mercer's instruction on commercial scales in Patagonia, and that a Bob Bagier, Arizona Game Ranger George Peterson, and a man by the name of Gatlin on whose range the wolves were caught, witnessed the weighing.

"John," Mercer grated, "how much do <u>you</u> weigh?"

Figure 8: Johnny Ehn, vetern PARC Arizona-Mexico border country wolf hunter, setting trap at wolf-scent post (wisp of brush just in front of Ehn's left knee) on Brophy Range in Canelo Hills with Huachuca Mountains in background. About 1939.

Old snapshot reprocessed by Robert Zubia, Arizona State University from E. M . Mercer collection - loaned by Mrs. Helen Mercer.

Figure 8

"About a hundred and forty-eight."

"O. K., you and I are going into Patagonia first thing in the morning. You are going to weigh yourself on those same scales. There aren't many wolves in this state that weigh much more than half of those you reported, but if you show up on those Patagonia scales weighing about 300 pounds, then I'll have to believe everything you reported about those two wolves."

Ehn admitted that he hadn't actually weighed the two wolves -- only guessed at the weights. (Mercer, personal correspondence, 1966).

Arizona District PARC records show that soon after the above incident, Ehn reported catching another wolf that weighed 62 pounds. Later, Ehn caught another huge old Sonoran wolf - a male - that weighed 74 pounds. Shrewd Charley Vorhies had been right.

Young (1944) describes the skull of baileyi as being: "...similar to that of mogollonensis, but distinctly smaller, less massive ... ", and the color: "dark".

But color variations in baileyi, like most gray wolves, runs the gamut. Young (1944) says: " ... tawny ..."; " ... cinammon ..."; "... pinkish buff ..."; and it is true that many Mexican lobos are attractively rufous in hue. It is also true that a family pack (most wolf "packs" with the exception of occasional tundra caribou migration territory crossing are blood related) are

"Joseph's Coat" dissimilar - with the maximum possible color range from near raven black to an ivoryish white. There is, however, a more-or-less average basic coloration among Mexican gray wolves, almost reddish when the individual animal is in good physical condition and ranges in a moderate to cold climate (the higher elevations of Mexico, New Mexico and Arizona).

And, as one veteran tracker put it: "They sure are pretty things." (McBride, 1969).

The elongated (more so as compared with that of a dog of comparable size) track of a wolf is distinctive, as is his mile-eating "trot". The outsized forepaw print of a very large gray wolf may measure up to about six inches (Young-Goldman, 1944), with that of a large baileyi at about 4 inches, being more trapezoid than the more roundish track of a dog. Too, the author's observation of Mexican lobo prints (forefoot) is that they seem to have a tendency to run up on their toes, with the center two pad-claw prints running closer together , pointing more forward than splayed out as in dogs, and with the fore-center two claws digging in deeper (Gish, unpublished notes, 1950).

The author has also observed that Bailey lobos run to a more narrow-chested build than dogs, and that the forelegs have an almost "frail" longish look in comparison with body size; that when observed in their characteristic

mile-consuming trot, wolves almost seem to dance or flail the forelegs in a not-graceless, fanlike rhythm, managing to look about them from side to side as they go. One of a number of such observations was made through an 8-power spotting scope by the author from a high prominence near Baboquivari Peak in October, 1949, in company with George Peterson, Nogales, Arizona. (Personal notes, Altar Valley, 1949).

The average Mexican gray wolf is an attractive animal, somewhat resembling in the field a shaggy German Shepherd Dog but with prominently longer forefeet and forelegs, the eyes often yellowish-orange and squinted, the ears more rounded than pointed, the chest narrower and the entire configuration more rangy and slightly less symmetrical than the classical purebred German Shepherd Dog of otherwise similar appearance, size and general coloration.

Population Numbers

Just as in the matters of animal weights, wolf ferocity and aggressiveness toward humans and other lobo characteristics, the common figures as to wolf population numbers seem to have also been spun of campfire mythology and legend.

Too, the language habits of the gray wolves' southwestern human contemporaries must be considered. For example: when the now-legendary lion, bear and wolf-hunter Giles Goswick was involved in fall cattle round-up in the western Mogollons of Arizona in October, 1913 (Mercer, personal correspondence, 1966), in the vernacular of the time and place, " Dead cattle was everywhere." And mostly, Giles said, apparently for the pure joy of killing.

Goswick rode up on a pair of adult wolves trying to teach their litter of coyote-sized pups how to drag down a longhorn calf. Longhorns were hard to kill, and the pups were making a hash of the job, even while the grown wolves held the brood cow at bay.

The bitch wolf barked furiously at Goswick's trail hounds, while the rider "fell off" his horse, rifle in hand, and shot the old female and four of her pups.

"They didn't have sense enough to run away," Goswick reported. But the male escaped.

Within a week, Goswick killed thirteen more wolves in the same vicinity (Mercer, personal correspondence, 1966), being paid $50.00 bounty for each of the eighteen wolves by the roundup association. Six of those wolves were of the same family pack.

No factual record exists as to "official" estimates of wolf numbers in Arizona at the outset of the controls

set into motion by the 1893 Territorial Bounty Act and the Congressional activation of the Bureau of Biological Survey in September, 1915. However, Ligon (1916) did make an estimate that there were "about" 300 gray wolves (all sub-species - all adults) in New Mexico "at the close of the fiscal year". At the same time, he also made an estimate (1916) that about 60% of the wolf "damage" in the two states occured in New Mexico, theoretically, then, allocating to Arizona a 1916 population of adult gray wolves of 20% less than in New Mexico.

It is the only figure we have to go on, but as things turned out, Ligon's estimates were accurate.

According to "old timers' of that period, "wolves was everywhere", but something less than 300 wolves spread over all but lower Sonoran desert areas of the fifth largest in area state of the contiguous forty eight, would be thin, indeed, over 113,909 square miles -- whereby a wolf would be hard to find.

We have to deal with the figures that are available to us.

By 1919 (Annual Report), Ligon claimed that:

> " The big wolves ... in Arizona and New Mexico ... no longer confront us as a serious menace ...".

And, although unrealistically optimistic, Mark Musgrave, successor to Ligon in Arizona, officially reported:

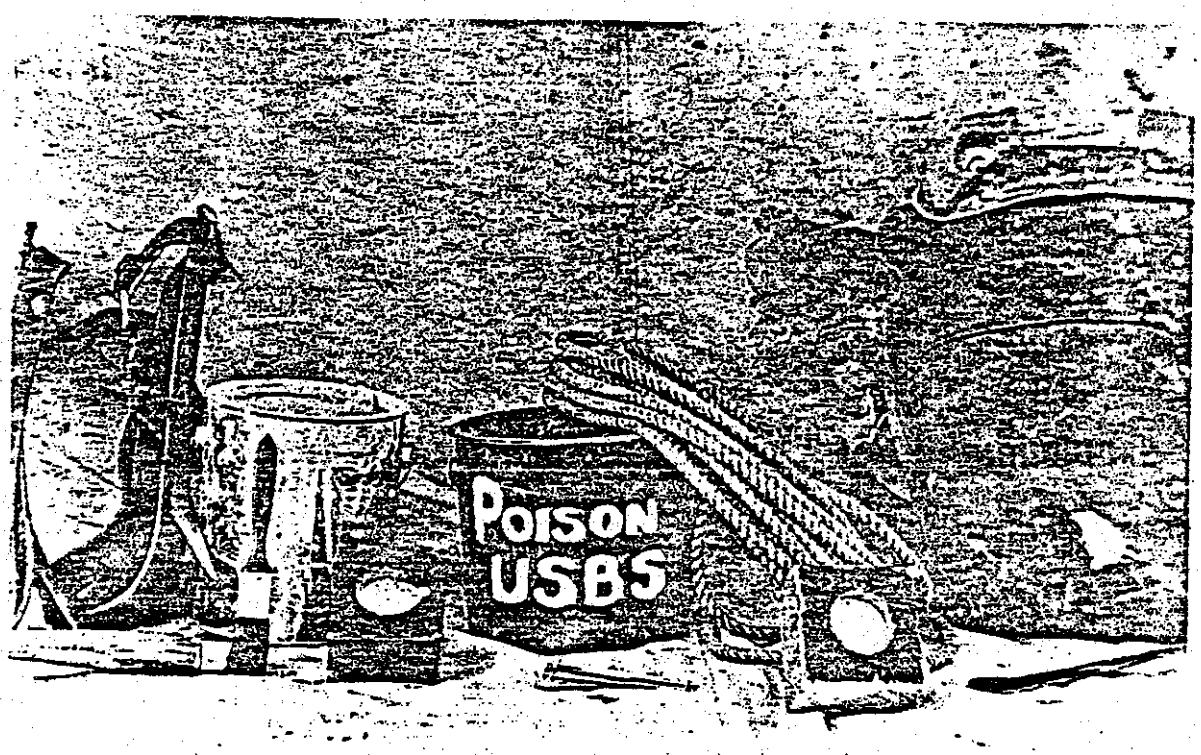


Figure 9: PARC hunter's paraphernalia. Trap on left; dies (left and right of poison can) for making suet cubes; and lidded can for carrying strychnine cubes. Bag (right) is for carrying equipment in the field when afoot.

Reproduced from an old Bureau of Biological Survey snapshot by Robert Zubia, Arizona State University - from E. M. Mercer collection, loaned by Mrs. Helen Mercer.

> "This year marks the end of the lobo wolf, for there are no wolves left inside the borders of the state." (Annual Report, 1926).

All of these population reports must be studied very carefully.

During the first year of operations (Ligon, 1916), the PARC professional hunters took 69 wolves in Arizona and New Mexico combined, including thirty-six "immatures" (pups in dens and unborns).

In 1917, the hunters took 83 wolves, including fifteen young.

In 1918, they captured 123 wolves, including thirty young. Of those 123 killed, 111 were taken by federal hunters and twelve were poisoned (arsenic and strychnine) by a special force employed during the period February 6 to June 30, 1918, by New Mexico A. & M. College (State College, New Mexico, 1889). Of those wolves taken by federal hunters in the two states, forty were adult males and forty one are listed as adult females. The thirty young were not classified according to sex.

No records were ever made as to subspecies. One can only conclude that the majority of wolves taken during this three-year period except along the borders of the two states facing Old Mexico were resident Canis lupus mogollonensis and C. l. youngi. And the majority of wolves captured along the southern borders were probably C. l. baileyi. The records are no more specific than that.

But it is also believed (Young-Goldman, 1944), that on overlapping territories, the three subspecies did intergrade, so one can only assume as an educated guess that all or most wolves taken in Arizona subsequent to 1926-1928 (Musgrave) were, logically, Mexican gray wolves.

The issue of wild wolf populations is always speculative. As one old-timer once told this author: " One wolf can kill a lot of calves, and one doe deer can make enough tracks in one night to look like a whole herd."

Consequently, it bears repeating that in less than three years after it commenced field operations in 1916, the PARC had destroyed every single gray wolf of its two major resident subspecies in the entire state of Texas (Caras, 1966).

The records show that approximately 1,400 "big" (gray wolves as opposed to Canis ~~niger niger~~ rufus, the Texas Red Wolf), wolves were killed in Texas during that three-year period. In less than thirteen years of PARC activities, all resident wolves in New Mexico and Arizona were officially declared destroyed. The last two known resident wolves in Arizona (probably C. l. youngi) were killed by strychnine by PARC hunter George Logan during 1928 in Prospect Valley on the South Rim of the Grand Canyon (Musgrave, 1928).

Just as rapidly, gray wolves disappeared from the vast open cattle and sheep ranges across the Great Plains,

the Dakota country, the Rocky Mountains and the Pacific Northwest.

Again, the official records of the Bureau of Biological Survey (PARC) show that of the total of 128,513 major wild predators shot, trapped or poisoned in the sixteen western livestock-range states during the six-year period 1915-1920, inclusive, only 2,936 of those so-called "killer" predators were gray wolves (Caras, 1966)!

This is a startling record, considering that this also accounts for the entire, "wiped-out" wolf populations of those sixteen open-range states, including the six-year increment of young!

Also startling is the revelation, according to those same "official" records, that one-half of this entire western-states' wolf populations lived in Texas, with only 1,536 wolves distributed over the other fifteen states - about 100 wolves per state!

There is no other official or other documentation.

Then, considering Mexican gray wolves, it is also important to recognize that from the same official records of the PARC during the thirty-two years between 1912 and 1944, not more than 475 gray wolves, excluding unborns and pups in dens, were killed, captured or otherwise removed from their natural state in Arizona alone (Mercer, 1966)! But because of natural overlapping and intergrading, there is no possible way to determine how

many of those 475 wolves were youngi, how many were mogollonensis and how many were Mexican gray baileyis.

It is perhaps even more conclusive to point out that from those same PARC records for the period of the first three years of Bureau of Biological Survey operations in Arizona and New Mexico (because the records were kept for the two states by Ligon in one file) from September 1, 1915, through June 30, 1918, only 263 wolves were killed (by PARC hunters) in the two states, but that this "take" virtually wiped out the entire resident wolf populations of those two states! (See Fig. 10).

Population numbers of gray wolves have always been easier to guess at than scientifically inventoried, even by the experts of the day. After estimating "at least" 300 adult gray wolves in New Mexico in 1916 (Ligon), the PARC Inspector reported that at the end of the fiscal year, 1917:

> "My estimate is that there are not more than 70 adult gray wolves in New Mexico at the present time, and perhaps that same number in Arizona."

Two years later, he reported:

> " ... there are probably a dozen adult wolves in the State (New Mexico)" (Ligon, 1919).

During that same fiscal year, Mark E. Musgrave was appointed to take over predatory animal control reins in Arizona. He made a special effort to kill wolves, hybrids and a pack of wild dogs ranging in Arizona along the Mex-

FACTUAL COUNT OF ADULT GRAY WOLVES DESTROYED IN ARIZOI

September 15, 1915 to June 30, 1967

1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
33*	68*	27	26	64	37	58	37	22	31	18	16	5

1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
43	14	3	8	4	3	7	5	5	3	8	6	1

1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
8	5	6	5	4	3	4	1	0	2	2	1#	0

1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
0	0	0	2	0+	2	2	0	3	0	0	0	0

Total: 602

* - New Mexico and Arizona combined

- Bounty only

+ - One male captured alive - to Arizona-Sonora Desert Museum

(Note: Mercer steadfastly questioned some early wolf catch reports that may and probably did include wild dogs and dog-wolf hybrids)

Figure 10 - Table 1 PARC record of wolves destroyed in Arizona - 1915-1967.

ican border between the Huachuca Mountains on the east, the Santa Rita Mountains on the north, and the Baboquivari Mountains on the west (Musgrave, 1919). He reported that:

> " ... when operations stopped in May, (1919), there were few or no wolves left on this side of the border."

Ligon (1919) stated that the large predators were a menace (to livestock) only in harbors of refuge from the pursuit of man. He estimated that:

> " ... probably not more than one-tenth of New Mexico and Arizona furnish such refuge." (Ligon, 1919)

We now have, according to the Ligon and Musgrave reports for 1919, " ... probably a dozen wolves ..." on one-tenth of New Mexico's 121,666 square miles - undoubtedly among the roughest and most precipitous near-8-million acres in the western United States, and:

" ... few or no wolves ..." left on one tenth of Arizona's 113,909 square miles (7,289,600 acres).

The mathematics put southwestern gray wolf censusing into a clearer perspective than the campfire legend:

"Wolves was everywhere."

One year later, Musgrave (1920) reported:

> " ... we have the wolves (in Arizona) down by at least 30%."

adding:

" Wolves are not numerous in this State (Arizona), but are scattered over a very large area, and there are a great many individuals (wolves) that cover a big range and are very shy."

Complementing the New Mexico report (Ligon, 1919) that:

"Trapping the remaining wolves is going to be a long, drawn-out process."

That was the year that Musgrave's special crew in southern Arizona caught thirteen wild dogs and fifteen wolves, many of them running together. (Musgrave, 1919).

And the same year that a concentrated program was initiated against the wolves then reported to be ranging on the watersheds of the Black River, Eagle Creek, the Blue River and on Bonita Creek in Arizona's White Mountain country. (Musgrave, 1919).

"This is a large range, and there are a great many wolves scattered over it."

During the last few days of May and the month of June, eight wolves were taken off this range by PARC hunters (Musgrave, 1919).

One can only conclude that earlier estimates of gray wolf numbers , disregarding annual increment of four to five pups per mating pair, were far from accurate -- a problem that continued to plague the annual reports of PARC district agents for another four decades in the southwest. (See Fig. 11).

NUMBERS OF ADULT GRAY WOLVES CAPTURED BY MONTHS
ARIZONA DISTRICT - FIVE-YEAR PERIOD
FISCAL YEARS 1919 - 1923, INCLUSIVE

Month	1919	1920	1921	1922	1923
July		6	5	4	3
Aug		5	11	1	6
Sep		4	4	9	1
Oct		8	4	7	3
Nov	2	7	0	5	2
Dec		0	1	4	5
Jan	2	4	0	3	1
Feb	5	3	0	3	1
Mar	4	2	0	4	2
Apr	3	2	2	3	6
May	2	15	3	5	2
Jun	8	8	7	10	5
Tot	26*	64	37+	58#	37=

* 10 unborns
\+ 1 wolf poisoned
\# 18 wolves poisoned
= 14 wolves poisoned

Figure 11 - Table 2
Gray wolves captured - Arizona District
By months 1919-1923.

Even today, most North American wolf expertise is uncertain as to gray wolf populations except in the small and isolated packs in northern Minnesota and Isle Royal.

In a personal conversation with Dorr Green, a personal friend, in 1945, then Director (Chief) of the PARC in Chicago, the author was told that one of the major problems of the "Service" since its inception in 1915, was convincing state and congressional appropriations committees of major predator populations and dollars and cents "damages" to the livestock industry. Gray wolves were particularly elusive in this respect. (Figure 12).

Figure 12: Dorr Green, PARC Chief in 1944, holding standard PARC wolf trap. His right elbow rests on an Alaskan wolf pelt.

Reproduced by Robert Zubia, Arizona State University from an Oeser-Sarra photograph in American Magazine - June, 1944.

From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

PREY

"What wolves eat", like the matter of wolf populations, remains a highly speculative subject today. It is most unfortunate that the page which included the summary of stomach contents of predatory animals taken during the year is missing from every annual report of the Arizona District PARC. One can only guess at the reason.

Wolves are predatory carnivores by reason of natural law, and they eat meat - the best of whatever they can catch. (See Fig. 15).

And based upon their natural food habits, the destiny of gray wolves in Mexico and the United States is inextricably fused with the lives and times of three men: Gregorio de Villalobos, who brought the first domestic cattle to continental North America in 1521 (Wellman, 1939); William F. "Buffalo Bill" Cody, flamboyant symbol to all Americans of the era that destroyed more than ten million plains and woods bison; and then Colonel Nelson A. Miles (Johnson, 1962), United States Army, who deservedly symbolizes the conquests of the Kiowa, the Comanche, the Sioux under Crazy Horse and Sitting Bull, the gallant Nez Perce under Chief Joseph, and the fierce Apache under Geronimo - all of whom stood squarely in the path of the relentless march west and the inevitable development of the North American livestock industry.

Three hundred and fifty years after de Villalobos' eight Andalusian calves (seven heifers and one bull) arrived on mainland North America, the buffalo herds had been wiped out, all but a remnant few wolves had been destroyed, all the warrior Indians had been defeated and herded onto reservations, and the original eight Spanish calves had exploded into a mighty empire. (Wellman, 1939).

It is the fact that gray wolves turned from natural wild prey to dollar-food-valuable cattle, sheep, goats and poultry that brought about their certain destruction.

In the United States, the onset of World War I in Europe and the consequent oceanic blockade that brought about great demand and higher prices for foodstuff - including American range beef - triggered the creation of the Bureau of Biological Survey by an Act of Congress on September 1, 1915 (Congressional Rrcord, 1915). The agency was charged with the destruction of predatory and deleterious rodent animals, originally known as the Bureau of Biological Survey, United States Department of Agriculture, and currently the U. S. Fish and Wildlife Service, Division of Animal-Damage Control, United States Department of the Interior.

To those originally associated with it, this agency became forever known as "PARC" and "The Bureau". Their single-minded concern was with "what predators eat".

In the Southwest, the first "PARC" administrator, then called "Inspector", for the two-state District of New Mexico and Arizona was an astute Carlsbad biologist named J. Stokley Ligon. He was known as "Stoke".

Ligon knew his business - he knew, instinctively, that the method of public appeal for funding predatory-rodent control operations lay through the American "Bread Basket" - in this case, the livestock industry.

Consequently, when the new Inspector addressed a conference (Ligon, 1917) on November 1, 1917, in Albuquerque that included the President of the New Mexico Cattle Growers' Association, the President of the New Mexico College of Agriculture and Mechanic Arts and " ... other interested parties", they arrived at an estimate, based on tax rolls, of "damage" to the livestock industry caused by: " ... wolves, mountain lions, 'big' bears (grizzlies), coyotes, bobcats and wild dogs during the preceding year (in New Mexico)" that amounted to:

"Cattle:	24,350 head.	Value:	$1,374,000.
Sheep:	165,000 head.	Value:	1,320,000.
Horses:	850 head.	Value:	21,250.
			$2,715,000.

It was the death knell for wolves, because it

became axiomatic that:

> "Wolves feed on cattle almost entirely, plus an occasional sheep." (Ligon, 1918).

It was the same year that PARC hunters were asked to send in reports of stomach contents (89 wolves), showing:

> "Beef . . . . in 13 wolf stomachs
> Horse . . . in 2 " "
> Sheep and Goat . . . . in 4 " "
> Unclassified meat . . . . in 2 " "
> Deer . . . . in 1 " "
> Acorns . . . in 1 " "
> Grass, sticks and berries. in 1 " "
> Empty . . . 18 " "
> No report. . 47 " "

In the Arizona District annual report for 1925 (Musgrave, 1925) quoted a letter from the Manager of the huge Chiricahua Cattle Company (Boice, 1925):

> "We have been operating a breeding herd of cattle (among first pure-bred Herefords in Arizona) in the mountains along the Black and Gila Rivers, located in Graham, Gila and Navajo Counties for about 17 years. ... For a number of years the number of wolves running on our range remained about the same. ... As an indication of how destructive these wolves were, one of our hunters found a den in which young wolves were just old enough to run around. He (the hunter) found 25 calf skulls in and around the den, ... 25 calves (that) had been killed and dragged in to feed the pups."

The Arizona District annual report six years later,

(Foster, 1931), listed actual predatory animal depredations as witnessed (or verified) by the far-flung PARC hunting force:

> " A total of 3,958 livestock and game animals were reported killed by predatory animals (this year). Of this amount, 3,359 were livestock, or a ratio of 6½ livestock to one game animal. The fact that livestock is much easier to catch than a wild animal may be responsible for this condition."

The same annual report (Foster, 1931), also listed in cash amounts "damages" to livestock by predatory animals, of which 53 kills are credited to wolves, 43 of which are listed as "calves". Four were steers. It is to be noted that in normal western range parlance, the term "calf" usually refers to big, weaned, "Long Yearlings", rather than suckling calves.

In the same report, wolves are also charged with killing two chickens and two deer.

For comparison, in the same report (Foster, 1931), four calves are listed as killed by bald eagles, six calves killed by bears, 107 by coyotes, ninety one by mountain lions, and fifteen calves are listed as killed by predatory feral dogs. One "steer" is listed as being killed by a mountain lion.

We go back to Ligon (Annual Report, 1918):

> " ... from a commercial standpoint, the gray wolf has no rival as a destroyer of livestock. Mountain lions are less destructive to domestic stock for the only reason that more than half their food consists of deer. All old and large bears are killers of sheep, horses, goats, burros and cattle during certain periods of their activity, and (the) larger animals feeding almost entirely on grown cattle."
>
> "In the southwest, where cattle run on the open range during the entire season, wolves feed on these, and each adult wolf at the present time will average killing $2,000.00 worth of stock (1918) annually."

In that same year, Ligon (Annual Report, 1918) charged (all) predatory animal "damages" to cattle in the amount of $350,000.00.

What do wolves eat? Mercer (Personal letter to author, 1966) agreed that wolves should be able to subsist entirely on a diet of field mice, if necessary.

"In fact," Mercer suggested, "if eaten whole, a diet of mice should prevent a man from developing scurvy."

He cited the instance a number of years earlier when an early-morning fisherman at Big Lake in Arizona's White Mountains walked right up to within forty yards of a wolf near the south end of the lake. The wolf was so busily engaged in scratching field mice out of the tall grassy hummocks that he forgot to be cautious about man.

Food habits of all wild animals rise and fall with natural cycles. Mercer's reports for 1946 indicate

that PARC fieldmen that year noted that field mice were unusually abundant, especially in the White Mountains. "Everything was feasting on them," he wrote.

But the high toll on mice never seemed to reduce their numbers to any noticeable degree. The small rodents remained " ... as thick as fleas ..." until a sudden thaw the following winter drowned them. Meanwhile, the wolves got fat (Mercer, personal letter, 1966).

It should also be noted that in the earlier days of southwestern livestock operations, especially about the turn of the century, Casto (personal interview, 1966) recalled:

> "Them cow critters was half wild, and there was ten to twenty (on the range) where there's one today. And they had to be half-goat and half-mule, just to get around."

Casto referred to half and quarter-bred longhorns. Arizonians called them "Indian Cattle", but others often called them "cimarrones", "mustangs" or just "wild cattle". They could run and hide like deer.

What wolves eat is further documented in the PARC annual reports (Musgrave, 1920) concerning the so-called "Chiricahua Wolf", a wide-ranging lobo killer, eventually caught by PARC hunter A. W. Mills. Musgrave termed this wolf: " ... one of the most wiley and destructive ever taken in Arizona."

Mills' lobo ranged the Chiricahua Mountains in southeastern Arizona for at least four years, and the record charges him with killing a yearling Hereford about every four days. Mills credits the old pirate with eating his fill of from 16 to 18 pounds of choice flank beef-veal, and never returning for a second feeding off his victim.

Three years later, Charlie Gillham poisoned another "famous" wolf - "Old Aguila", another killer wolf that had been ranging the Aguila Mountains (Eagle Tails), (Musgrave, 1923): " ... for the past eight years...", killing thousands of dollars worth of cattle and sheep. On one occasion, Old Aguila: " ... killed 65 head of sheep in one night", and "forty head of sheep" on another night.

Aguila-range stockmen Campbell and Martin, and stockmen Stokes and Allen, claimed that Old Aguila cost them at least $25,000.00 in cattle and sheep during his eight-year reign.

That same year, rancher William Lutley, northwest of Douglas, reported that a "pair" of wolves killed eighteen of his calves (Musgrave, 1923). Lutley's "calves" also probably referred to big, weaner long-yearlings.

Three wolves were caught by PARC hunters in 1931 (Foster, Fiscal year report). The stomach of one contained beef meat, another was full of deer meat, and

the third wolf had fed on antelope.

The same report indicates that the three wolves had killed twenty calves - mostly half-grown long yearlings.

In 1933, fourteen "calves" were reported killed by wolves (Foster, 1933). Wolves also killed two adult Herefords and four sheep (Foster, 1933).

In the following year, wolves are credited with killing fourteen adult cows and four calves (Foster, 1934).

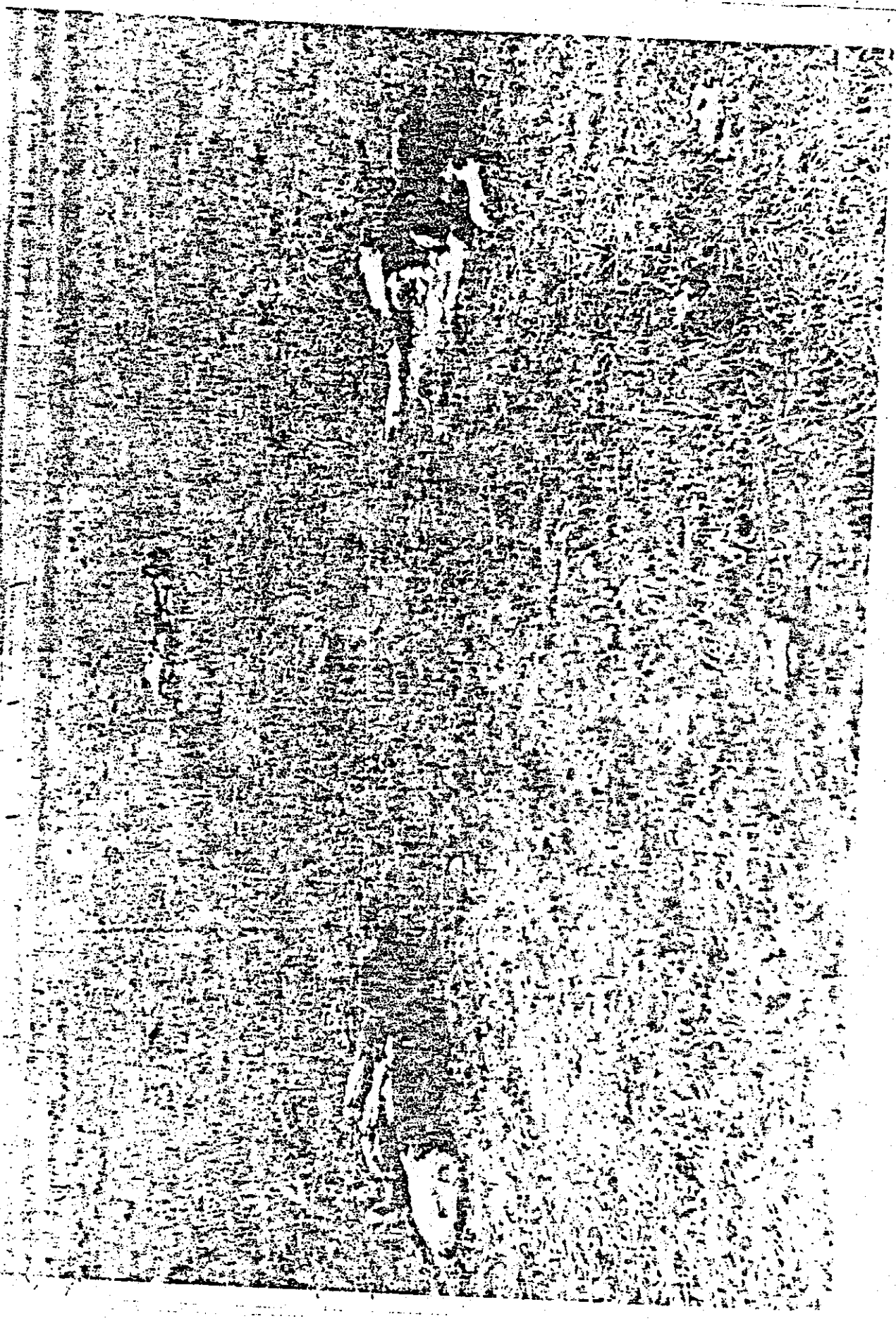
Although the numbers of wolves in Arizona (by now almost certainly all Mexican gray lobos), a steady flow of wolf-kill reports continued to drift into the Phoenix PARC office. (See Figure 13).

The 1937 report lists four "calves" killed by wolves, one adult brood heifer, and four marketable steers. (Mercer, 1937). In the same report, one pair of migrant Mexican lobos were reported to have killed twenty head of cattle (unclassified) in the Baboquivari and Santa Rita ranges.

Other cattlemen phoned in complaints that eight separate wolves were ranging in Pima and Santa Cruz counties during 1938-1939, killing more than 50 head of cattle (Mercer, 1939). And in late spring of that same fiscal year, a single pair of wolves are supposed to have killed eighteen head of cattle and badly injured fourteen more (Mercer, 1939).

In 1940, one distinguishable old Peg-leg lobo is on

Figure 13: Remains of three Hereford calves killed by wolves in Arivaca District. Wolves ate only a few bites of flank meat from each - coyotes, ravens, buzzards and other scavengers will finish the job. Bureau of Biological Survey photo from E. M. Mercer collection. Loaned by Mrs. Helen Mercer.



record as having killed at least nineteen head of cattle along the border with Mexico from as far east as Montezuma Pass to as far west as Ruby. Considering the peculiar signature at the sites, the reports are difficult to disbelieve.

One rancher reported that a single wolf killed two 350-pound yearlings on his range near Nogales (Mercer, 1941). (Probably Hathaway range - dmg).

Casto trapped a family of wolves at and near a den on the west slopes of the Huachucas in 1941 that had been subsisting principally on whitetail deer (O. c. couesi), but had apparently " ... also killed a goodly number of cattle". (Mercer, Casto, 1941).

Five calves and one deer are reported to have been killed in 1943 along the Mexican border (Mercer, 1943).

PARC hunter Earl Long of Pima trapped a wolf in the Pinal Mountains south of Globe after it had killed several calves and several deer (Mercer, 1944).

Another wolf was trapped in June of that same year after it had killed several calves (according to rancher complaints) in Pima and Santa Cruz counties (Mercer, 1944).

In 1945, an old wolf drifted northward across the border and killed calves in southern Pima and Santa Cruz counties (Santa Rita and Ruby-Baboquivari areas). That same year, four other apparently young wolves worked up into that same region without recording any livestock

kills (Mercer, 1945). They seem to have subsisted mostly on deer and smaller animals and birds.

At the end of June, 1947, two wolves were reported to be killing calves near Arivaca in southern Arizona (Mercer, 1947).

Two wolves ranged in the Chiricahuas in 1947, (Mercer, 1947) killing several thousand dollars worth of livestock, according to letters on file in the Arizona District PARC office (T. C. Creighton and Mary Eva Mulkins, 1948).

Another wolf ranged in the Baboquivaris, depredating on cattle, and was trapped in that vicinity by a PARC hunter on December 1st. (Mercer, 1948).

Two years later, a Cochise County stockman on the east side of the Dragoon Mountains reported that wolves killed a calf on his range, November 9, 1950. (Mercer)

In July, 1951, a report was made that a wolf had killed a calf near Patagonia. On August, 8, a PARC hunter discovered that two wolves had entered from Old Mexico into the Patagonia district and had killed several cattle. By the time the pair was trapped, one near Canille on August 10, the other on August 23, they had taken a toll of at least twelve head of cattle (Mercer, 1952).

On May 6, 1952, a calf was killed on the John D. Leverton Ranch, southwest of Concho. St. John PARC trapper Cy Mangum, laced the carcass with several strychnine "baits", and the wolf was found dead the following morning within a few feet of its kill (Mercer, 1952.)

The Leverton wolf claimed (by Leverton) to have ranged a spread of about 50 miles, killing " ... about two calves a week" for several months. (Leverton letter, 1952).

Another wolf made a kill on the west side of the Graham Mountains in early June, 1952 (Mercer).

Mercer verified that a wolf killed a calf near Arivaca but the wolf was never located. (Mercer, 1953).

Arizona Game Ranger George Peterson, Nogales, reported that he came upon and surprised a wolf feeding on a calf northwest of Nogales (Peterson, 1956).

In 1957, a wolf killed a deer on the Dubois Ranch in the Winchester Mountains, western Graham county. At about the same time, a wolf killed a deer on the Dee Jernigan Ranch, about 25 miles south of the Dubois Range.

During June of the same year, a cowboy on the Crane Ranch in the Mule Mountains, Cochise county, rode up on a pair of wolves that had just killed a calf. (Mercer, 1957). The cowboy who reported the incident said that he did not have a gun at the time, and had difficulty

driving the wolves away from their kill. When he returned to the scene a short time later, the wolves had fed heavily from the calf and were seen disappearing up a narrow canyon nearby.

In relating the incident to Mercer, the cowboy reported that he had a very uncomfortable sensation while inspecting the calf to determine its condition while the two wolves lingered nearby, watching.

In 1960, a Mexican rancher southeast of Nogales in northern Sonora (Morales, 1960) reported that twenty-six head of his cattle had been slaughtered by wolves during the year. In August, a wolf was caught after it had killed two calves on the Schilling Ranch, north of Willcox. (Mercer, 1960).

Again, there was no "rash" of wolf "reports" in Arizona at any given time, but those wolves that were in the state even for short periods, took a fearful toll in numbers and dollars and cents from range stock, and their principal prey was large yearling calves, based upon averages of reports on file in the Arizona District PARC office since 1916.

Consistently, Ligon, Musgrave, Gilchrist, Foster, Mercer, Casto and PARC field hunters reported (U. S. Fish and Wildlife Service records, 1915-1966) that wolves took big, healthy young cattle in preference to

the sick, maimed, weak and aged prey. If there was a deterrent in prey selection by wolves, it was in method of attack to avoid personal injury to themselves. (Fig. 15).

Consistently, (numerous personal interviews and personal observation - 1945-1968), reports indicated that the majority of livestock kills were made by biting the prey in the flanks and rump areas, often opening the stomach-bowel areas while the victim remained afoot.

It was not rare, either, that a pregnant cow near her time was attacked in the genital areas, with the unborn calf being ripped out and partially eaten (See photo Fig. 14).

Experience of the author and from notes taken in personal interview (Ligon, Gillham, Casto, Mercer, et al) indicate that wolves are capable of fasting for long periods, then gorging themselves almost to bursting. All persons familiar with wolves (Boice, 1925, et al) are aware that adult-parent wolves and pack members will make a kill, often many miles from the den, gorge themselves on the fresh meat, then disgorge it, fresh and/or partially digested at the densite to feed the pups.

But the records also show that wolves can and will drag/carry large and almost unbelievably heavy portions of cattle carcasses (Boice, 1925), even to the point of swimming them across large and swift streams (Casto, 1909), to be deposited at the den site for whelp food

Figure 14: Many wolves were rugged individualists. The one that killed this pregnant Hereford, did so for tid-bits of unborn calf. Note calf's head where it was torn from womb and consumed on the spot. Bureau of Biological Survey photo from collection of E. M. Mercer. Loaned by Mrs. Helen Mercer.

Figure 14

. . . I have many other figures that prove the great loss the wolves cause . . . but it is a well known fact that wolves not only eat meat almost constantly--cattle, horses, or sheep, but they eat the very best obtainable and generally want it fresh. . .

J. Stokley Ligon, Annual Report, 1916.

Figure 15.

without going through the gorging and disgorging process.

There is little substantiation from southwestern records and interviews that wolves cull out sick, weak and unfit prey animals. To the contrary. (See Fig. 16).

There is also considerable evidence from the records, interviews and observation that wolf attacks upon prey animals are often "triggered" into motion by the prey animal turning away and running, whereas in many instances, the attacking wolves were deterred by the belligerant defiance of brood cows with small calves and herd range bulls. It may also be significant as to the ability of the old longhorn breeds of cattle that such comprehensive documentation of the history of the western livestock industry as The Trampling Herd (Wellman, 1939), has no mention of wolves, in spite of the known fact that plains (buffalo) wolves are an integral part of American history. (Dakota Cowboy, Ike Blasingame. 1958).

Figure 16: Vintage Model T. Ford pickup truck hauls away three big Hereford cows from the watering trough where they were killed by the infamous Krentz Wolf. San Bernardino Valley, 35 miles east of Douglas, Arizona. May 1, 1934. Bureau of Biological Survey photo from the personal collection of E. M. Mercer. Loaned by Mrs. Helen Mercer.

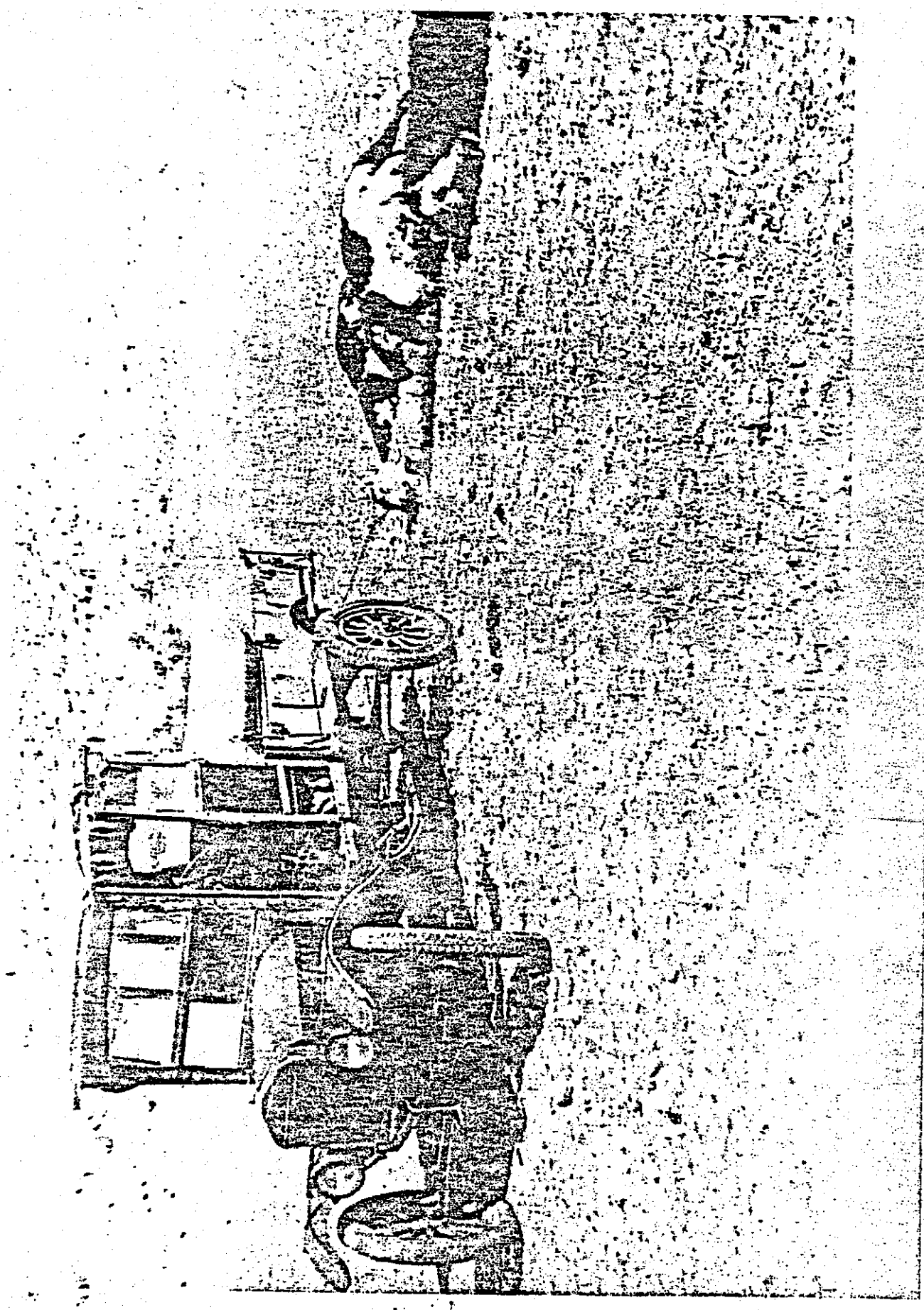


Figure 16

CHAPTER IV

DISCUSSION

Economic Factors

Bounties

The cash value of a wolf to an Arizonan is limited to the sale of pelts (furs), salaries of administrators of control agencies and professional hunters in the field, redemption for bounty, and in reducing potential livestock losses.

Needless to point out that prime wolf furs, taken in higher altitudes and during cold months, are of greater economic value than those in poor condition.

The subject of bounty is a complicated and difficult one to detail. In recent years, many wildlife agencies on the North American Continent (particularly Canadian and Alaskan), have come to the conclusion that most bounty systems, especially as they have operated in the past, constitute more of a local "welfare" program, beset by many abuses, than as any viable program for predatory animal damage control. Gilchrist and Foster (1930-1936) had to combat the inherent prejudices that contributed greatly to these problems in Arizona, as will be pointed out from the records cited herein.

When Casto (1909) was first employed to hunt down the Spring Creek Wolf in southwestern Colorado, he worked for an agreed bounty of $50.00 per wolf, paid privately by the Club Ranch. So costly were the depredations of

that particular wolf (Gish, unpublished papers) - so grateful the Club Ranch management (Grimes, et al) - that Casto was also presented with a new .35 caliber Winchester lever-action rifle - one that he carried until his untimely death in an automobile accident near his Snowflake, Arizona, home.

"private" bounty fees varied - on wolves and all predators - but from across the Great Plains country (Blasingame, 1958), bounties for wolves paid by private individuals and corporations ran from about $25.00 each, and "found" (Boice, 1925), to an average of about $50.00 per wolf. The Arizona State Bounty, re-enacted shortly after W. W. II, amounted to $50.00, but was later raised to $75.00 (Nogales Daily Herald, 1959)

Casto later went bankrupt on his own cattle ranch along the Blue River of Arizona, due to depredations by wolves upon his market-trail herds on their way to railhead at Magdalena, New Mexico (1911). It was the factor that set the young Mormon cattleman upon a lifetime of "wolfing" and private-contract hunting and trapping of other major predators before he was appointed Senior Mammal-Control Agent for Arizona in 1938.

In 1893, the Arizona-New Mexico Territorial legislature established the enabling Territorial Bounty Act, so designed and purposed that monies later appropriated for the purpose could be paid by county governments on

bounties for "predatory wolves, 'big' bears (grizzlies), mountain lions, bobcats and coyotes". It was the first such "official" action against wolves in the Southwestern Territories, patterned after similar actions by Massachusetts, Virginia, New York and Pennsylvania (Young-Goldman, 1944), several hundred years earlier.

In October, 1913, Goswick (previously cited), famed Mayer, Arizona, lion, bear and wolf hunter, was involved in the annual roundup of cattle in the high western Mogollons. When the roundup crews found dead cattle "laying everywhere", Goswick was relieved of his roundup chores and employed by the local cattlemen to kill wolves for a bounty of $50.00 per wolf.

Goswick (Mercer, 1966) went home, gathered up his trail hounds, provisions, horses and some traps, and returned to the high limestone cock's combs. As he rode along one of a series of the upended series of limestone fault ridges in dense timber country, he came in sight of a pair of adult wolves and their pups. He shot the female and four of the five pups. Remaining in the vicinity for another five days, Goswick killed thirteen more wolves - a total of eighteen wolves, earning a total of $900.00 bounty in less than a week. It was good money for 1913.

In 1914, J. Stokley Ligon of Carlsbad, New Mexico, a good biologist with a dream to raise huntable game birds commercially, was employed to map prairie dog

colonies on the pioneer Becker ranchlands near Springerville, Arizona (Mercer, 1966). Ligon found that several wolves were feasting on Becker livestock, so he caught the wolves in traps he'd set. August Becker paid Ligon a ten-dollar bounty for each of the two wolves.

Henry Boice (1925), longtime and pioneer manager (with brother, Fred) of the huge Chiricahua Cattle Company, wrote (PARC Arizona files, 1925):

> " ... One great source of loss to us was the stock killed by wolves every year. In order to cut down this loss, we encouraged hunters to go into our range and catch them, paying (the hunters) $25.00 apiece bounty and furnishing them provisions. For a number of years, these bounty hunters caught from 15 to 25 wolves a year, but, apparently, the number of wolves running on our range remained about the same."

The practice was common - many ranchers offered "bounty and found" to private trappers. Casto, Cloudt, Goswick, the Lees and many others worked in this manner at one time or another. J. J. Tucker was both cowhand and trapper, working many years for the vast Double Circle along the upper Black River, one of the greatest concentration areas for migrant Mexican lobos.

And many private trappers kept a steady pressure on fur bearers and predators. Cited is the year 1920 (Musgrave) about a wolf that slipped through the Arizona "border patrol" and killed many cattle in the Santa Ritas.

Numerous local private trappers (and amateurs) went after the old "Devil Wolf", who quickly got nipped just enough to become fiendishly trap-wise and eluded all efforts to take him until PARC hunter, William A. Knibbe caught up to him.

Of all bounties in Arizona, the one revolving around the infamous white Old Aguila is perhaps the most publicized. Charlie Gillham, who is credited with catching Old Aguila, became a prolific freelance writer after retirement as a PARC hunter.

At one time, Aguila area stockmen had a bounty of $500.00 posted for the old killer. It attracted a lot of attention, and hundreds of private trappers and hunters and cowboys worked to catch the old wolf for more than eight years. It was once said that Old Aguila cost more in printer's ink than the livestock he destroyed.

Considering Arizona wolf bounties, it is not inconsistent to quote from a report dated 1928, made by then Director of the Bureau of Biological Survey, Albert M. Day, as published by the Wyoming Extension Service, Laramie (King, 1965):

> "In the year 1896, the State (Wyoming) paid bounties of $3.00 each on 3,458 wolves. From 1895 to 1927, 36,161 wolves had been taken in Wyoming. ... In 1915, when the Biological Survey first started (wolf) work in Wyoming, there were over 1,000 wolves in the state."

One needs to read and study Day's mathematics very carefully. The same report also stated that at the time of the report (1928), only five wolves were left inside Wyoming (borders), other than those inside Yellowstone Park, of which two were in Jackson Hole.

Any bounty system has always brought out some very startling statistics and population estimates - particularly of wolves - by officials bearing the burden of influencing legislative funding grants for control work.

In 1932 (Foster), beef prices were down and furs were worth little. Private trapping dwindled. PARC operating funds trickled to almost nothing, and the Arizona State legislature failed to appropriate any "cooperative" predatory control funds.

By 1934 (Foster, annual report), the situation had become even more desperate. With beef prices at the bottom, stockmen were violently opposed to losing even a few dollars to predators.

Exerting severe political lobby pressure, the Arizona livestock industry (Cattle and Wool Growers' Associations and Livestock Sanitary Board) prevailed upon Governor Sydney P. Moeur to provide (from luxury-tax revenues) $1,000.00 per month to employ predatory and rodent control personnel. The amount was barely enough to hire three hunters for the entire state. One was the veteran Payson lion hunter, Frank Colcord. The other two men

worked entirely on coyotes. The low price of furs and lack of bounty monies did not encourage private trapping - although many PARC traps (and catch) were stolen.

Rises in fur prices in 1937 re-stimulated the private trapping industry, but trap and fur thievery became even more rampant (Foster, 1937).

Fur prices plunged again in 1939 (Mercer). Discouraged, most private trappers pulled up early in the season.

By 1941, fur prices rose again, and considerably more private trappers were active - more so than for six years (Mercer, 1941). And the added number of trappers in the field did have some tendency to decrease bobcat and coyote populations, and as fur prices increased, it also brought on a marked increase in the numbers of traps and furs stolen from PARC traplines.

Finally, in June, 1947, the 18th Arizona Legislature appropriated the sum of $15,000. per annum, to be expended as "cooperative" funds for predator control, work for the fiscal years 1948-1949. At the same time, the 18th Legislature also passed a revision of the 1893 "Bounty Law" enabling act, appropriating $10,000.00 per annum for the fiscal year 1948-1949, by which the Arizona Livestock Sanitary Board could pay a bounty of $3.50 each for coyotes and $50.00 each on wolves and mountain lions.

But the somewhat ambiguous language that sifted down onto the floor through committees left it to the arbitrary decision of the Livestock Sanitary Board as to the making of such payments. And no money was appropriated for the administration of the new bounty law, so the Board elected to pay a bounty only on mountain lions, thereby providing food for any numbers of packs of trail hounds, and setting off considerable opposition to the PARC's poison program.

The bounty on lions did not become effective until July 1, 1947. But finally, the Livestock Sanitary Board elected to pay a $50.00 bounty on wolves for the fiscal year ending June 30, 1948 (Mercer, Annual Report, 1948), and by an amazing coincidence, bounties were paid on eight wolves privately captured during that year. Four were (supposedly) taken in Santa Cruz county, two in the Santa Rita-Baboquivari runs, and one on Mount Graham.

The fiscal year ending June 30, 1950 (Mercer, annual report) passed without a single wolf being captured in Arizona. The Livestock Sanitary Board paid out no wolf bounties that year, nor during the following year, 1951.

At the end of the fiscal year ending June 30, 1953, (Mercer annual report), the Arizona Livestock Sanitary Board reported that it had paid out a bounty on one wolf taken by a private trapper in the Graham Mountains. It is believed to have been the same wolf said to have been ranging the area at the end of the fiscal year, 1952.

No bounty was paid on wolves during the fiscal year 1954, nor during the following year, 1955, and no bounties were paid out by the Livestock Sanitary Board in 1956-1957 (Mercer, 1957)

The PARC fiscal year report ending June 30, 1958, again recorded that no wolf bounties were paid for the period, but the Nogales HERALD reported the trapping alive of a large male wolf by vaquero Raymundo Topas on June 2, 1959. The incident is also otherwise recorded in this text.

The Livestock Sanitary Board paid a bounty on a wolf ($75.00) taken in August, 1960, on the Schilling Ranch north of Willcox after it was reported to have killed three of Schilling's calves.

Furs

Without any doubt, the value of wolf furs had some undetermined importance throughout the development of the west. Most early fur trappers (Pattie, et al), carried arsenic as a part of their beaver-trapping gear and used it for the purpose of sprinkling on the carcasses of skinned beavers to discourage fur damage by wolves.

Oddly, while many Indians and early white settlers used wolf furs and wolf robes for clothing and bedding, wolf furs, even with their unique non-frosting qualities,

have never appeared prominently in the early chronicles of the American fur trade as compared with beaver, muskrat pelts and buffalo hides.

The deterrent may have been the difficult logistics of carrying and tending a supply of larger wolf traps for furs of less number and value.

But wolf traps were fairly common around many Southwestern ranches, and many a cowhand kept a few traps set around the range, and, although it is not a well documented fact, some cowhands and ranchers' sons supplemented meager incomes and allowances by the sales of whatever furs they could catch.

Nor is there much substantial record that southwestern wolf furs were of much value - they are probably of higher market value today than at any time in history.

And many wolves were probably trapped more by accident than skill in the saga of Arizona trapping among non-salaried predator and fur trappers.

The record is sketchy. Goswick (1913), for example, has not recorded whether or not he pelted out and sold the furs of the eighteen wolves he captured in one week during the 1913 cattle roundup previously cited, but he probably did, adding that revenue to his bounty money of $900.00.

Bureau of Biological Survey hunters were required to turn in the scalp, ears and hide of each wolf caught

but there is also some evidence that this was a difficult rule to enforce with "bootlegging" by some PARC hunters for bounty money not uncommon. Mercer, (correspondence, 1966) refers to this as " ... something we always had to watch for". Ligon, (1919) referred to trappers being held responsible for furs caught.

Working in areas where wolves and other fur bearers ran, there existed a constant friction between private trappers and salaried government hunters. Especially in years of economic depression or in years of high fur prices, this friction occasionally broke out into open warfare (Foster, 1932). Clashes were many, and incidents common that trap and fur thieves stole the equipment of far-ranging government trappers.

It had always been so, but the depression year 1930-31 was a period of growing friction between PARC hunters and private trappers (Foster, 1931). Trap and fur thefts became common.

Random information gleaned from official records indicates that there was little net return to PARC funds from the sales of wolf hides as fur. Ligon (1918) lists thirty eight wolves taken by the New Mexico State Council of Defense hunters. Of those, nine wolf hides were sold (as fur) at an average of $13.96 per pelt. Seven wolf hides were sold (price not listed) as "trophies for study purposes". Twenty one of the wolf hides were

stored in the PARC warehouse. Disposal was not stated.

By way of fiscal comparisons for the same period (Ligon, 1918): coyote hides were bringing an average of $5.00, but the highest prices being paid at the time for prime coyote furs occurred on January 12, 1920, averaging (for 153 hides) $11.61.

Fox skins in 1920 averaged $2.50, a skunk pelt brought $1.45, and badger went for 35¢ a hide.

Ligon, (1920) also listed the following dispositions:

> The following specimens for educational purposes were retained for State institutions (unnamed): 8 adult and 13 young wolves; 19 adult and 7 young mountain lions; 18 adult and three young cub bears; 13 adult and five coyote pups; 16 adult and one bobcat kitten; and one martin. Two grizzly bear hides and skulls were exchanged to the government (Bureau of Biological Survey) by the State for scientific purposes; and one lion taken by a government hunter (unnamed) was exchanged to the State by the Biological Survey to complete a group of big animals taken in Colfax County. Wallis West, a rancher near Cimarron, was permitted to retain the hides of three mountain lions. These lions were killed by him with trained dogs belonging to State Hunter J. T. McMullin . . .

In the same report, Ligon (1920) stated that:

> . . .a few hides were stolen under circumstances that it would be unfair to expect the hunter to return them . . .

Ligon didn't bring it out in the report, but

when hides were stolen, the PARC trap often went with them.

Working alone and in remote wildernesses, most of the trappers of the day were also veterans of Indian "problems", and were a hardy breed. Such theft for a trap was taken no more lightly than that of horse stealing.

Fur handling had other ramifications: rabies, tularemia, plague. The subject will be dealt with in the section under "Controls".

Mange was an occasional factor. During the fiscal year ending June 30, 1927, one Mexican wolf got into the Baboquivaris. He had hair in wisps and only on his head, neck and tail. The back, neck and top of his head were black from the sun, and were scabby and cracked. He was the fourth wolf recorded in that (southern) part of the state so badly aflicted with the disease. One such wolf was entirely bare, and was burned black from the sun. (Figure 17).

Mercer (1937) recorded the incident of one female--"Old One-Toe's" mate--found several years after her death, lying in deep chapparel just a few yards off a well-defined wolf run. Due to protracted mild weather, the fur and guard hairs on her upper, exposed, side were still almost intact, although her lower parts,

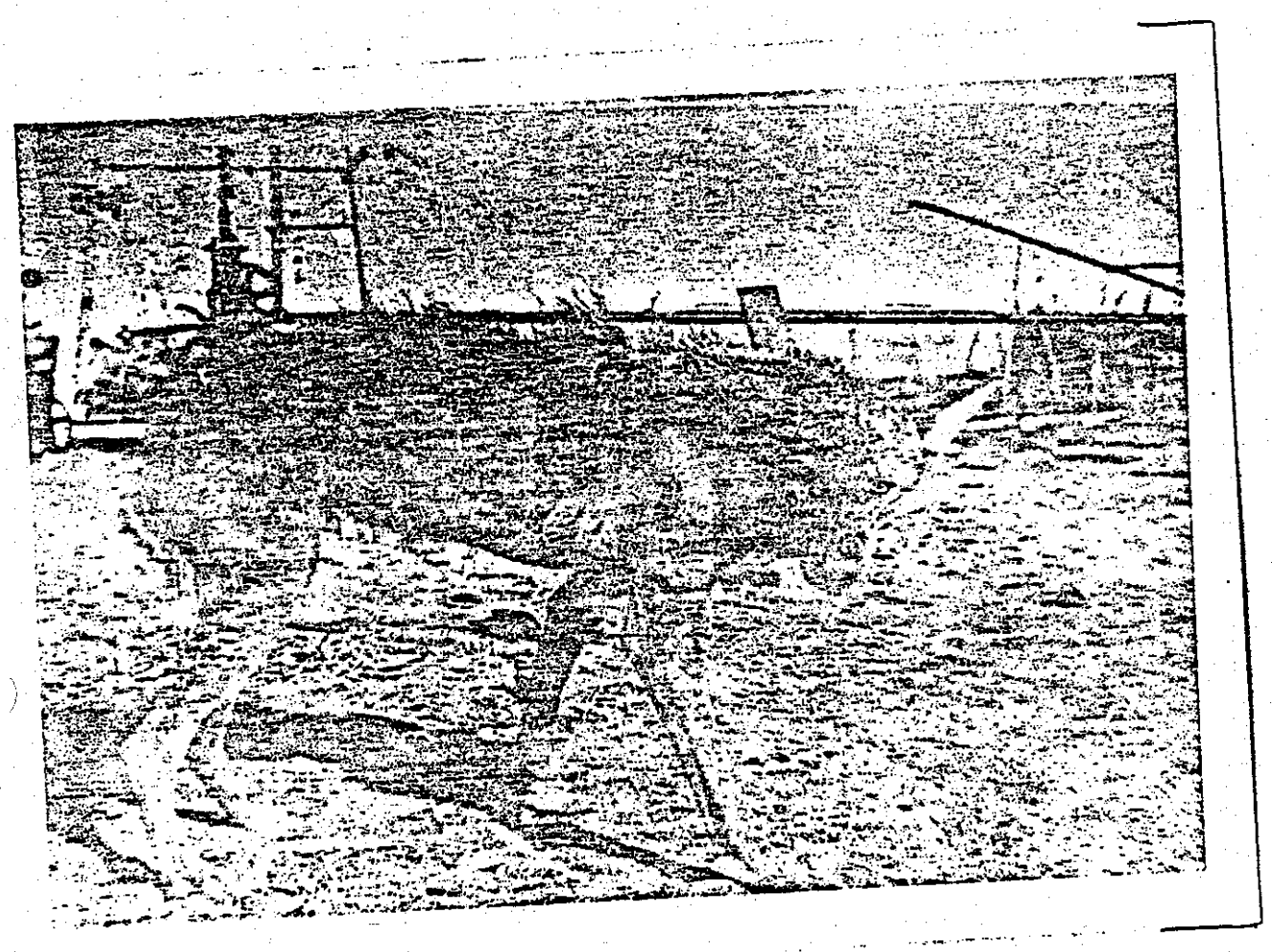


Figure 17: Coyote with severe mange, captured near Arivaca, Arizona, November 7, 1927. Occasionally wolves were captured that were nearly bald from this disease.

Reproduced from a snapshot by J. Stokley Ligon by Robert Zubia, Arizona State University. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

next to the soil, were dissolved by rot and insects.

In 1930 Musgrave was replaced by his assistant, Donald A. Gilchrist. Gilchrist's first annual report (1930) reported 14 wolves taken, their scalps turned into the PARC office. No record shows what happened to the furs.

The year 1932 was marked by severe cutbacks in PARC operating funds. People were out of work, cattle prices dropped to the bottom, furs weren't worth the catching. (Foster, 1932).

But rises in fur prices in 1937 re-stimulated the private trapping industry. Again, trap thieves and fur thieves plagued the hard-put PARC field personnel. (Mercer, 1937).

Fur prices plunged again two years later. (Mercer, 1939). Discouraged, most private trappers ceased operations early in the season.

In 1941, fur prices rose again, and considerably more private trappers entered the field than for six years.

Again, there was a marked increase in the number of traps and furs stolen from the PARC trap lines.

Under "Expenditures and Receipts--1918", Ligon (1918) listed:

Expenditures--salaries of hunters	$21, 802.44
Receipts--sale of furs, St. Louis, Mo.--May 14, 1918:	4, 026.40
Net expense:	$17, 776.04

Although not so designated, percentage wise, as to receipts, the hunter force took 81 adult wolves and 30 pups, which may or may not have been included under "Sales of Furs".

For the period February 6 to June 30, 1918, the New Mexico College of Agriculture and Mechanic Arts (Cooperating), had expenses listed:

Expenses:	$3,320.59
Receipts--sale of furs at Auction June 29 at Albuquerque:	298.00
Net Expense:	$3,022.59

The College take of predators included 12 wolves.

A total of 123 wolves were taken by the combined Arizona-New Mexico and cooperating agencies forces during the fiscal year ending June 30, 1918.

For Arizona only, (Musgrave, 1919), listed operational expenses for the period October 1, 1918, to June 30, 1918 as:

Government Expenditures (not including Inspector's salary, poison and equipment shipped from Washington, and clerk's salary):	$12,576.01
State Expenditures:	12,463.63

Musgrave added that the "state expense does not include $1,241.10 for the sale of state furs which was also expended."

The report includes 32 wolves taken by government and state hunters. Table 3 of the report, which purports to show the contents of stomachs of "destructive

predatory animals taken", is, unfortunately, missing.

In 1920, 64 wolves were taken by government and State hunters. Government expenditures for the year are listed at $13,628.46. State expenditures are listed at $17,840.60, from which is deducted $4,232.90 for sale of "State Furs". Special work entitled MESA DESERT COYOTE FUND, shows under "Amounts Paid In", receipts of $60.00 for sale of 12 coyote furs. (Musgrave, 1920). As usual, wolf furs were not listed separately.

The following year, sale of state furs brought $278.95 (Musgrave, 1921). From a total catch of 1409 major predatory animals and 1470 lesser fur bearers, 37 wolves were caught.

In 1922 (Musgrave, Annual Report), a total of 1703 major predators were caught, and 1731 lesser fur-bearers were taken. From the sale of marketable furs, revenues of $1,390.00 were received. Classified as "Major Predators" were bears, bobcats, coyotes, foxes, mountain lions, wild dogs and wolves. Fifty-eight wolves were caught. The "Lesser Rodents and Furbearers" included badgers, ringtail cats, raccoons, skunks and porcupines. (It is remarkable that few coati-mundis were ever listed among animals taken in control operations.)

The annual PARC report for Arizona for the fiscal year ending June 30, 1923, lists 37 wolves taken. It does not include a report of fur sales for the year. (Musgrave, 1923).

Twenty nine wolves were taken in Arizona during the fiscal year 1923-24 (Musgrave, 1924). A total of 1262 major predators (833 coyotes) and 1311 lesser furbearers and rodents were caught. Sale of furs shows $1,026.50. It was the year of the Aguila Wolf capture by C. E. Gillham, with hundreds of amateur trappers in the field.

In 1925 (Musgrave, Annual Report), 31 adult wolves were captured out of a total of 1353 major and 1383 lesser predators and furbearers. Sale of furs was not listed.

The 1926 report did not list sale of furs. (Musgrave, 1926). Eighteen wolves were taken, of the 1501 major predators and 1,541 lesser animals caught. During the remainder of his period of supervision of the PARC in Arizona, Musgrave discontinued the report of fur sales. The figure did not appear again.

Also notable by omission was Table 9, Stomach Contents of Predatory Animals Taken, from all of Musgrave's reports. The page has been removed from the files of each Annual Report.

In Table 13, "Disposition of Skins and Scalps", fiscal year ending June 30, 1930 (Gilchrist, 1930), the annual PARC report lists one wolf skin sold, but does not indicate the amount received for it. The skins of two wolves caught in August, 1929, by hunter William A. Knibbe, are reported as "specimens" donated to the California Institute of Technology.

In passing, it should be noted that on March 1, 1930, a die was made to mark lion hides to deter bootlegging of the 1200 Arizona lion hides taken in this state for the combined bounty of $125.00 each then being paid by San Diego County and the State of California. Hide dealers at the time were paying from $2.00 to $15.00 per lion hide.

Depression ran deep in Arizona in 1930-31 (Foster, Annual Report). Foster lists 600 skins sold by the government and 210 sold by the state. Revenues were listed at $359.50 from the sale of "Cooperative Skins".

The following year was little different - economic depression remained severe. Foster (1932) listed 234 government (federal) skins (unclassified) sold for $352.60, and 174 "State" skins sold for $251.75, which probably includes the eight wolves taken by PARC. Ben Foster's report added this comment:

> Improved methods for caring for (mostly lion) skins have been developed. They are salted and drained in the field for at least four days, then sent into the (Phoenix) office, where they are opened, scraped and re-salted.
>
> Fur stretchers have been provided for all hunters so that a uniform product will go on the market."

In 1933, (Foster, Annual Report), 301 "government" skins were sold for $285.55, and 422 "State" skins brought $304.20. For some unexplained reason, Foster pencilled marginal notations both on "Number of Skins Sold" and "Revenue" tables: "Do not use". He added:

> The practice instigated by Regional Supervisor Gilchrist of having uniform stretchers worked very satisfactory, and a neat, uniform display greatly aided in their sale in Albuquerque. Prices of pelts were the lowest this year ever experienced."

Three wolves were taken by federal hunters and one was taken by a state hunter that year.

And three more wolves were taken in Arizona during the fiscal year ending June 30, 1934 (Foster, Annual Report). Two were taken by federal hunters, one by a state hunter. Government skins (not classified) numbering 115, brought $163.25. One hundred sixty-six state skins brought $227.30. It is assumed that the three wolf skins taken were included in these totals.

It was the beginning of the end of designations in the Arizona District annual reports where the economic

effects of wolf-pelt sales might have some bearing. Seldom had any of the reports segregated the actual cash value of a wolf pelt - only that so many wolves were caught and so many total skins (probably mostly coyote and lion) sold and the total receipts listed.

Cash value of wolf pelts, then, were apparently of small consequence other than to the individual private trappers, of which there were never very many.

And one must keep in mind that in the entire history of federally-supervised predatory control, commencing in 1915, the grand total of all wolves taken in Arizona did not exceed 600* individual animals over half a century of time.

The total cash value of those furs could never have been significant.

* Probably less.

Chronological
Economic Effect of Mexican Gray Wolves
on The
Arizona Livestock Industry

Depredation

United States history proves beyond any reasonable doubt that all gray wolves were a major factor in the 456 years of development of the livestock industry on this continent. This is particularly true of western States "open range" areas, and probably even more true of the milder-climate areas of Texas, New Mexico and Arizona, where cattle were on the open range throughout the four seasons of the year. It is true of the Mexican gray "loafer" wolf in Arizona.

We look at the records.

Earliest cattle herds came up into Arizona through the lower San Pedro and Santa Cruz River valleys (Wellman, 1939), and they probably encountered resident gray wolves throughout their journies, and probably also brought an equivalent number of attendant Canis lupus baileyi in the wake of the dust as they drifted northward.

Although wolves as such are seldom mentioned in the early chronicles of the livestock industry - seldom, that is, as a major factor - such records as The Trampling Herd (Wellman, 1939) and many others of

Western and Southwestern history mark the parallel development of the American livestock industry almost hoofprint by hoofprint - and the two, wolves and cattle, cannot be separated.

The fact is that half-wild early range cattle - Andalusians - Cimarrones - Longhorns - were about as able as most large wild animals to fight off wolves, or run, as circumstances dictated. Those abandoned by Hernando Cortez became as self-sufficient in the wild as any buffalo-bison. Perhaps more so.

It was the introduction of pure-bred Durhams, Herefords, Angus and later blood-line refinements that made long-yearling range "calves" the choice of southwestern gray wolves.

Ben Foster (1930) observed that this was probaby because:

> ... domestic livestock was easier (for wolves) to catch (than natural, wild prey). (Figure 18).

In any event it was the introduction of pure-bred domestic cattle breeds and the onset of World War I with its suddenly-accelerated demand and higher prices for beef that prompted the United States Congress to create the Bureau of Biological Survey in 1915. Within less than a decade later, western wolves had been virtually extirminated. The wolves' time had come.

Figure 18: Private predator hunter Bill Casto with remains of three calves killed by wolves on the Fort Apache Indian Reservation - 1930. Wolves ate only small portions of these kills - coyotes, ravens and buzzards probably finished the rest.

Reproduced from an old Mercer snapshot by Robert Zubia, Arizona State University. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

Again, that record is documented:

> Wolves (Ligon, 1918) are the most destructive animals ... that preys almost exclusively on cattle."

As earlier cited, Goswick (1913) reported that:

> "Dead cattle lay everywhere."

Casto (1911) working a small cow spread as a joint venture with relatives, was bankrupted while trail-herding his first marketable beeves to railhead at Magdalena, New Mexico. Many small cow outfits went under the same way.

At a conference in Albuquerque on November 1, 1917, Ligon (Annual Reports) presented an estimate of " . . . damage to the livestock industry by wolves, mountain lions, big bears, coyotes, bobcats and wild dogs during 1916" as:

Cattle: . . .	24,350 . . .	$1,374,000.
Sheep: . . .	165,000 . . .	1,320,000.
Horses: . . .	850 . . .	21,250.
		$2,715,000.

Figures in the millions were not easily baited about in 1917, but the practice of estimating livestock "damages" by predatory animals in large dollar figures quickly became common practice. The philosophy is understandable: predatory animal control work cost money for supervision, clerical and field operational salaries and for equipment and materiel.

It is relative information that the United States (Internal Revenue Service) tax per capita rose from $3.83 in 1914 to $35.38 in 1918. (U. S. Internal Revenues: 1866-1967. R-D Almanac and Yearbook, 1969).

In the joint two-state Bureau of Biological Survey work during its first year in Arizona-New Mexico, funds were budgeted at $20,000.00. There had to be not only justification for spending that kind of money in 1916 - there had to be results. So "damage" estimates became a standard table in annual PARC reports.

In his Summary Report of Operations With the New Mexico State Council of Defense, February 6, 1918, to December 31, 1919, Ligon stated that:

> "From a commercial standpoint, the gray wolf has no rival as a destroyer of livestock."

But, in the same report, Ligon also estimated that: (since November 1, 1917):

> " . . . depredations by wolves have been reduced three fourths . . ."

In that same report (Ligon, 1919) he also listed a net operating outlay by the State (New Mexico) of $31,676.77, for which:

> . . . there have been killed 112 of our most destructive animals - gray wolves, mountain lions and bears - mostly adults - and 3,101 coyotes and bobcats. On the basis of estimates widely accepted on the destructiveness of these animals,

> the annual saving represented in livestock and poultry is $265,000.00.

In other words, for an expenditure of $31,676.77, there was a "saving" of $265,000. - a net of over $230,000.00. It was this kind of fiscal reporting and accounting that was presented to the Congress, state legislatures, and "cooperating" livestock associations and Indian reservations that took the original annual budget of the Arizona-New Mexico PARC from $20,000.00 per year in 1916 to a total of $219,777.00 in Arizona (alone) for the fiscal year ending June 30, 1964. (Donahoo, 1964).

During which time, the wolves were extirminated.

Ligon (1919) added:

> During the same period, Government paid hunters in the state destroyed 1491 predatory animals including 97 wolves, 38 lions and 15 bear, saving on the same basis, to livestock and poultry, $260,000.

For the previous year (1918), Ligon's joint Arizona- New Mexico reports estimated $100,000.00 "damages" to livestock (essentially cattle) in <u>New Mexico</u> for the year, adding:

> . . . for Arizona, I can probably do no better than apply the same figures . . . I feel that it is a conservative estimate to state the the losses of

> all classes of livestock in the two states during the last twelve months was about 2½-million dollars, although officials of the Cattle and Sheep Grower Associations place the loss at a much higher figure.

In the same report (1918), Ligon repeated his estimates of $100.000.00 "damage" done by lobo wolves during the preceding year:

> . . . more than half this amount was confined to New Mexico - or about $60,000.00. This is against about $300,000.00 annual damage in the state (New Mexico) at the time government operations (1916) were instituted.

Also: " . . . wolves feed on cattle almost entirely."

But he also charged (Ligon, 1918) that in the region:

> . . . west of the Rio Grande and south of the coast line of the Sante Fe Railway tracks, lions are still rather common, and the resulting damage to cattle in this region alone was probably 1,500 head the past year.

In the same report (Ligon, 1918), the Arizona-New Mexico Inspector further stated that bears (grizzlies) killed many cattle in both states.

> . . . while cattle are the animals usually killed by grizzlies and the larger black and brown (?) bears, it developes beyond any doubt, that all kill domestic stock under certain conditions.

Thus, from the written record, wolves didn't do all the cattle killing.

In fact, the reports of Ligon and others (Musgrave, Gilchrist, Foster, Mercer) indicate that "calves" are also killed by coyotes, bobcats and eagles, plus an occasional jaguar.

In 1919 (Musgrave, Annual Report), 445 stockmen and farmers reported in writing the loss of more than $378,151.00 in livestock during the fiscal year. Others reported a loss of from 2% to 10% of their calf, colt and lamb crops. The new Arizona Inspector stated:

> . . . as the total livestock crop of this state is estimated at $79,928,000.00, the annual loss (at 2%) would be $1,598,560.00 due to predatory animals.

Cost of control operations for that same year included $12,576.01 in federal appropriations and $12,463.63 in state funds. Thirty two wolves were taken in the total of 2,316 predatory animals of all classifications taken during the year.

The fiscal year ending June 30, 1920, was a turning point for gray wolves in Arizona. All but a scattered few of the resident Canis lupus youngi and C. l. mogollonensis had been destroyed.

It should be noted that under the State (Arizona)

law known as Chapter 41, Section 1, Session Laws of 1919, state funds were appropriated to be expended in amounts equal to those of the federal government spent on predatory animal control work in the state (Musgrave, 1920)

It was also held by the Attorney General that the monies derived from the sale of "State Furs" could lawfully be used over and above such amounts as would even up to the total federal expenditures.

Losses remained heavy (Musgrave, 1920), but the losses of cattle was less:

> due to wolves and lions, over the preceding year, by at least 30% or 40%.

The Inspector did not attempt to estimate damage to livestock in dollars and cents, as before. Sixty four wolves were killed in Arizona. Fiscal year cost of operations totalled:

Government	$13,628.46
State	17,840.60
Sale - State Furs . . .	4,232.90
Net State	$13,617.70

Thirty seven wolves were taken by PARC cooperative forces during the year 1921 (Musgrave, Annual Report). Dollars and cents damage estimates to livestock were not listed for the year. The annual report did specifically refer to the 'famous" Spring Valley

Wolf, eventually poisoned by PARC hunter Fred Willis - a wolf that: ". . . destroys annually between $2,000. and $2,500. worth of livestock (Musgrave, 1921).

The so-called "Spring Valley Wolf" was actually two wolves that ranged, sometimes together, more often separately, from the Grand Canyon to Kindrick Mountain, for four or five years. The darker-hued and younger of the two wolves was killed by a rancher by the name of Saunderson. The second of the Spring Valley wolves, older and almost white, was poisoned by Willis while hunting coyotes (Musgrave, 1921).

Fifty eight wolves were destroyed in Arizona in 1922 (Musgrave, Annual Report). Cost of operations, federal and state, totalled $30,285.13, but again, no estimate was made as to livestock losses by predators.

A total of 3,821 destructive predatory animals were taken during the year, 1922.

Of the thirty two wolves taken during the fiscal year 1923, fourteen were poisoned. Various stockmen reported that six or eight more wolves were killed by poison and the carcasses later found on their ranges (Musgrave, Annual Report).

A careful survey was conducted among livestock operators over the state during the 1923 fiscal year, by which Musgrave estimated that:

> . . . about one half of one percent of all range livestock were killed by predatory animals. This would give us a total loss in the State (Arizona) of $201,230.00 - or approximately 12½% of the estimated total loss (by Ligon) during the fiscal year, 1918. Accepting these estimated figures, (See Ligon, 1918 and Mercer, 1948) we have cut down the loss in livestock during the past four years approximately 87½ percent.

Thinking strongly in terms of man-hour dollars, Musgrave also made a strong pitch to expand poisoning operations. Approximately 13,411,200 acres of grazing land were placed under the poison program during the year 1923. Total cost of operations was $15,458.53 in federal funds and $14,999.69 in state allocations.

A total of 1,546 major predators were destroyed.

Twenty nine wolves were taken in 1924. Total cost of control operations were:

Government	$15,611.04
State	14,995.00
State Fur Sales . .	1,026.50
State - Net Total	$13,968.50

It was also the year of the now-infamous Aguila Wolf, eventually poisoned by Charlie Gillham.

No livestock damage estimate totals were listed that year, but Musgrave did point out that the big livestock operators in "Old Aguila's" territory claimed losses of over $25,000.00 during his eight-year reign.

Musgrave's 1924 annual report also mentioned an old border lobo eventually captured by hunter Ira Sheley near Arivaca that had been said to have been raiding U. S. cattle off-and-on for at least five years.

In May, Musgrave personally killed a female wolf within thirty yards of rancher A. B. Carey's front door:

> I feel confident that she drifted in from Mexico - one foot was entirely gone - and it is possible that this is the wolf caught (and lost) by Lee Parker two years back.

It is also noteworthy that the 1924 annual report includes an account of calves being killed in the Chiricahua Mountains. PARC hunter, William Knibbe, investigated the complaints and found that the killings were being made by eagles (Musgrave, 1924):

> . . . Mr. Knibbe killed seventeen golden eagles that he actually found working on young calves.

The 1924 report also included an account of six feral dogs that were found ranging wild in the Canelo Hills district west of the Huachucas:

> . . . after poisoning the dogs, we found that they had (all) belonged to men living at Fort Huachuca, but would travel out as far as twelve or fifteen miles and killed calves and pigs.

Many dogs of that time were employed as "catch dogs" to work out wild cattle in rough thickets:

> . . . occasionally these dogs turn killers, and it is necessary for us to destroy them.

And it was also the same year that five bears about forty miles north of Clifton were found to be slaughtering cattle. Later, one old female bear with two yearling cubs was caught in the act of killing cattle and was destroyed:

> She tried to teach her cubs how to kill, but all they could do was claw and bite some calves until they were a bloody mess and probably died later. (Gish, personal notes from Casto and Jess Burke, Beaverhead, Arizona).

A pair of old-time trappers and frontiersmen, George and Jim Wiggins, south of Winslow, poisoned fourteen lions, seventeen coyotes and three bobcats that year. Nearby in December, pioneer J. L. Fredericks found where a mountain lion had killed a grown horse weighing about 800 pounds, and had dragged the carcass a considerable distance into a steep canyon under a juniper tree. Mountain lions congregated in the area in great numbers that winter until the old Indian-fighters, George and Jim Wiggins, cut them down.

Thirty one wolves were taken during the following year (Musgrave, 1925):

All of the thirty one wolves were taken by Charlie Gillham, the captor of Old Aguila.

Musgrave reported:

> . . . at the end of the last fiscal year, we made the statement that there were six adult wolves left in the state. Our men caught four wolves that were indigenous to the state and six that drifted in from outside. (An additional) twenty one wolves were taken along the border that were migrating north into the United States from Old Mexico.

A number of half-breed wolf-dogs were killed along the New Mexico-Arizona line by Eddie Anderson and W. B. Ramsel.

No damage estimates were given. Operational costs for the year were:

Government	$15,393.19
State	14,998.92

and a total of 1,353 predators of all classifications were taken. One hundred twenty seven mountains lions are included in that total.

Of the 1,501 large predators destroyed in 1926, eighteen were wolves (Musgrave, Annual Report):

> The fiscal year 1926 has been a banner year . . . this year marks the end of the lobo wolf for there are no more wolves left inside the borders of our state.

But, like Mark Twain's obituary, the claim was premature. Wolves would continue to drift into the state from New Mexico and Old Mexico for at least another four decades.

The 1926 Annual Report included a letter from Henry Boice, manager of the huge Chiricahua Cattle Company along the Black River, traditional wolf range, that claimed:

> . . . there are no indications of wolves drifting through our range . . . at the present time.

Predatory animal control operations for the year are listed at:

Government funds	$16,115.26
State funds	15,000.00

Of the total of 1,525 major predators taken in the fiscal year 1927 (Musgrave, Annual Report), sixteen were gray wolves. Operational costs were:

Government funds	$16,876.35
State funds	14,996.43

Thirteen million acres of grazing land were treated with poison.

Several wolves drifted onto the Double Circle range from New Mexico during the year. The assortment of wolf reports indicated that six wolves may have come down the Black River.

The veteran J. J. Tucker left his cattle-tending duties long enough to catch two wolves on the Double Circle.

Twelve more wolves were caught along the Mexican

border wolf runs and as far north as the Rincon Mountains near Tucson. Damage figures were not listed, but most of the wolves were caught quickly enough after they crossed the border that they could not have caused much damage - damage claims were slight.

One jaguar was killed that year by poison put into a horse carcass by hunter Fred Ott. It was the largest of three taken in the state to date (on record).

Musgrave's report (1927) also listed one hundred twelve mountain lions taken during the year "that would have meant a loss of 5,824 livestock or deer". Wolf damage in dollars and cents was not listed.

In 1928, (Musgrave, Annual Report), 1,643 major predators were taken by the cooperative hunting force. Five were wolves. Operational expenditures are listed as:

Government funds $19,631.71
State funds 14,998.19

And ten million acreas of grazing lands were treated with poison for predatory animal control.

Three wolves were reported to have crossed into Arizona from Old Mexico, and four crossed from New Mexico. There were no claims of wolf kills among livestock during the period. J. J. Tucker caught the four wolves that had crossed from New Mexico and showed up

on Double Circle range. One of the Old Mexico wolves got into a trap set by Fred Ott.

It was again a year of considerable livestock losses to mountain lions (Musgrave, 1928 Annual Report). There were claims of more than 150 sheep killed by lions. And:

> To the best of our knowledge there is one large grizzly left in the state. This animal ranges from the New Mexico line around Blue, Arizona, over into the White Mountains south and east of McNary.

Nine bears were killed during the year because of depredations upon livestock.

The following year, one wolf was caught by the PARC hunting force (Musgrave, 1929 Annual Report). Several hunters were assigned to investigate specific wolf reports. In late September (1928), Musgrave personally visited the Guadalupe Canyon district east of Douglas, Arizona, where at least one wolf had been coming through from Mexico for about four years. Hunter A. S. Field was assigned to set traps on every pass on that range of mountains and leave them set until he caught the wolf.

In December, Field found the wolf in one of his traps. Later, he caught a second wolf in one of the traps that got away, leaving two toes in the trap.

Livestock losses to wolves were negligible.

Federal payroll hunters worked a total of 2,944 man-days that year, taking 975 major predators (including forty three mountain lions), for a salary expenditure of $12,966.68. State hunters totalled 3069 man-days, captured 872 major predators (one hundred and two lions and one wolf), for total salary expenditures of $11,571.66. Ten million acres of grazing lands were "treated" with poison. (Raw strychnine sulphate and one-grain alkaloid tablets.)

Seventeen gray wolves were destroyed in 1930 (Gilchrist, Annual Report). Thirteen of the wolves were taken by federal hunters, one by a state hunter, and three wolves are estimated (Gilchrist) as being poisoned but the carcasses not located. Such estimates are based upon evidence of poison baits being picked up where wolf tracks indicate that they were probably taken up by wolves. Of the fourteen wolf carcasses actually accounted for, twelve were poisoned and two were caught in steel traps.

Seven wolves were caught in Pima County (Santa Rita range) and four in Santa Cruz County (Ruby-Baboquivari range) - all by PARC hunter William Knibbe. Knibbe caught five of the wolves in one night.

Hunter Al Fields took two wolves in Cochise County, and George Logan caught one in Coconino County.

The wolves caught by Knibbe and Fields were taken soon after they crossed into the state, and the damage to livestock was slight.

One pack of wolves was reported to be ranging the Double Circle range along the Black River-Malay Gap area that PARC hunters were unable to catch up with (Gilchrist, 1930):

> They are doing a great deal of killing.

It was the same year of national concern over exploding deer populations on the famous North Kaibab National Forest (and Grand Canyon National Game Preserve).

Table # 5 of the Annual Report for 1931 (Foster) lists under "Estimated Losses Caused by Predatory Animals for the Fiscal Year, 1931" as:

> $270,350.00 total ($57,600. for cattle) based on present livestock values.

It should be pointed out that the total damages Foster estimated a loss of colts at $2,000. (probably to mountain lions), and $100,000. in "game".

The 1931 report lists "a few stray wolves . . . from Mexico. One wolf was finally caught along the Black River, and hunter William Knibbe trapped another old wolf that had:

> . . . taken a heavy toll of cattle on this side of the Mexican line ...

And hunter E. E. Anderson took another wolf in a blind set.

Taking the three wolves effected a saving, Foster claimed, of $1,800. And this against a saving, according to Foster's estimates (1931) totalling $196,250. for all other major predators for the year.

Foster's Depredation Tables (1931) show that wolves killed twenty "calves", one deer and one antelope during 1931.

Considering the depressed national economy, the following statements are significant (Foster, 1931):

> . . . although the cost-per-animal (caught) may seem somewhat high, consideration must be given the fact that our efforts are confined to the control of predators on those areas only where their depredations to livestock and game are of sufficient economic importance to justify their removal . . . Present funds will not permit us to extend our operations to aid <u>all</u> who call for our assistance.

Foster was soon to have operational fund shortages even more critical than in 1931.

As to wolves, Foster was pledged by fact and tradition to maintain as best he could, the Border Patrol against marauding Mexican (<u>baileyi</u>) wolves, both on the southern and eastern borders of the state.

Eight wolves were captured in Arizona during the fiscal year, 1932 (Foster, Annual Report). The PARC

District supervisor was able, somehow, to add one more man to his 1932 Border Patrol. Total expenditures for salaries, including field men, totalled $33,043.53.

Estimated losses caused by predatory animals came to $243,000., including $45,000. in cattle. Numbers of wild and domestic animals "known" to have been killed by predators included forty three calves, two chickens, four deer and four steers killed by wolves during the year.

Salaries for the year, including field men, for the year ending June 30, 1933, totalled $31,136.87. Other operational costs came to $3,916.58. (Foster, Annual Report).

Four wolves were taken - three by federal men and one by a state hunter. Estimated losses for the year due to predators is listed at $222,510. and $45,836.00 of this figure is in cattle.

Wolves are blamed for the killing of fifteen calves and two adult cattle and four sheep during the year. An additional fifty four calves are listed as killed during the year with no cause given.

A total of 3,111 predators of all classifications were tallied for the year:

> Four wolves were taken, and while not many, represent a great deal of work by trained men (Foster, 1933).

Three wolves were destroyed the following year (Foster, 1934). Two were caught by federal hunters - one by a state man under PARC supervision. Total operating revenues were reduced to a total of $20,588.19 ($17,469.52 for salaries). The number of predatory animal hunters in the field was cut to an average of three per month.

> Predatory animal work in Arizona faced the most crucial period in the history of the work . . . Due to the shortage of funds . . . we could not maintain the air-tight patrol (against wolves) which we formerly kept on the border of Mexico.

Estimated (Foster) total losses caused by predators during the year came to $296,500., including $60,000. losses in cattle. The total figure includes $150,000. losses of "game animals".

Wolves are specifically charged with killing six calves and eight adult cows on the range. Fifty three calves are listed as killed, cause unknown.

A total of 2,790 predatory animals of all classifications were tallied for the year.

Operating funds for 1935 increased slightly (Foster, Annual Report) to $29,683.13.

Foster managed to have an average of four hunters (federal) in the field each month. The State of Arizona employed ten hunters under PARC supervision.

Seven wolves were caught - two by federal men and five by the state trappers. A total of 3,857 predators of all classifications was taken, and one additional wolf (totalling eight) was taken by a "private cooperator" with a trap furnished by the PARC.

No damage or loss reports were included in 1935, but:

> Several wolves made their way into Arizona the past year, causing considerable damage. All were caught soon after their presence was noted.

Arizona District PARC operating funds for 1936 (Foster, Annual Report), totalled $33,798.23, and in addition to regular State of Arizona contributions of $9,981.55, $2,383.55 was available from a "Governor's" 15% Luxury Tax fund.

Ten federal and ten state hunters were in the field.

Five wolves were taken during the year. No specific (dollars-and-cents) estimates of damages were given. But there were:

> Several reports of wolves drifting in across the border, but in each instance we have been successful in taking the wolves and keeping damage to a minimum.

Assistant District Agent Harry P. Williams (1936-1937), spent several days of hard riding in the vicinity of the Pinal Ranch between Superior and Miami, investigating a "wolf" report that turned out to be a lioness

and her three cubs.

Along with the five wolves, a total of 3,674 predators were taken by the cooperative hunting force during the year. The total included 3,007 coyotes, 553 bobcats and ninety two lions.

Arizona District PARC operating funds for 1937 (Mercer, Annual Report), totalled $30,725.17. This included $9,988.95 in regular legislative appropriation and $1,640.00 from (Governor Sydney P. Moeur's) 15% Luxury Tax funds.

Five wolves were taken in steel, leg-hold traps during the year. Two were caught in Cochise County and three in Santa Cruz County. All, of course, were Mexican lobos. The Cochise wolves were caught in the Chiricahuas and Peloncillos, the Santa Cruz wolves in the Ruby-Baboquivari district, and both traditional baileyi wolf runs.

PARC field men specifically charged the wolves with killing eight calves and four deer. (Mercer, 1937). The four deer listed were probably whitetail (Odocoileus couesi).

It is interesting to note that feral house cats were charged by PARC field men with killing nine lambs during the year 1937.

A total of 4,179 major predators were taken, including the five wolves and seventy nine mountain lions.

For PARC work in Arizona during the fiscal ending June 30, 1938, a total of $27,629.81 was expended. (Mercer, Annual Report).

The combined hunting force took a total of 2,344 destructive predators of all classifications. Non-supervised "cooperators" took another 397 bobcats and coyotes. Three adult wolves were caught in steel traps and in the month of March, six unborn wolf pups were destroyed (the average of unborn wolf pups taken by PARC hunters in Arizona is five - Mercer - Gish notes).

PARC hunters personally verified that wolves killed four calves and two steers during the year. Other (reliable) sources charged wolves with killing one adult cow and two steers.

> Only three wolves were taken during the year. One of these . . . was taken on the Black River in Greenlee County (Double Circle range), while two were taken in the Peloncillo Mountains in the extreme southeastern part of the state in Cochise County . . . one pair of wolves running in the Baboquivari and Santa Rita Mountains near the Mexican border, killed about twenty head of cattle during the months of May and June. A hunter was detailed on June 1, . . . and had not been successful . . . at the close of the fiscal year. (Mercer, 1938)

Total operating funds from all sources of $30,385.30, made it possible to maintain a hunting

force of from twelve to eighteen fieldmen throughout most of the year 1939 (Mercer, Annual Report).

Full-time hunters accounted for a total of 3,321 major predators, and non-supervised "cooperators" took another 902 coyotes and bobcats, for a total of 4,223.

Eight wolves were taken - all captured in the No. 14 Newhouse steel, leg-hold traps.

> Wolves frequently entered the state from Mexico and were responsible for serious depredations on cattle . . . on one occasion it is known that eight of the animals (wolves) were operating in Santa Cruz and Pima counties at the same time. Reports indicated that these wolves killed more than fifty head of cattle. During the fourth quarter, a single pair of wolves . . . in Santa Cruz county . . . killed eighteen head of cattle and seriously injured fourteen more before they were trapped. (Mercer, 1939).

Operating funds for the year 1940 of $33,577.53 allowed the employment of several additional hunters in the field during the year. A total of 5,385 major predators were taken, including five wolves trapped by state hunters. (Mercer, Annual Report).

Wolves frequently entered the state from Mexico and were unusually troublesome northwest of Nogales.

Two, and occasionally three, hunters, were kept in the border country throughout the year. Most invading wolves made a kill or two and quickly returned to Mexico:

> One old "Peg-leg" lobo (Mercer wrote) . . . in the vicinity of Arivaca . . . was taken in January (1940). . . local stockmen reported that this wolf killed no less than nineteen cattle during the past one-and-one-half years.
>
> . . . A pack of wolves depredating on cattle in the extreme southeastern corner of the state . . . and southwestern New Mexico, were taken by a trapper employed by the New Mexico district.

A severe drouth created special problems in livestock "damage" -- bears became increasingly troublesome during the year (1940).

Only one wolf was taken during the year 1941. (Mercer, Annual Report). A total of 4,245 other predators were accounted for by the PARC forces. The single wolf was trapped in July near Green's Peak in Apache County.

A number of wolf complaints from along the Mexican border country were found to be depredations committed by coyotes and feral dogs.

Verifiable reports of wolf depredations on cattle were virtually non-existant in 1941.

Wolf damage, in spite of numerous complaints, was slight during 1942 (Mercer, Annual Report). The United States was at war.

One wolf that entered Arizona southwest of Nogales was reported to have killed two 350-pound yearlings before returning safely to Mexico.

One young wolf (two years old) that had travelled over 224 miles from point of entry into the state, was trapped near Limestone Point, about forty miles southwest of Winslow, Arizona. He left no record of livestock damage.

Locals reported in April that several lobos were at work in the Huachuca range, and it was soon discovered by the PARC hunter assigned to the complaints (Casto), that a pair of wolves had denned - an event that had become rare in Arizona - and had raised a litter of pups on the western slopes of the Huachucas. Casto trapped the male and killed the pups. The bitch escaped - probably back into nearby Mexico. The "sign" indicated that the wolves had been subsisting principally on the local whitetail deer, but had also: "killed a goodly number of cattle". (Casto, 1942).

A project was entered into that year with the local National Youth Administration to make several hundred steel trap drags at a cost of a little more than 10¢ per drag. Commercially made trap drags had been costing from 82¢ to $1.22 apiece.

Five wolves were killed in Arizona during the fiscal year ending June 30, 1943 (Mercer, Annual Report). One of the five wolves is known to have killed five calves and one deer before it was captured. The other wolves appeared to have not been in the state very long,

as no livestock losses are attributable to them. The available evidence (sign) indicated that the four had been living on whitetail deer in the Huachuca and Chiricahua Mountains where they were found.

Five more wolves were caught during the fiscal year 1944 (Mercer, Annual Report).

Transportation problems for the hunting force had become a critical matter, especially in maintaining the Border Patrol against wolf raids.

One such wolf worked his way up from the Mexican border as far north as the Pinal Mountains in southern Gila County, where stockmen claimed it had killed two calves and several deer. The PARC hunter assigned to the area trapped this wolf soon after it appeared.

A pair of wolves killed at least three calves in Cochise county. They were quickly trapped.

Another wolf ranging in Pima and Santa Cruz counties was trapped in June after it, too, had killed several calves.

Another pair of wolves were variously reported as ranging in the Baboquivaris, and several PARC hunters worked far into the Fort Apache Indian Reservation in search of a "pack" of wolves reported to be killing in that area. Those wolves had not been located at the end of the fiscal year reporting period.

Fifty six stock-killing mountain lions and twenty six "predatory" bears were also taken by the PARC hunting force during the year.

Total PARC expenditures for the war-year 1944 amounted to $49,752.10.

Another five wolves were taken in Arizona during the fiscal year 1944-45 (Mercer, Annual Report). All five were caught by traps.

Personnel problems had become acute - partly because of the low salary scale and also because of near-impossible transportation shortages. Only five hunters worked full time during the year.

Rabies, which had flared in southern counties (all along the border), appeared on a greater scale in 1945. Five head of ID cattle died of rabies on the vast San Carlos Indian Reservation. Dr. Ralph Bogart, an employee of the Indian Service, was severely bitten by a rabid coyote. Many domestic animals were affected, including more than twenty five head of cattle.

All five wolves taken in Arizona during 1945 had entered from Mexico, across the severe rabies areas. One of the wolves was captured in Cochise county, three in Pima county, and one on the San Carlos Reservation where rabies had been rampant for more than two years.

One very old wolf with blunted teeth and grayed

muzzle, trapped later, was reported to have killed several calves in southern Pima county and Santa Cruz county, but the other four were all the typical restless young Mexican loafer border crossers, had not been in the state very long, and appeared to have been subsisting mostly on deer.

A sixth wolf ranging in the Chiricahuas was trapped by a local stockman.

And wolf reports continued to come in from the Ft. Apache Indian Reservation. It was traditional wolf range - sprawling and extremely rough country. Careful checks failed to turn up any significantly-recent sign of these wolves.

By 1946, the rabies epidemic had spread to Yuma county on the west - no one knew how far north it might go. Three wolves were taken during the year (Mercer, Annual Report)

There were reports of wolves along the border on several occasions, but no serious losses of livestock. Wolves were few, and rabies raged the land. One large wolf was killed by "lethal bait" in Cochise county during January. A total of thirty calves were reported killed by wolves by "reliable sources" during the year.

Two wolves were caught in steel traps on the

San Carlos Reservation in the spring months. Two more wolves were believed to be ranging on the Fort Apache Reservation. On June 1, a PARC hunter investigated reports of wolves in the Baboquivaris. After three weeks of searching, the hunter learned that two wolves had been trapped earlier by a stockman in Bear Valley, south of Ruby, Arizona.

Ranchers reported that several wolves entered the state from Old Mexico and committed depredations on livestock during 1947 (Mercer, Annual Report).

A lion hunter trapped a wolf in April and another one in August in the Graham Mountains. Another wolf was killed by a cyanide "Coyote Getter" in the Santa Ritas during May.

Reports of wolves, with some substantial evidence to back them up, continued to come in from both the Fort Apache and San Carlos Reservations, but the wolves were ranging over a wide area.

At the end of the year (June, 1947), two wolves were reported killing calves in the Arivaca district, southern Pima county.

Specifically verified losses to wolves included one wild turkey noted by a PARC hunter and another wild turkey killed as reported by "reliable sources".

The three wolves taken during the year were in addition to 5,846 other major predators destroyed.

Forty six bears were trapped and fifty eight caught by dog packs. Forty six mountain lions were taken.

The annual report for the Arizona District for 1948 (Mercer), includes an excellent summary of the entire livestock-predator economic relationship in Arizona, commencing with the 1919 Annual Report by Inspector Mark E. Musgrave, who estimated that losses in 1919 would be $1,600,000. per annum - or 2% of the total livestock crop of the state, valued at $80,000,000.

In the perspective of the approximately three decades, Mercer suggests that subsequent surveys by the Bureau of Agricultural Economics in other states serve to substantiate Musgrave's 1919 prognosis, even though the picture for 1948 was entirely different from that of 1919.

Mercer's 1948 report and economic summary - too detailed to be included here - should serve as a text-book on predator-livestock economics. It is one of the most comprehensive documents on the history and status of predatory animal control policy in the Southwest.

By the mid-1920's, the once million-dollar losses of livestock to <u>resident</u> wolves had been shrunken to a hit-and-run tactic of a very few widely scattered individual predators.

By 1948, only the barest trickle of migrant lobos from Old Mexico remained, and their over-all dollars-and-cents effect on the agricultural economy had become insignificant.

A total of twelve wolves were taken in Arizona during the 1948 fiscal year (Mercer, Annual Report). And for the first time in many years, an Arizona state bounty of $50.00 per wolf was paid on eight gray wolves. Four were taken by private hunters in Santa Cruz county, two in Pima county, one in Graham county, and one in Cochise county.

PARC hunters accounted for four wolves. Hunter Douglas Fanning (later killed by lightning near Big Lake in Arizona's White Mountains), caught two of the four wolves - one on the C. B. Carrington range near Sonoita and the other on the Keith S. Brown range in the Santa Ritas.

Several wolves apparently entered the state during the 1949 fiscal year (Mercer, Annual Report), and took a toll of livestock along the border country. One wolf was taken by a PARC-supervised hunter with a cyanide "Coyoye Getter" in the Santa Catalinas near Tucson during July.

Four other wolves were taken by bounty hunters during the year.

A PARC hunter verified that a wolf killed an adult range cow. (Location not given).

Another wolf milemarker was passed in 1950:

> The fiscal year has passed without a single wolf being recorded by the cooperative hunting force. This has never happened before. (Mercer, Annual Report, 1950).

But two wolves were reported ranging in western Graham county in December, 1949. And another wolf was seen during spring in the Huachuca Mountains.

A stockman on the east side of the Dragoon range in Cochise county reported that a wolf killed a calf on his range on November 9.

These are the only wolf reports in Arizona during the year.

Two wolves killed several cattle near Canille (Mercer, Annual Report, 1951). One was caught on August 10, the other on August 23, 1950. Local ranchers claimed losses of twelve head of cattle to these wolves. There were a few other reports of wolves during the year, but no additonal livestock losses were claimed.

Two wolves were taken in Arizona the following year (Mercer, 1952). One was trapped in the Galiuros on April 3. A wolf made a kill (prey unidentified in the report) in nearby Graham Mountains in June.

Another wolf killed a calf southwest of Concho in

Apache county. The carcass was laced with several "lethal" strychnine baits, and the wolf's body was found next morning within a yard of the calf's carcass. Rancher John D. Leverton said this wolf had no mate, and that it had been killing an: "average of two calves a week for the past year" within a fifty mile range.

No wolves were taken by PARC personnel during 1953 (Mercer, Annual Report). One fast-moving lobo from Old Mexico killed a calf near Arivaca, and a private trapper took another wolf in the Graham Mountains and collected the $50.00 bounty.

Merely by way of comparison with early and depression-year Arizona PARC operating funds, the total for 1953 amounted to $70,894.41.

1954: No wolves taken. No bounties paid out. Rabies widespread. (Mercer, Annual Report).

1955:

> Only two wolves are reported to have crossed the border during the year. No wolf bounties paid. No livestock damage reports. Rabies remain widespread. (Mercer, Annual Report).

1956: A recent sign of a wolf was found on the Papago Indian Reservation. Indians report that wolves are taking a heavy toll of cattle in Mexico, south of the Reservation. (Mercer, Annual Report.)

A wolf is reported to have fed from a "lethal station" (1080) in Cochise County.

On the night of December 15, 1955, PARC agent Harvey C. Day heard a wolf howl in the Gu Vo district at the southwestern corner of the Papago Indian Reservation. Indians reported that wolves were killing cattle in that vicinity.

George Peterson, Nogales, saw a wolf feeding on a freshly-killed calf near Arivaca.

There were various reports of migrant Mexican wolves along the border country in 1957 (Mercer, Annual Report). One wolf was seen by a cowboy and a deer-kill found on the Dubois Ranch in the Winchester Mountains, Graham county. Another deer was killed, apparently by a wolf, on the Dee Jernigan Ranch about twenty-five miles south of the Dubois range.

And a cowboy on the Cane Ranch, Mule Mountains, Cochise county, rode up on a pair of wolves that had just killed a calf. He shot at and believed that he had hit one of the wolves.

No wolves were taken by PARC fieldmen and no wolf bounty was paid out during the year.

1958: Two wolves were killed by cyanide "Coyote Getters" - one in July near Elgin, the other near Redington in August.

No other wolf or damage reports during the year, and no wolf bounties paid (Mercer, 1958, Annual Report).

1959: No wolves were taken by PARC forces. No bounties were paid out on wolves. One male wolf (with evidence of some dog ancestry) was trapped alive by vaquero Raymundo Topas on the Bob Kane Ranch in Peck Canyon, Santa Cruz County. The wolf was donated alive to the Arizona-Sonora Desert Museum, Tucson. (Nogales Daily HERALD, June 3, 1959).

1960: A wolf was reported on the Fort Apache Indian Reservation and later seen by a stockman just outside the Reservation. One male wolf was trapped by PARC hunter Russell Culbreath, March 28, 1960, in the Reservation's western "Grasshopper" district. (Mercer, Annual Report).

A second wolf for the year was killed by a cyanide "Coyote Getter" on Feburary 5, 1960, just northwest of the Nogales airport.

A wolf was reported, but not located, on Kindrick Mountain, Coconino (Flagstaff) county.

A Sonora rancher (Morales), a few miles southeast of Nogales, reported that wolves had killed twenty-six head of his cattle that year.

1961: One wolf was killed by a Coyote Getter gun on the Vaca Ranch in Red Rock Canyon, Santa Cruz

county, on May 2, 1961. (Mercer, Annual Report).

The Arizona Livestock Sanitary Board paid a bounty of $75.00 for a wolf trapped on the Schilling Ranch, north of Willcox. Schilling reported that the wolf had recently killed three calves.

Unsubstantiated "wolf damage" on calves was reported north of Young, Gila County. (Mercer, 1961).

1963: Three wolves taken during the year by PARC forces. One was killed by a cyanide gun in Pinal County, and one wolf was trapped and another shot in Mojave county. (Myers, 1963).

Rabies flared, centered on the Fort Apache Indian Reservation.

1964: No wolves taken during the year (Donahoo, Annual Report).

The day of the Mexican gray wolf as an economic force in Arizona had ended, one year shy of a half-century after it began with J. Stokley Ligon on September 15, 1915.

The effect - economic and social - of resident and migrant gray wolves on the history of Arizona had been a significant chapter, and one of the most dramatic of our time.

CONTROLS

Methods

Historically, wolves have been controlled by a wide series of methods and devices limited only to what man could think of to remove a wolf from his natural circumstances, but natural factors and internecine warfare cannot be overlooked in considering wolf controls.

Socially, wolves are strongly territorial - - the dominant pair in the family "pack" is the key to wolf survival. Many wolves have been killed by the inflexible laws of the pecking order, and this was no less true in the southwestern United States when young wolves (especially males) were literally forced out of the marginal food supply family pack territory by the successive litter. There were historically no large herds of classical-wolf large prey animals such as the plains buffalo and sub-arctic caribou, for example, in the far-southwestern states and in Old Mexico. Nor could the Sierra Madre Occidental be considered heavily populated with deer in modern times.

Bounty systems for wolf control date back (in the U. S.) to the Massachusetts Bay Colonies (circa 1620). Individual and livestock association bounties became common in the old west.

Previously cited is the instance of the $50.00

per wolf bounty paid to Giles Goswick (1913). Casto (1909) worked most of his life as a private bounty hunter for wolves, bears and mountain lions throughout southwestern United States and Old Mexico.

Also previously cited is the enactment of the 1893 Territorial Bounty Act by the joint New Mexico-Arizona Territorial Legislature.

Traditionally, early Southwestern fur trappers carried arsenic in their kits, and the lacing of skinned-out beaver carcasses with poison to kill down wolves and lessen depredations upon trapped beaver furs was common practice. Among other supplies, arsenic was standard "trade" goods in the forts from Sante Fe to the rendesvous at Three Forks, Montana Territory.

Later wolf hunters of this century drifted more into the use of strychnine in a variety of forms. As a derivative of the nux vomica bean, strychnine came into wide use as a canicide and is still a standby in predatory animal control. Its effect on Mexican lobos in Arizona during the 1920's was catastrophic. (Musgrave, Gilchrist, Foster, et al), although since supplanted by the newer chemical controls: cyanide, thallium sulphate and sodium fluoroacetate (1080),

Wolves have also been subjected to elaborate pitfall traps on the Mexican and southwestern U. S. ranges. (Young-Goldman, 1944).

Economically, the major physical problem in lobo-wolf control has been the one-man to one-wolf factor presented by the steel, leg-hold trap of tradition - however effective it was - and is.

Wolf traps come in several sizes and types, more-or-less according to agency policy and/or the individual preference of the trapper. The author was witness on many occasions to the half-serious running argument between Casto and Gillham concerning the relative effectiveness of the Number 14 Newhouse versus Charlie Gillham's "jump" traps.

Wolf traps in the Arizona District as supplied by The Bureau and available from the Arizona Hardware (O. S. Stapley) Supply in Phoenix, consisted of the Number 4 Newhouse, the Number 4½ Newhouse, and the size-type most generally warehoused by the PARC in Arizona - the Number 14 Newhouse. (See Figure 19).

For any practical purpose the essential differences in these traps was in the spread of the jaws and the set and configuration of the jaws and the springs. The Number 4 had the smallest jaw-spread - 6½ inches. The Number 14 had an eight inch spread with offset, "toothed" jaws. The Number 4½ had a spread of eight and three-fourths inches.

Other varieties of steel traps (some of them hand forged), included double-jaws, double and single

Figure 19: A proud, professional hunter, Louis C. Cox, displays his array of equipment. Fish & Wildlife Service photo by Ken Shake - Prescott. From the E. M. Mercer collection. Loaned by Mrs. Helen Mercer.

Figure 19

"leaf" springs, and coil-spring traps. Casto charged the use of the "jump" trap with creating most of the many legendary "one-toed" and "three-legged" wolves down through history. "And some "no-nose" wolves, too."

Of such opinions, prejudices and biases are legends fabricated.

Casto (1966) insisted that he never bothered to "bait" a wolf trap - " . . . only <u>where</u> I set it. I want to get a wolf to step automatically into the trap <u>before</u> he has time to think about the bait." (Fig. 20).

Casto believed that most wolves are too smart and too instinctively cunning to allow them "time to think". (See Figures 21 and 22).

Wolf-scent "posts", however, were the most important factor, other than the trap, in wolf trapping, and "social" scents were and are used in some form by most trappers. The wolf (coyote) scent recipe of Albert P. Rhodes (1940) was basic, with variations of it used by most wolf hunters (Personal notes of author):

> Take eight coyote glands (or wolf)
> ¼ liver with gall
> 1 kidney
> black coyote or wolf dung (black from eating meat diet)
>
> Grind glands, liver with gall, and kidney place in glass jar, screw lid on but do <u>not</u> seal air tight. Let stand in a warm place until well rotted. Then dissolve black dung in warm water

Figure 20: This wolf, taken in Sycamore Canyon, Arizona, was caught in a double-set - probably the first trap nipped the forefoot, then the wolf stepped into the second trap while fighting the first.

Reproduced by Robert Zubia, Arizona State University, from an old snapshot by J. Stokley Ligon. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

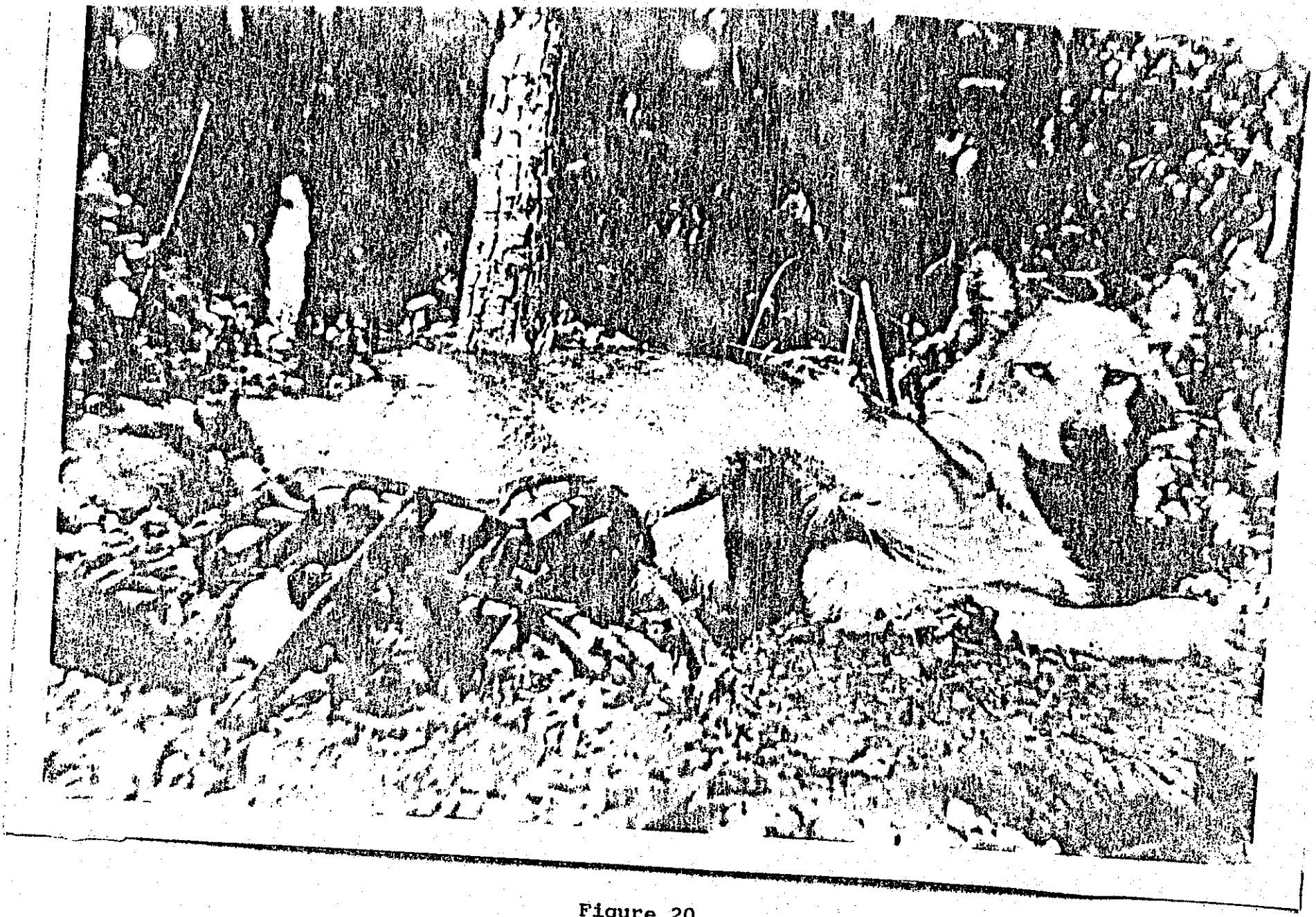


Figure 20

Figure 21 (above) and Figure 22 (below), demonstrating the location and setting of trap just off game trail and one step from scent post at butt of fallen tree and wisps of shrub-grass. Fish & Wildlife Service photo by SMC Cartographic Section, Concho, Oklahoma - 1957. From Collection of E. M. Mercer. Loaned by Mrs. Helen Mercer.

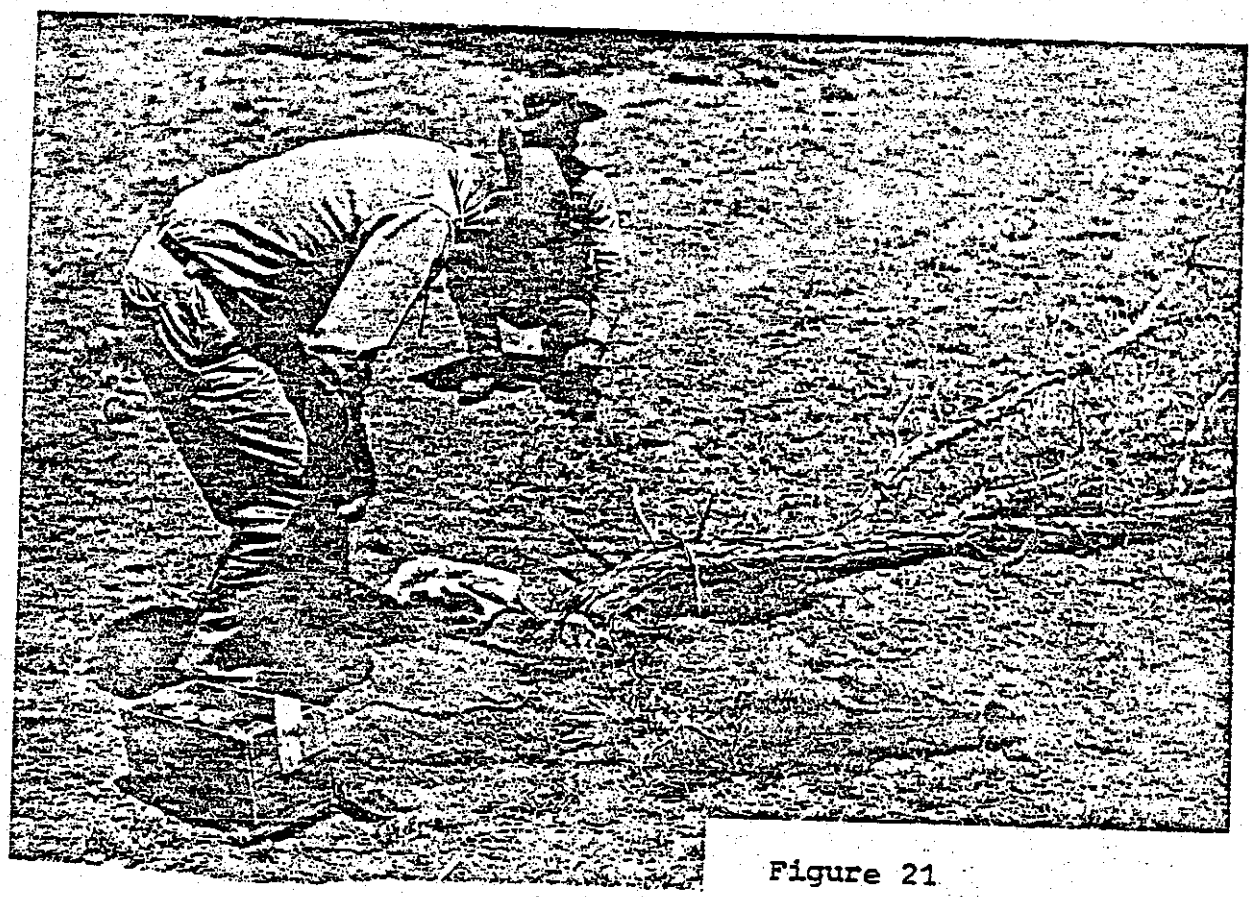


Figure 21

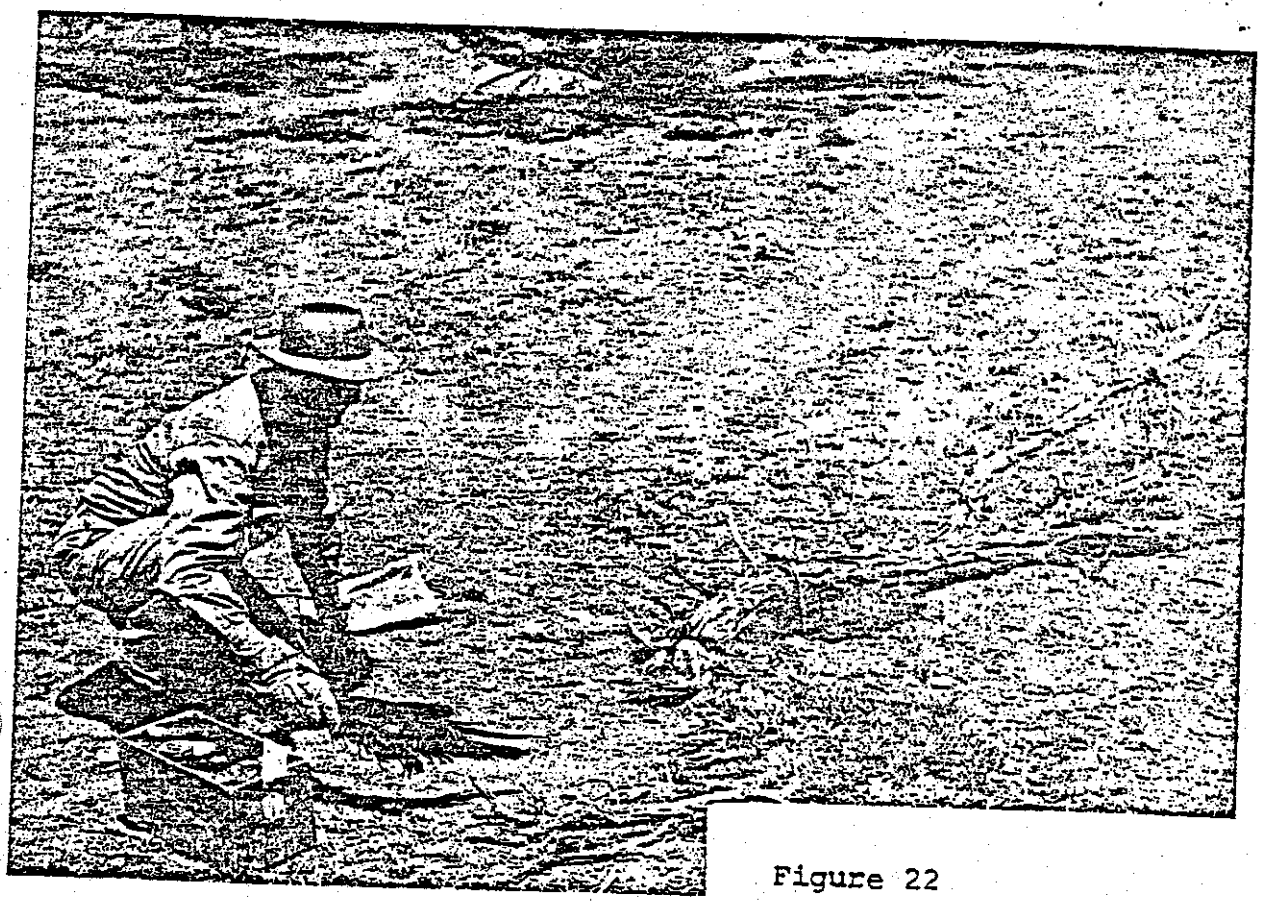


Figure 22

> and add two ounces of the well-rotted glands. Then it is ready for use. Scent trap every five days. Substitute wolf dung for coyote and wolf urine for the warm water if available.
>
> Mr. Williams says (Harry P. Williams - Custer Wolf) that coyote or wolf urine mixed with the dung is better than warm water. Also, in preparing the bait, be sure never to let flies blow the mixture. This always spoils it.
>
> (5) Albert P. Rhodes

Rhodes adds:

> Glands will be found as follows: one in each hind leg on back side of leg just above the hock joint. Two glands will be found near the center of the stomach just under the skin - one gland under each shoulder, and one on each side of neck.

Rhodes also had a recipe for preparing lion and bobcat scent baits - all of which he also used for coyotes as well.

Another wolf hunter (personal notes of author) of high repute and success gave his formula for wolf scent bait, requesting that his name and home state not be used. His formula in his own language follows:

> Take all parts of the wolf or coyote that is not flesh: interals (internals); kurnals (sic); glands; tongue; windpipe; lungs; eyeballs; brains; spinal column and pads of feet and one-fourth pint of wolf or coyote gall. Put this mixture in a five-gallon container, adding three gallons of

> warm water. Cork tight and let set three days in a warm place. Wrap an old blanket or quilt around container at night if weather is cool, to prevent chilling. Loosen cork each morning to release gas pressure. It is ready to use the fourth day.
>
> Now, use a gallon jug for mixing one-half pint of the base mixture, 25 drops of spirits of asafetida (use eye dropper), 2 drops of anise oil, 2 drops of Tonquin musk (grain), 20 drops of Canton musk. Put this mixture in a gallon jug and fill the jug with dog, coyote or wolf urine. When using, do not use more than 20 drops at any one time and not oftener than three times a week.
>
> I have caught as many as three coyotes in one set before rebaiting. This bait has laid under three feet of snow for 90 days, and when the snow and ground thawed, catches (wolves) were made just the same as before the snow fell.
>
> If this (formula) is published, please do not mention any names or state.

Scent posts for locating steel traps was usually determined by the trapper from typical dog-like scratch marks in the soil adjacent to a bush, stump and the like used by wolves to urine-mark territorial boundaries. (Fig. 21 & 22).

The standard techniques for using steel traps in wolf control is detailed by Stanley P. Young (Young-Goldman 1944) (pages 303-310), and need not be repeated here.

All Southwestern trappers known to the author had wolf trapping methods and variations of their own and the author has attended and participated in numerous predatory animal control "conferences" (Mercer, 1947), almost invariably held in some remote wilderness area for about a week's duration, at which all District and other fieldmen and administrators participate. (Figures 23 & 24). (Figures 25 & 26).

One of those most amusing aspects of such conferences is the effort by the District Agent to get one or more of his successful veteran trappers to demonstrate his personal trap-setting methods. It was a rare thing that one of the veterans "volunteered". More likely, when the time came, the veteran had a pack mule with a sore back, gear that needed mending, or a trail hound with a split foot.

The author once went on an unscheduled two-day bear hunt with Gyp Cloudt in just such a ruse, and wound up with a gigantic juniper and oak pit-barbecue of bear for all hands.

Needless to say, the innate cunning of wolves - <u>resident</u> pack wolves more so than migrants far from home territories - coupled with the occultic photographic memories and instincts for anything amiss, demanded the maximum of trap-setting skills and techniques.

Figure 23: Number 14 Newhouse trap is set here on well-defined game trail inside frame of sticks (arrow) to "force" wolf to step in trap. Trap set by Hunter Roy Bryant, Snowflake, Arizona.

Figure 24: Trap is set on game trail to left of man's hat (arrow). Long stick is placed to discourage deer and cattle from setting off trap. Trap set by Roy Bryant.

Both photos reprocessed by Robert Zubia, Arizona State University from snapshots by E. M. Mercer. From E. M. Mercer collection - loaned by Mrs. Helen Mercer.

Figure 24

Figure 23

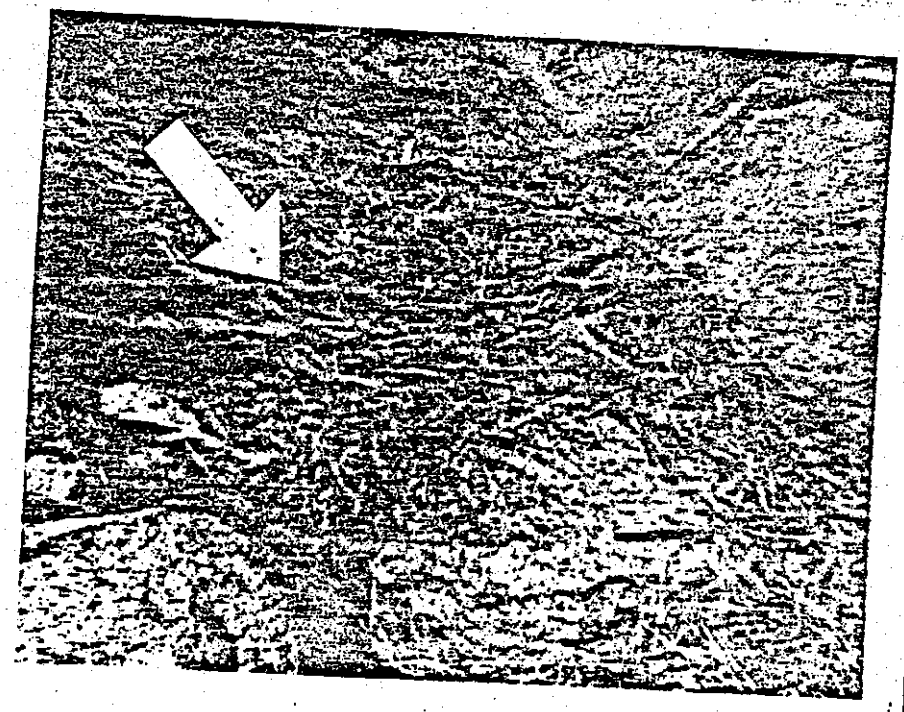


Figure 25: This trap is set among cluster of football-sized granite boulders that are wolf scent posts, positioned so wolf must step in trap when using scent post.

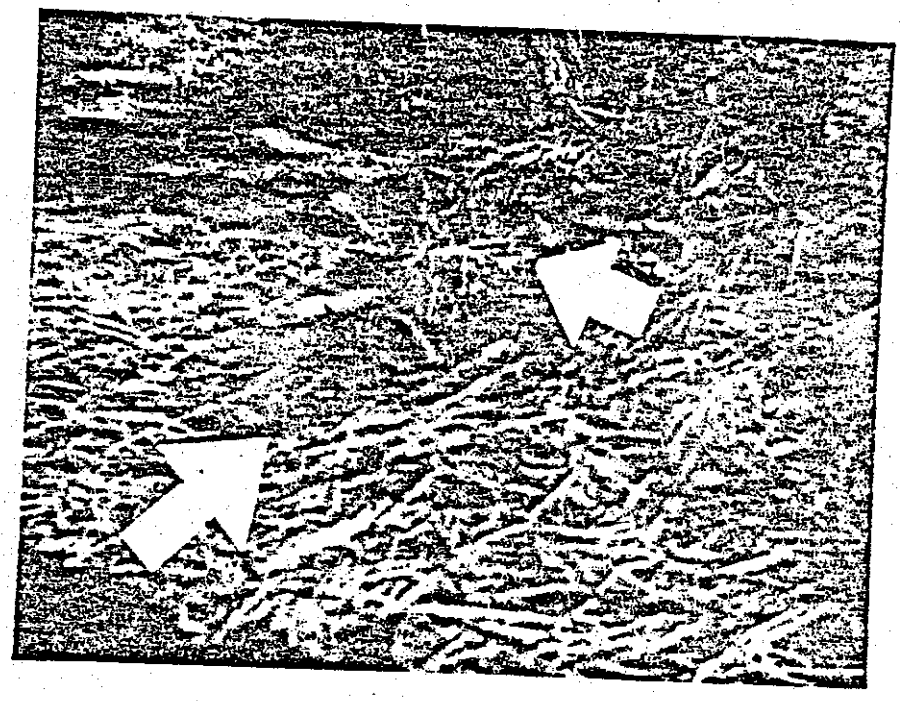


Figure 26: # 14 trap is set inside stick barrier within a step of scent post at base of tree (upper right arrow). Lower left arrow points to set trap.

Both photos reprocessed by Robert Zubia, Arizona State University from snapshots by E. M. Mercer. From E. M. Mercer collection - loaned by Mrs. Helen Mercer.

It became more organized, if more critical, that more uniform procedures be taught and pursued in the use of the variety of chemical control compounds that gradually came into widespread use against wolves and other predators in Arizona.

The term "canicide" is proper, as well as the more recent semanticism, "lethal bait". In any terminology, from the early day trapper's vial of arsenic to the more sophisticated variations of the nux vomica bean extracts in alkaloid or sulphate form, a succession of chemical compound canicides have been and are increasingly effective against predatory canids.

In the hey-day of wolf slaughter, circa 1916-1928, three distinct varieties of strychnine were employed in Arizona, particularly by "lacing" carcasses of prey animals that wolves were known or suspected of killing. Substantial wolf sign was normally evident at such sites. Also, wolf kills are unlike the kills of lions and bears and can be identified as such, in that bears maul their kill, and most lions will hide or attempt to hide their kills. Too, lion kills are often made by smothering and breaking the neck of the prey, whereas wolf kills are most frequently accomplished by pulling the victim down from behind, usually in the flank or rump areas. The author

has never seen a wolf kill made by hamstringing.

Private and government hunters habitually treated recognizable wolf kill carcasses with "raw" strychnine (Musgrave, 1928); the special processed and more-or-less standard one-grain alkaloid tablet (Musgrave, 1921); or the later 2.18 gel-coated tablet (Gilchrist, 1930).

A variety of PARC-approved techniques were evolved through experimentation and consequent directives for the use of each of the strychnine canicides.

Authorization and policies are summarized in a series of PARC directives circulated over the signatures of Director, Albert M. Day, and Dorr D. Green, Chief, Branch of Predator and Rodent Control, in Memorandum number 131, Supplement number 1, United States Fish and Wildlife Service, under date of May 1, 1950, Washington, D. C.

These policies were also endorsed by Memorandum W - 56, also dated May 1, 1950, by (S) Lyle F. Watts, Chief of the United States Forest Service, Department of Agriculture.

A summary of the methods at the district level for the use of poison (strychnine) is detailed in Circular Letter No. 7, Supplement number 3, dated October 10, 1946, including drawings of the methods

to be followed in preparing strychnine "Drop Baits" (S) E. M. Mercer, District Agent, as follows:

Preparation of Poison Baits

Fresh, clean fat from a horse (not rendered fat), flank beef fat, rump fat of a burro or a mule, or mutton fat should be used in preparing poison baits.

Before starting to make baits, the hunter, in order to avoid leaving human scent, should clean his hands thoroughly with soap made from pure vegetable oils (avoiding the use of soap with strong odors such as tar soaps), and then thoroughly grease them (hands) with fat. All baits should be cut, or bait material prepared before poison is put in any of them. Baits should be just large enough to cover the poison cubes (about ½-inch square) and withstand exposure to the weather. It has been found that the best results are obtained by use of small baits.

Personnel are cautioned not to smoke while preparing poison baits. The odor of tobacco is readily transmitted to the fats, and coyotes and wolves are likely to detect the odor of tobacco.

Baits of the following types are suggested for use with strychnine tablets. Under no circumstances should the baits be handled bare-handed. Use a sharp sliver of wood or small tweezers for handling baits.

The directive then gave instructions (see Figure 27 - following page) for preparing Rolled-Fat baits, pit-type baits and Slot baits.

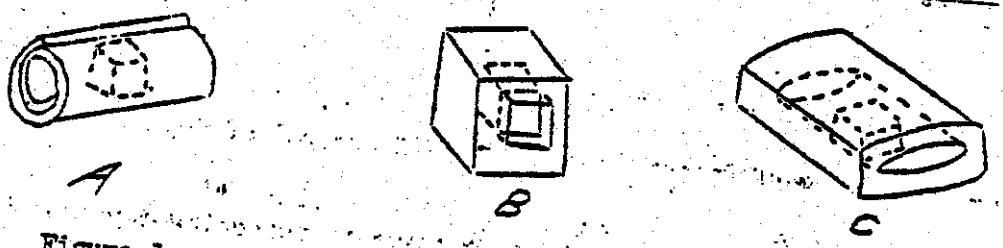


Figure 1.—Standard types of bait: A, rolled-fat bait; B, pit-type bait; C, slot bait

Pressed Ground Fat Baits may be made with a bait press.

Instructions for Making Bait Press

A piece of hardwood approximately 3½ inches wide, 3/4 inch thick, and 12 inches long, and a similar board about 1/2 inch thick for the base, are used to make a bait press. The two boards should be fastened together by means of a small bolt in the center 2½ inches from one end. Ten or 15 holes can be bored through the top board with a 3/4-inch bit. The holes nearest the bolt should be far enough from it to come free of the baseboard when the top board is turned at right angles to the base. Two round plungers should be made of 1-inch hardwood 6 inches long. One of these should be made to fit the holes snugly and extend 1/4 inch through the top board. The other plunger should have a 3/4-inch shoulder fitting snugly 1/4 inch from the shoulder that when inserted in a hole comes to the top of the top board. This plunger should have a tit-like point extending 1/4 inch farther, within 1/4 inch of the bottom of the holes in the top board.

With the pressboard in place to form a bottom for the holes a spoon should be used to fill these holes loosely with one of the soft baits - ground beef suet or mutton tallow. Press this suet solidly into the lower half of the holes with the large plunger, then make depressions in these partly formed baits with the pointed plunger. One poison tablet should be placed into each of these depressions. The remainder of each hole should be filled with soft bait which should then be pressed tightly with the large plunger. The top board should then be moved at right angles to the baseboard and the completed baits punched out with the large plunger.

Figure 27. Photocopy of Circular Letter No. 7, Supplement Number 3 - October 10, 1946. PARC Arizona District. E. M. Mercer, District Agent.

The techniques of preparing strychnine baits seeks to encapsulate the quinine-bitter taste inherent in strychnine within a minimum wrapper of fat or suet so that a feeding canid swallows the bait whole, dog-fashion, and have the morsel gulped down before its own body heat melts the fat and exposes the pill within.

The technique is particularly more effective in cold weather. It was implemented in use by distributing the carefully catalogued and mapped "drop baits" spoke-like out from an unpoisoned section of animal carcass, well wired down with number 9 wire to some solid base to prevent the "station" from being dragged about and scattered. Drop baits were usually concealed from bird (raven) theft by being placed under a cow chip, a small, flat rock or a chip of wood. Canines smelled these out and their natural reaction is to snatch at the food morsel by their cleverness and quickly to gulp it down against a competitive predator. It is most likely that the dominant male or female in any canid group would be the first to pick up a drop bait.

The cubes of strychnine and raw strychnine were also widely used in treating the carcass of any fresh kill in predator ranges.

A more recent canicide poison is the development of the blue-green radio isotope, thallium sulphate. Its actual use, although effective, was soon abandoned in favor of the more lethal and more "selective" monosodium fluoroacetate, more commonly known as 1080.

The original departmental policy directives for field use of the compound 1080 was issued nationally over the signature of Albert M. Day, Director of the PARC under date of August 1, 1949.

Thallium sulphate had already been in use, and the methods were similar.

Compound 1080, originally a rodenticide developed for use by the armed forces against rats, particularly in plague areas of Burma, China and Indo China, was so-named 1080 because of its chronological one thousand and eightieth order in the series of formula experiments of re-adapting the compound as a predator control tool by the U. S. Fish and Wildlife Service laboratories in Denver.

Thus the war-time rodenticide became the peace-time canicide, and became most deadly against the remaining Mexican gray wolves and coyotes of the Southwestern desert states.

Classified as a "highly lethal" agent by Day's

1949 directive, instructions and safety precautions for its use in the field (also applies to the use of thallium sulphate - Mercer, September 12, 1949), in Arizona PARC District Circular Letter No. 36, revised.

In general, preparation of the lethal 1080 station material usually consisted of the selection and killing by shooting (in most cases) in the brain at close range an undesirable wild or aged "broomie" horse, mule or burro. Many of these ran wild on open range and on Indian Reservations during the author's time, in direct forage competition with marketable and breeding livestock. Immediately prior to the killing of the potential station material, a standard * Morton Meat Gun is readied, and as the selected station animal falls, it is deeply injected at various points of the carcass while it remains at body temperatures so that capillary attraction is likely to thoroughly circulate the lethal compound substance throughout the meat of the station animal. (See Figure 28).

If proper techniques are followed, all segments of the treated animal carcass are lethal to canines. This material is then distributed, well anchored to some substantial base to avoid scattering by feeding canines, on a selected predatory canid run.

(* Modified for safety)

Figure 28: The necessary professional skills of the PARC hunter are demonstrated here by Louis Cox - shown preparing lethal (powdered in solution) "1080" compound for injection into the freshly-slaughtered horse or burro meat (left - center). Note modified standard Morton "Meat Gun" on lid of box used in injecting lethal solution.

Fish & Wildlife Service photo by Ken Shake - Prescott. From E. M. Mercer collection. Loaned by Mrs. Helen Mercer.

Figure 28

The dangers to humans of 1080 and thallium sulphate if carelessly handled, is extremely high, and a few serious accidents have occured (Riggs, Arizona, 1949). The dangers of these canicides is equally high to pets and other domestic animals.

Fortunately, 1080 in animal-carcass solutions does dissapate rather well into negligible concentrations under exposure to sun and rain so that, for instance, 1080 solution that would kill a wolf, coyote or fox quickly when consumed as food, seldom has sufficient lethality density to non-canids such as cattle or humans except by direct contact under careless circumstances. This is the factor of selectivity by which laboratory - field mammalian biologists have determined 1080 to be the best canid control chemical available.

There is little doubt, based on Arizona District PARC records, that arsenic, strychnine and both thallium and 1080 killed many Mexico and New Mexico gray border wolves in Arizona during the period from about 1920 through the late 1960's. (See Economics - Depredations).

But perhaps even more effective against the last of the migrant lobos in Arizona and on their resident territories of Old Mexico was the cyanide "Coyote Getter" gun, later to be called the "Humane" Coyote Getter.

Just how "humane" the Getter is is a matter of viewpoint. The author once witnessed the slow dying of a

huge buffalo (Bison bison) herd bull at Raymond Ranch on Anderson Mesa in Coconino county, Arizona about 1950, that had "pulled" a Getter while browsing. The huge beast managed to stagger to a watering pond near the Ranchhouse, where he stood, his nose bobbing deeper and deeper into the water for days until he fell and drowned.

Operational directives and methods of safe handling for the Coyote Getter are set forth in PARC District Circular Letter Number 8 (revised) - (Mercer, October 2, 1961). (See Depredations).

Overly simplified for brevity, the Getter is virtually a small, .38 caliber pistol - an extremely short-barreled firearm with a figure 4 triggering mechanism, that, when pulled by a predator, shoots a cyanide capsule into the mouth or face of the puller. (Figure 29).

In use as witnessed and practiced by the author Getters were usually placed in clusters of about one dozen around a bait station. Getters were equally effective against all predators from foxes to grizzly bears. Members of the feline family, however, present special problems because of their tendency to pull at the Getters with their paws rather than with their teeth.

PARC hunters usually thwarted this misfiring problem by fastening a Getter to a post, tree trunk or

Figure 29: Professional Hunter Louis Cox points to cyanide "Coyote Getter" (in circle) he has just set adjacent to game trail (arrows) near Skull Valley, Arizona.

Fish & Wildlife Service photo by Ken Shake, Prescott. 1959. From E. M. Mercer collection - loaned by Mrs. Helen Mercer.

Figure 29

stump about four feet above the ground, just high enough that cats would rise with front paws against the post or tree, more often than not pulling the Getter with the teeth. (Figure 30).

Most Getters were set and wired to posts or fence wire or to stakes driven into the ground.

Unnaturally naive migrant wolves of the last several decades, far from their homeland territories, -- on the move and far more restless than resident wolves -- all too often lacked the normal and inherent sagacity of earlier resident wolves. As the records prove, many succumbed to strychnine drop baits, to Getters, thallium and 1080 increasingly distributed along the border country and inside Mexico.

Economically, lethal chemical control operations expedited administrative funding problems, especially as man-hour costs rose and during those periods when depression and transportation shortages plagued the PARC.

The utility of a steel trap, even in any feasible numbers, nevertheless required the physical attention of a man in the setting and "running" of each individual trap. One trap could catch no more than one predator at a time - chemical canicides could kill dozens or hundreds with no more man hour expenditures than the setting of a trap line.

Figure 30. Louis Cox demonstrates "Coyote Getter" ready to go. Components and tools are also shown. Fish & Wildlife Service photo - 1959 - by Ken Shake, Prescott. From collection of E. M. Mercer. Loaned by Mrs. Helen Mercer.

Figure 30

Figure 31: J. Ramsay Patterson of the Prescott, Arizona, area, was the first full-time professional predator hunter employed by the Bureau of Biological Survey in the Arizona District.

Patterson was a colorful character, with a pack of trail dogs, and worked principally as a lion and bear hunter.

Reprocessed from a very old snapshot of about 1917 by Robert Zubia, Arizona State University. From the E. M. Mercer collection loaned by Mrs. Helen Mercer.

Figure 31.

Figure 32: E. E. "Eddie" Anderson, Douglas, Arizona, was the first full-time PARC wolf hunter employed by Ligon for the Bureau of Biological Survey in Arizona and New Mexico. Anderson worked both states and was an expert wolfer.

Photo reprocessed by Robert Zubia, Arizona State University, from an old snapshot by Ben E. Foster. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

Figure 32

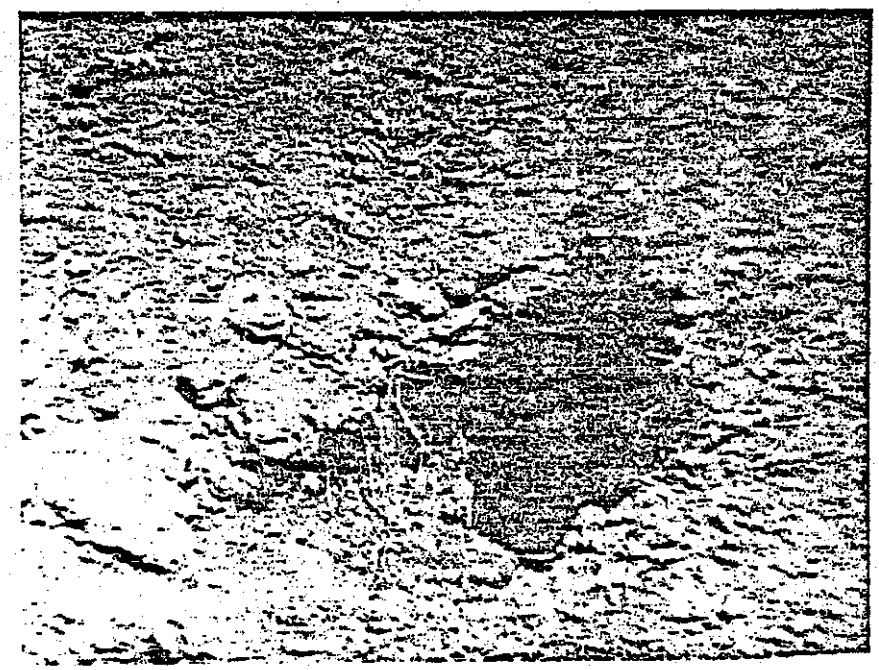


Figure 33: A wolf dug out and ate the prairie dogs that lived here, and then moved into it as a wolf den. Near South Rim of the Grand Canyon.

Photo by Dr. Walter P. Taylor - April 14, 1918.

Photo reprocessed by Robert Zubia, Arizona State University. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

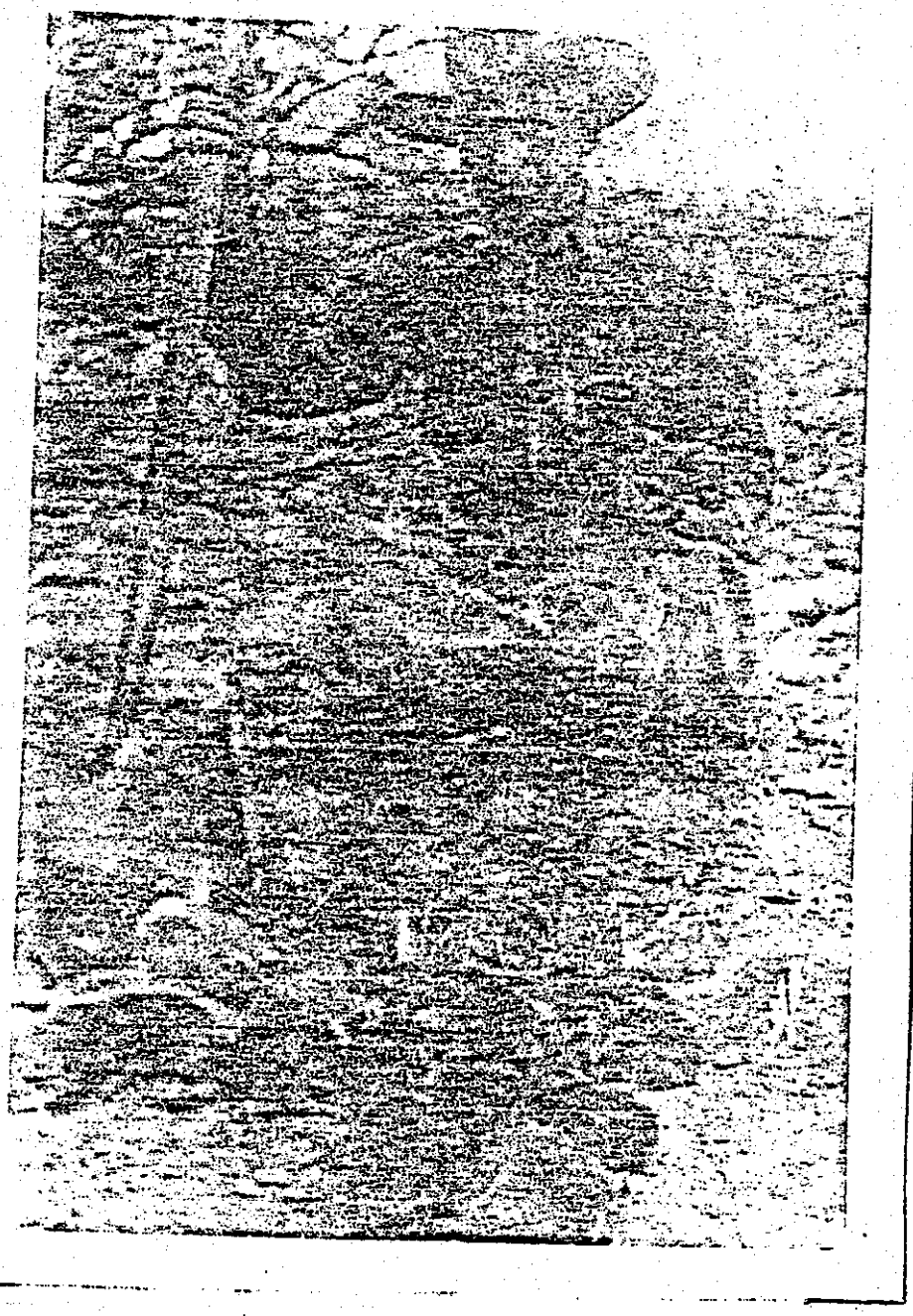


Figure 34: Denning is hard work, and this is an unusually large batch of wolf pups. Not many litters were this large.

Old snapshot reprocessed by Robert Zubia. From the E. M. Mercer collection - loaned by Mrs. Helen Mercer.

Musgrave (1919-1930) was a strong advocate of upgrading the PARC program by supplementing the steel trap operations with poison in taking fast-moving and far-ranging migrant Mexican gray wolves in Arizona.

But as civilization progress advanced into the southwest and remote wildernesses and the open range shrank, Musgrave and Ben Foster after him became more alarmed at the indiscriminate and unsupervised public use in the burgeoning urbanization of Arizona. There was cause to be alarmed - strychnine was available to any one at the corner drug store - no questions asked. And rodents swarmed all over the desert and forests.

Under Foster (1930=1935), the matter became one of urgency and straining public relations (See Depredations).

About 1969, then District Agent Robert V. Shiver came under considerable public fire - undeservedly so - because two PARC personel set Coyote Getters adjacent to a public rest stop alongside a major highway artery in west-central Arizona, causing the death of several pet dogs.

Nevertheless, from the overall economic standpoint, chemical poisons have been an effective tool in the cutting down of livestock losses in Arizona. The records documented in this report substantiate that premise.

It should also be noted that for some years a control method temporarily named "Lethal Smear" was experimented with, particularly on sheep lambing ranges in Arizona. The technique had no bearing of record on wolves.

In the history of predatory animal controls in Arizona, J. Ramsay Patterson of Prescott, was the first PARC hunter employed by Ligon in the Arizona District. (Figure 31).

Eddie (E. E.) Anderson and Jack Hays became among the most effective of the first dozen good wolfers. Hays once caught seventy one wolves, far more than any other hunter, in 768 working days. Ligon pointed out, however, (Annual Report, 1918), that Hays worked an area infested with wolves.

Eddie Anderson, of Douglas, Arizona, was the first full-time wolf hunter to be employed in the Arizona district. (Figure 32.)

Eddie Ligon caught the first PARC wolves in Arizona - three adults in the rugged Fossil Creek region east of Camp Verde.

"Denning" was a specialized technique in wolf control - locating denned pups and destroying them (See photo, Figure 33 and photo, Figure 34.)

For many years, Stanley Young and Harry Williams,

each famous in his own right in wolf history, had a running feud over denning techniques. In his personal letters to the author, Mercer details an incident in which Young tricked the reticent Williams into revealing his personal and secret denning techniques for the general benefit of the Bureau in its training programs. Williams never forgave Young for the ruse.

Casto and J. J. Tucker were experts at denning. Casto's pair of wirehair "tree" dogs could sniff out a wolf den, where a man might never find it.

When Casto's wirehairs sniffed out the wolf den on the west slopes of the Huachucas in April, 1942, it was the first time that any wolves are known to have raised a litter of pups inside the state since 1931.

Wolf denners know that mating among Mexican lobos takes place in February, that gestation lasts sixty-two days, and that the pups are born in late April.

Most PARC hunters were also aware that the labor of locating a wolf den and digging the pups out is hard work, requiring the removal of much earth and rock.

As the records show, early PARC hunters tallied many pups and unborn young wolves, but the art dwindled as resident wolves disappeared.

Some report must also be made of natural mortality among wolves. Undoubtedly, many wolves succumbed to

the socialized internecine warfare of wolves. And there is substantial evidence that female wolves with pups, control the numbers of their litters according to the availability of food (Vorhies and Mercer, unpublished notes, and personal notes of author).

And wolves, although they make a special effort to avoid it, are injured and often enough, killed by the hooves, horns and antlers of their intended prey. The standard method of wolf killing among southwestern lobos (personal notes and observation) - attacking the flanks and rump-tail areas to avoid being kicked by their prey - is a distinction of Bailey wolves, if not of other wolves elsewhere. (See Figure 14 - Page 59).

Undoubtedly, many wolves froze to death and/or starved in times of extreme cold and heavy snows. (Young-Goldman, 1944)

Parasites, too had an effect on wolf health. Young (Young-Goldman, 1944) also lists a variety of wolf parasites: fleas, ticks, lice, tapeworms and a mite-caused mange.

Violent hydrophobic rabies was a common mammal enemy in the Southwest, and there are numerous citations in this report to indicate periods of rabies spreading across the state, with many documentations of verified cases among wild and domestic animals

and humans. Perhaps one of the most awesome of these infectious virus outbreaks concerns the epidemic that ravaged the Keewatin Barrens of Canada and the entire state of Arizona, thousands of miles away, simultaneously in 1946.

In a letter to the author, dated February 7, 1966, Mercer wrote:

> . . . rabies sure had a hand in governing wolf numbers and there seems to be no way it can reduce their numbers below a certain point, and no one knows how that works . . . Also, I do not believe that adult wolves allow their young to get very far from the family circle until they are a year old (greatly reducing their chances of becoming infected with rabies).

During the rabies epidemic of 1946 in Arizona, (Mercer, Annual Report), hundreds of cases are documented of substantiated rabies among coyotes, foxes, bobcats, skunks, domestic cats and dogs, and among livestock. No one will ever know how many of the then scarce Mexican gray wolves also succumbed to rabies during that epidemic.

And no one knows - no record was ever made - of how many Mexican wolves may have been killed by endemic * plague bacilli, Pasteurella pestis, that lies as a constant threat to all potential hosts of the several types of plague-carrying fleas (and possibly ticks) in western United States.

* Enzootic

Wolves are subject to plague. Two Navajo Indian boys contracted plague after skinning a dead coyote that was verified by laboratory analysis to have died from plague (U. S. Center for Disease Control, Fort Collins, Colorado, 1975).

Plague is a possible mortality factor among wolves that has never been explored.

Individual characteristics

It was common practice in the hey-day of wolf history in the west, to create what is properly called "campfire legends" about certain wolves. This became particularly true if public interest could be fanned locally to set private trappers against a wolf, or wolves, that seemed, at least in the telling, to be taking some unusual toll among livestock. As with most rumors, it happened often enough that such tales grew out of all proportion. Young (Young-Goldman, 1944) lists a number of Great Plains and western wolves who, by repuation alone, have come down to us in history. Already listed in this report is the famed Currumpaw Wolf of New Mexico, Arizona's Spring Valley Wolf, and Charlie Gillham's Old Aguila. Others that could be mentioned because of notoriety in their time are also included.

The bitch with her batch of pups that faced Giles Goswick's pack of hunting hounds in October, 1913, has to go down in history, because she appears in the personal memoirs of Goswick, Mercer and others.

Soon after he took office as Arizona District supervisor, Musgrave publicized the Spring Valley Wolf (1921).

They liked to use the term "famous wolf" in those days, like Harry P. Williams' (later Assistant District Agent in Arizona) famed Custer Wolf in the Dakotas.

Musgrave wrote (1921):

> Early in September, Mr. Fred Willis was detailed to the same range (between Williams and the Grand Canyon) and . . . got one of the most famous wolves in the State.

As earlier referred to under "Depredations". this Spring Valley Wolf was actually two wolves. The pair occasionally ran together, but more often separately, from Spring Valley and Kindrick Mountain to the Grand Canyon. It is not likely that either animal was a Mexican lobo (C. l. baileyi), judging from the time and place.

One of the several characteristics of the Spring Valley Wolf, in addition to stock killing (estimated at $2,000. to $2,500. annually), was the habit of: " . . . visting back yards and playing with the ranch dogs".

This same characteristic among wolves is recorded among other wolves and other places. Some wolves were friendly with ranch dogs, others were not.

It should be noted that in his 1921 Annual Report, Musgrave quotes a letter from Fred J. Fritz, pioneer cattleman along the Arizona-New Mexico border country, a long-time President of the Arizona Cattle Grower's Association and also long-time President of the Arizona Senate:

> . . . the dogs owned by Mr. Cleve Miller are equal to those owned by the famous hunter, B. V. Lilly. We have seen both packs at work so know their value and feel positive that Mr. Miller's dogs cannot be surpassed in hunting lions.

The Fritz Ranch lies in the heart of the heaviest infestations of wolves, mountain lions and grizzly bears in Arizona's history, where Cleve Miller also trapped many wolves.

Another notable Arizona wolf is the one taken by PARC hunter George Logan on the South Rim of the Grand Canyon in Prospect Park in 1928. Although Musgrave (1926) had reported two years prematurely that:

> . . . the lobo is a thing of the past in Arizona, for there are no more wolves left inside the borders of the state.

it now seems clear that Logan's is the last known resident wolf of the two subspecies Canis lupus youngi and C. l. mogollonensis to be taken in Arizona (Musgrave, 1928).

From that moment in history, it is logical and biologically sound to assume that all wolves taken in the state subsequent to Logan's catch are C. l. baileyi.

Another wolf of distinction in Arizona is cited in the following (Mercer, 1942):

> During August (1941), a young lobo wolf was taken by a service hunter in a trap set for coyotes at a point known as Limestone Ridge, about 40 miles southwest of Winslow, Arizona.

> This was a male, and about two years old (the average age of most of the Mexican gray lobo wolves migrating north across the border). This wolf had undoubtedly crossed into the state from the Mexican border, a distance of over 225 miles, as wolves had not been reported in the country where this animal had been taken (since 1926).

Every wolf encountered by the PARC hunters was an individual, differing in some way from his kind. The wolves were of different sizes, coloration varied widely, and the very nature of each animal differed from any other.

Mercer firmly believed (personal papers) that all wolves are killers, often killing for the sheer thrill of the chase and the triumph of the climax. "A pair of them," he once wrote (personal papers to author), "could eat up a grizzly if they made up their minds to." (See Fig. 15).

> They do not pick out the sick, aged and crippled prey. Time and again, they'll pass up culls, sick and crippled down on the ground. They love the chase - something big that will run from them. And they love those big, healthy, weaned yearlings that have left their mothers.

Mercer's personal observations, gleaned over a lifetime in the field, bear repeating:

> There was one lobo down along the border near Ruby, that would invariably rip out the flank of a big calf, steer or yearling. Just enough that the bowels came out.

> He always attacked in that same way from the rear and flank, feeding, just a few bites of flank at a time, while following the cripple for a day or so at a time, until it died. Then it would cut out another fat calf and repeated the performance. It never varied.

Casto finally snagged this wolf in a trap, but it left two toes and escaped, and the Ruby wolf always left his distinguishing mark after that - like the single scratch of a ten penny nail, literally pointing directly at each trap set for him.

Phil Clark, a rancher in Santa Cruz county found this peculiar "one-toe" scratch mark and notified PARC trapper, Johnny Ehn. (Figure 8).

Ehn searched around and found old "One Toe's" distinguishing signature mark on top of some cattle tracks in the dust.

Mercer visited the area after Phil Clark's phone call, and noticed some sets that Ehn wasn't mentioning. He suspected that Ehn, on government salary, was secretly trying to bootleg the catch for private bounty ("Something we had to look for all the time")

Ehn admitted that he had been trying to bootleg the catch, but hadn't been able to swing it.

Mercer had with him some Alaska wolf urine in a bottle that Stoke Ligon had sent him from Alaska. Ehn used it to scent his traps.

It took Johnny Ehn several years more to catch old "One Toe" and his mate after they had jumped in and out of Mexico uncounted times. Always, Ehn found the characteristic single-toe scratch mark at his sets where the old fellow would leave his signature, then jump off the hard pan sand and gravel near the trap.

But not many of the raider Mexican wolves were as acute as One Toe. Trapping them was not as difficult as finding their range and getting out ahead of them.

J. J. Tucker, who hunted wolves for many years as a special cowhand for the big Double Circle Ranch on the upper Black River country, knew the wolves' migratory habits and every high pass through which they would travel from one range to the other.

Tucker, Casto, Gillham, Knibbe, and Ehn and others had keen eyes for wolf sign near recent kills in the dust or mud of cattle trails and back roads, and always on the high passes and "military crests" of mountain ranges. Wolves prefer to look down upon surrounding countryside.

Seasoned wolfers can look at a country and walk or ride to the areas where wolves are most likely to pass. Wolves, like coyotes, mountain lions and jaguars, are creatures of habit that will probably pass through the same patch of brush, exiting the same place and entering the same place time after time. Wolves have

photographic memories as to sight and smell. They notice displacement of even the smallest sticks and stones, once they have inspected and made note of what they have recorded.

Based upon fieldmen reports over a period of many years, Mercer wrote (personal notes to author):

> These Mexican wolves of more recent years are funny - the female does not allow the male at or in the den until the pups are big enough to wander around outside.

Also:

> No mountain lion in his right mind would get caught near a den with wolf pups in it.

In 1916, Musgrave made record of the famous Chiricahua Wolf:

> One of the most wiley and destructive wolves in this state was taken by A. W. Mills in the Chiricahua Mountains in June. This wolf was known to have run the full length of the Chiricahuas for the past four years, and though other packs of wolves have drifted through from Mexico, this wolf has never joined with them for any length of time, but has played the Lone Wolf game, killing a yearling about every four days, and <u>never returning to the carcass.</u> (Italics mine, dmg.)

In 1925, Musgrave (Annual Report) states that:

> . . . the catching of a wolf (today) is not so much a difficult matter as the locating of his range. We have found during the past two years since wolves have gotten down to a very few individuals,

> that they travel long distances, and change their ranges, possibly hunting for other wolves, possibly fearing the consequences of what happened to the remainder of the kind. At any rate, they are more restless than when they ran in packs, and are not so regular in their habits.

In this short paragraph, Musgrave chronicled for all time the precise nature of migrant Mexican gray lobos and what happened to them and how it happened, and how they became so easy to destroy.

Also cited earlier in this report is the letter written by Henry Boice (Musgrave, Annual Report, 1925) concerning the 25 calf skulls found near one den full of wolf pups along the Black River on Chiricahua Cattle Company range.

In personal conversation with the author in 1966, Casto recalled a similar circumstance of multiple calf kills along the San Miguel on the Club Range in southwestern Colorado in 1909.

> They'd drug them calf critters from all over the range to one spot near the den.

Also previously cited is the Ligon report of 1920:

> . . . from a commercial standpoint, the gray wolf has no rival as a destroyer of livestock . . . each adult wolf . . . will average killing $2,000. worth of livestock annually.

In the same report, Ligon stated:

> . . . wolves . . . are the most destructive animals.

Also previously cited is the instance recorded by Mercer (personal letter to author) of the wolf near Big Lake, Arizona, too busy digging mice out of grassy hummocks to notice the approach of a man.

And:

> Wolves are not numerous (Ligon, 1919) . . . but are scattered over a very large area, and there are a great many individuals that cover a big range and are very shy.

It was in 1920 that PARC hunters caught another so-called "famous" wolf - one that skipped in and out of the border-patrol area for months, killing cattle and avoiding many amateurish trappers.

Hunter Cleve Miller (See Fritz letter, 1921) caught another female wolf, famous in her time, that had been killing calves and eluding trappers for a long time. (1920).

And Old Aguila (Musgrave, 1924) probably deserves another word or two as most famous of Arizona's infamous wolves. Taken by Charlie Gillham (for many years afterward a prolific outdoor writer of note and an outspoken admirer in print of Casto), Old Aguila had an excellent press agent.

But her statistics are revealing: eight years

in the Eagle Tails Range at Sonoran Desert elevations above-sea-level far lower than is normal for gray wolves; distinctively whitish in color; many thousands of dollars of cattle and sheep killed (on record) with 65 head of sheep killed in one night and forty head of sheep killed on another night; eluded hundreds of gunners and amateur and professional trappers for eight years; brought about the largest dollars-and-cents bounty offers for one wolf in history; with a retinue like the tail of a comet of a large satellite band of coyotes that got fat on Old Aguila's leavings.

And then there was Ira Sheley's wolf - mangy - naked of all but wisps of hair - that got nipped by a toe two years earlier, and trapped for keeps in the Baboquivaris. (See Figure 17).

The same Ira Sheley who caught another notorious wolf near Arivaca - an aged killer that had been crossing and recrossing the border line for five years. A wolf can kill a lot of calves in five years - and firm up a solid reputation. Plus the fact that this gray muzzled killer's track was distinguishable: Ira's traps had nipped its toes twice before

Finally, Sheley set out a poison "line" across the old wolf's run, and got him the first time he recrossed it.

In May, 1924, Musgrave poisoned a female wolf within

thirty yards of rancher A. B. Carey's front door. This was another wolf that had developed the habit of coming into the Carey ranch yard at night, trying to coax the ranch dogs off. She had been caught in a trap earlier - possibly, Musgrave recorded (1924 Annual Report), by hunter Lee Parker, two years earlier. One front foot was entirely gone.

Twenty-seven wolves were caught in 1925 - twenty-one of them apparently Mexican wolves that had drifted north across the border. Musgrave (Annual Report, 1925) added that he:

> did not feel that any of those wolves were particularly notorious.

Mexican wolves still ranged far and wide north of the border country in 1925. One was repeatedly seen on a line on the Mogollon Rim covering a span of seventy miles between East Clear Creek and the distant Whiteriver (Fort Apache) Indian Reservation.

There were many feral dogs running loose and interbreeding with wolves, particularly along the Animas-Whitewater line with New Mexico and on both sides of Fort Huachuca, into the Santa Ritas and as far west as the Baboquivaris.

In 1927, another Mexican wolf that ranged up into the Baboquivari had only wisps of hair. His back and neck and the top of his head were cracked, black and scabby.

That same year (1927) the Arizona District PARC office received a letter from General L. H. Manning, owner of one of the largest cow outfits in the southwest at the time:

> . . . the wolf that Mr. Knibbe got was very large and very old.

Already recorded in an earlier chapter is the matter of wolf sizes as reported by Mr. Knibbe.

Near the end of 1928, J. J. Tucker caught four wolves on the Double Circle. One of Tucker's four wolves was also very old, with one leg missing entirely. It had long since healed, and Tucker could not guess whether it had been shot off or gnawed off.

Unfortunately for posterity, if not for science, as wolves became more scarce, the campfire legends of famous wolves also became scarce, and the tale bearers turned to other things. Young, two-year old wolves - mostly males - literally on the run, covering as much and more as a hundred miles in a day, and seldom staying in any one local area long enough to do much more than make a quick kill for a fast feast before nervously moving along, established few reputations of consequence.

There was an occasional exception: on April 3, 1952 (Mercer, Annual Report), a PARC hunter trapped a loner wolf on the Charles Prude Ranch in the Galiuro

Range in Graham County. Prude told the PARC hunter that this wolf had been ranging in the area since December. A number of local ranchers judged from the wolf's manner that it may have been in captivity at one time. Its tracks were seen frequently around the Prude barn and other outbuildings, and Mrs. Prude once saw the wolf through a window one evening as she sat near it, reading.

The same wolf had also been seen at various times by Prude and several of the ranch helpers, and had also been seen by a private lion hunter working in the vicinity.

Another distinction of the Prude Wolf was that it was heard howling a number of times and was once seen howling in broad daylight.

In addition, the Prude wolf was once pursued by a motorist and was shot at at that time. He was recovering from what appeared to be a gunshot wound at the time he was trapped.

The male wolf trapped alive by vaquero Topas in 1959, mated freely with a captive Sonoran female at the Arizona-Sonora Desert Museum zoo and sired a lusty batch of pups. Later, a male and female from that litter was on display at the Phoenix Zoo.

The Topas Wolf escaped from the Arizona-Sonora Desert Museum in February, 1964. Two days later, while searching for food, he was cornered and shot to death.

Other legends of famous southwestern lobos have died with those who told them.

Voice - Howling

There are few documented instances of wolf vocalizing in Arizona. Several such incidents, however few, have been previously cited in this report and are repeated here.

The earliest such report is the incident of the brood bitch with pups who barked menacingly at Goswick's trail hounds in October, 1913. Goswick shot this female wolf and four of her pups.

Also previously cited is the howling on a number of occasions on record by the Prude Ranch Wolf in 1952, a wolf that was also seen howling in broad daylight.

And also previously cited is the incident reported by Assistant District Agent (PARC-1955), Day who heard a wolf howl during the night of December 15, 1955 while in camp in the Gu Vo district at the extreme southwestern corner of the Papago Indian Reservation. The area is low-elevation desert type compared with normal gray wolf range in Arizona.

Factual documentation of wolf howling in Arizona appears to be limited to the above incidents.

Breeding

Several partial studies have been made concerning life-cycles of Mexican gray wolves in Arizona. Unfortunately, only a few of those studies were published in any form, and then in limited number and distribution.

The author has long been aware of a comprehensive compilation of such data on Canis lupus baileyi by the late Charles T. Vorhies, Ph.D., University of Arizona, but the present whereabouts of this work is not known.

The author has a number of personal notes excerpted from the files of Dr. Vorhies (circa 1949), from which certain information is included in this report.

One such item is the Vorhies-Mercer program cited herein under the designation "Physical Description" which does establish the only practical rule-of-thumb by which Mexican gray lobo body weights have been measured in Arizona.

Another of the Vorhies-Mercer studies pertains to the records of wolf pups captured in dens averaging four, whereas the number of unborns found in captured pregnant females averages five.

Breeding data of Arizona wolves was published in limited fashion about 1941 (Knipe-Nichols, et al, 1941), and similarly republished (Shiver, 1968) by the Bureau

of Sports Fisheries and Wildlife, Phoenix. Both works are tabulated summaries of various Arizona wildlife, without any distinction as to wolves between the earlier resident Canis lupus youngi and C. l. mogollonensis from C. l. baileyi.

Shiver's data indicates the breeding season for Arizona wolves as January and February, with a gestation period of sixty-three days, the number of young as from seven to eight, the minimum breeding age is not given, the pups appearing in March and April.

The author's personal notes, based on Vorhies-Mercer records garnered from PARC fieldmen reports over an approximate 25-year period, indicate that the breeding season of Arizona gray wolves (considering the time and geographical locations involved, almost certainly all Canis lupus baileyi) is February, oestrus lasts from three to five days, and the gestation period runs from sixty-two to sixty-three days almost without any variations. The average of denned pups taken during the twenty-five year period was four and the number of unborn foetuses found in pregnant females was five.

Earlier records of resident Canis lupus youngi and C. l. mogollonensis from Ligon, Musgrave, Gilchrist and Foster reports show wolf pup-foetus averages somewhat higher than those recorded for baileyi. A few early records show as many as ten pups taken in a den. (Figure 35).

AN EXAMPLE OF AGE AND SEX RATIOS
BY MONTH AMONG GRAY WOLVES CAPTURED
NEW MEXICO DISTRICT - FISCAL YEAR OF
1918

Month	Male	Female	Total Adults	Pups
July, 1917	5	2	7	0
August	3	3	6	5
September	2	3	5	1
October	7	7	14	0
November	7	7	14	0
December	4	2	6	0
January, 1918	5	7	12	0
February *	1	2	3	0
March	1	4	5	2
April	3	1	4	11
May	1	3	4	11
June	1	0	1	0
Totals	40	41	81	30

* - 5 unborns from one litter

Figure 35. Table III.

Present Status

Even today, the author encounters, more frequently than seems likely, reports of wolves in Arizona - for which he has a stock answer: "How many cattlemen complained - where - and how many calves did your wolves kill?"

However, so long as there is any remote possibility of one Mexican lobo left alive, it is not inconceivable that one or more wolves may yet appear somewhere along the traditional runways along the Arizona-Mexico and Arizona-New Mexico border country.

The key, of course, as it always has been, is the documented records that wolves prefer to kill and eat the same big weaner calves that has been their principal prey in the Southwest since the first pure-bred domestic stock appeared on the open range. Any wild lobo running the border today is bound to leave his single most characteristic trade mark behind him as he goes.

Silence (as to wolf depredations) from the Arizona livestock industry is almost proof positive that the occasional wolf reports of 1970-1977 are without substance.

Nevertheless, the author fervently believes that so long as there is any public interest in the ecology

and status of the Mexican gray wolf, additional field studies should be made by the most competent individual or individuals available with practical field experience with Mexican lobos in their natural range to include all of the former gray wolf runways below and along the New Mexico-Mexico and Arizona-Mexico borders as far west as the Organ Pipe Cactus National Monument lands. Particular attention should be given to the specific historic lobo runways listed in this text, in The Wolves of North America (Young-Goldman. 1944), and as indicated on the map, Figure 5, on the same basis as the similar work that is being completed in the interior of Mexico (McBride, 1977).

The author also believes that time is of the essence.

In 1970, the author placed a telephone call to the Arizona District PARC office. No personnel of field capability was in the office at the time. The receptionist on duty suggested that no one in the PARC employ at that time had any experience with or knowledge of wolves.

In personal telephone conversation with Chuck Hansen, Curator of Animals and Birds with the Arizona-Sonora Desert Museum, Tucson, in 1974, Dr. Hansen advised* that he had recently been told of an active wolf den on the western

* Dr. Hansen later reported this matter to me in person at the Museum in mid-June, 1974.

slope of the Whetstone Mountains, just north of the traditional Canelo Hills wolf runway. During June, 1974, approximately two months after pups would have been born, the author, accompanied by his eldest son, a graduate geologist, made a field inspection of the Santa Rita, Whetstone, Canelo Hills, Parker Canyon, Huachuca and Chiricahua traditional wolf runways, and located no evidence of wolves.

There was considerable evidence to suggest that were wolves present in any of this drouth-stricken former wolf range, significant evidence in the field and among livestockmen of the region would have turned up.

About the only interest we instigated was among border narcotic agents, who were suspicious of our prowling in remote areas, especially in the Madera, Greaterville, Sonoita and Parker Canyon-Canelo regions.

No recent physical check for wolves of the Washington Camp, Ruby and Baboquivari-Arivaca-Altar traditional runways has been made by the author in recent years.

It is believed that a few remnant wolves in small family packs may remain in isolated areas of the Sierra Madre Occidental, but that no movement of any significance into Arizona has occurred during the past decade.

CHAPTER V

Summary

In summarizing this historical sketch of the resident and migrant Mexican gray wolves of Arizona, I have concluded that wolves are an effective predatory carnivore with the capability of utilizing any prey animal on their natural habitat, and that as such, they are also inimical to the economy of western-range domestic livestock production. And that the encroachments of the cattle industry upon historical wolf range in Mexico and the southwestern United States constituted a confrontation of opposites that could not economically be tolerated.

I conclude from the documentation that is available (unfortunately limited), that the Bailey wolf inhabited the southern fringes of Arizona, much of which is traditionally wolf habitat, and that as resident wolves of the two other sub-species were extirminated, young Mexican gray wolves encroached upon those traditional gray wolf ranges and were subjected to an increasing intensity of organized predatory animal control methodology as detailed herein until the basic breeding stock of those Mexican wolves trickled to a near-stop in the mid-1960's.

The majority of all wolves taken in the Southwest were caught in steel-leg-hold traps, but the bulk of wolf extirmination in their latter years was accomplished

north and south of the Arizona-Mexico border by means of strychnine in several forms, cyanide "Coyote Getters", thallium sulphate and monosodium fluoroacetate incidental in most cases to the control for coyotes and bobcats.

Over more than three decades of relationship with and study of the Mexican gray wolf, I can sincerely dedicate this report to the most fascinating fauna with whom mankind has shared this land.

I feel fortunate that I was able to associate with wild wolves before their time had come.

For the wind passeth over it, and it is gone; and the place thereof shall know it no more. Psalms 103:16

Future

The future of the Mexican gray wolf in Arizona is poor and its prognosis on any of its historical range on the North American continent is precarious.

Scarcely a dozen "pure" specimens of Canis lupus baileyi may remain alive in captivity. The Rancho de los Brujos (Pack Foundation) in Abiqui, New Mexico, holds a few captive specimens of the Mexican lobo, as does the Arizona-Sonora Desert Museum near Tucson. The Phoenix, Arizona, Zoo, displays several wolves which they bill as "Timber Wolves", one of which may be a descendant of vaquero Raymundo Topas' Peck Canyon wolf. (Fig. 36).

A Glendale, Arizona, couple (Arizona Republic, September 18, 1977) claims to have, among a batch of so-called wolf hybrids, a " . . . Sonoran red wolf with yellow eyes", called Lobo. The claim gets complicated, however, when it adds that Lobo is also " . . . a registered shepherd mix". Nor does science include a "Sonoran red wolf".

But such captive specimens, regardless of blood lines, are not really wolves. On his remaining range in Mexico, however limited, the wolf is wild as a wolf must be to be a wolf. But on that same range, he also represents a relatively high cash value as bounty and as fur to a people whose income is as low

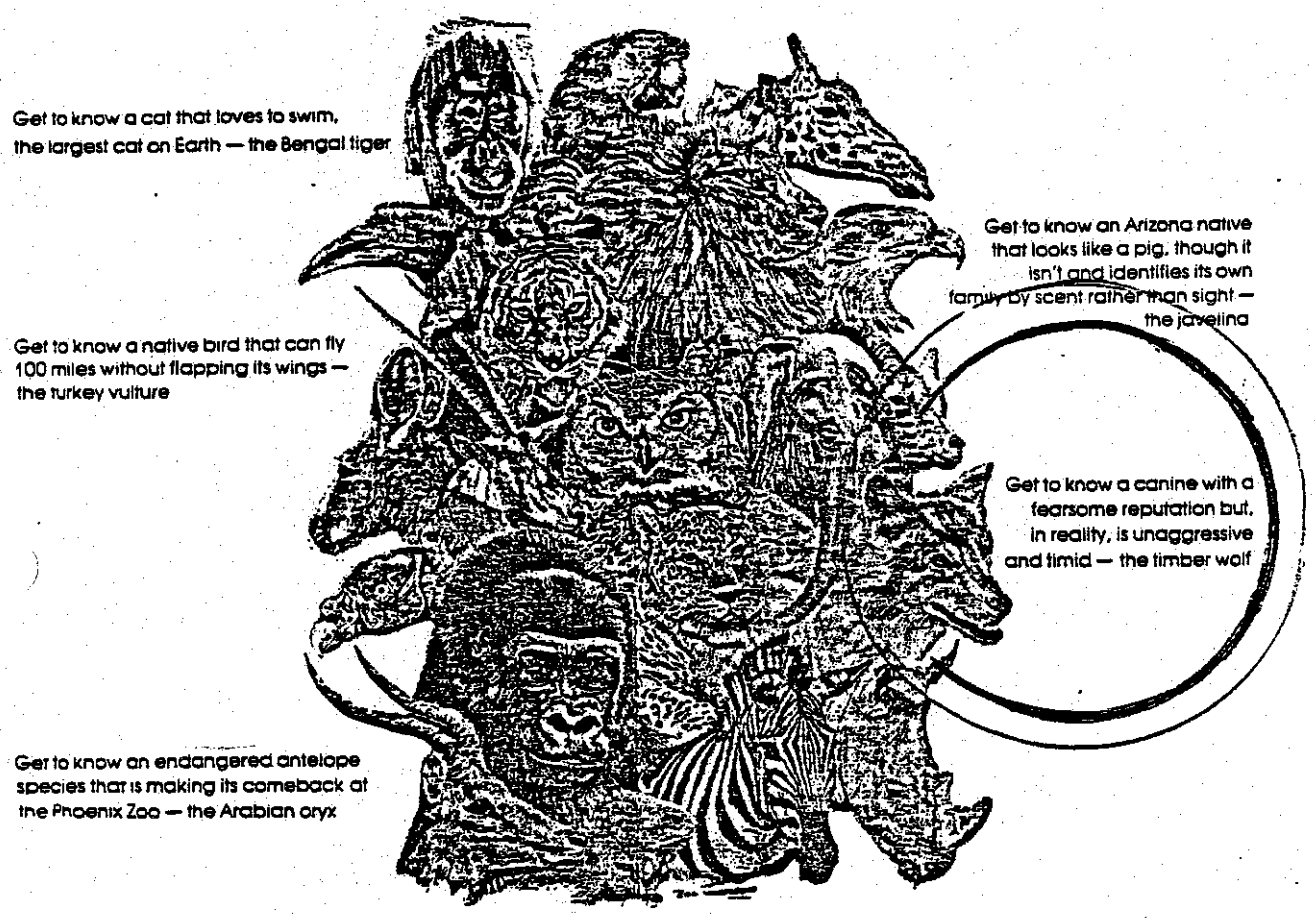


Figure 36: Photocopy of an annual-membership solicitation brochure distributed by the Phoenix, Arizona, Zoo. Note reference to "Timber Wolves", in circle.

per capita as any society on the North American continent and to whom the future of the wolf is of no importance.

Nor does there seem from any realistic standpoint, any practicality of possible re-introduction of gray wolves onto anything resembling a natural state in which such wolves might thrive in Arizona.

The dreamer may look at the exotic introduction of such small, carefully controlled groups as the young ligoni pups on a small island in the Alaskan Alexander Archipelago (Merriam); or the also carefully-controlled island zoo that is Isle Royal with about four dozen lycaon (Allen-Mech); but he must also scan with harder eyes the more recent developments that are taking place on traditional wolf ranges on the Superior-Quetico of Minnesota and the age-old caribou migration routes in Alaska and Canada.

In Arizona, where human populations and commercial developments are aneuretic - where the most likely wolf range has long been overgrazed by livestock and water tables are dwindling alarmingly, and in a world where economic inflation is pandemic and demands for world food supplies remain critical and are worsening, there seems no place for gray wolves outside of tightly-contained zoo conditions.

This has become increasingly so from the moment that de Villalobos' first eight Andalusian calves set foot on mainland America.

An island, whether surrounded by suitable bonds of water or a wolf-proof fence, with lifezones commensurate with a prospering wolf culture and without the conflicting elements that wolves cannot adjust to, seems the only likely possibility on the horizon for re-establishing any viable community of gray wolves on any of his southwestern range.

At one time, before Fort Huachuca was reclaimed by the military subsequent to World War II, being traditional and a thrifty natural wolf range, its 88,000 acres could have become the restoration area for Bailey wolves for all time to come. The terrain and a quantitative and qualitative natural food supply exists. Too, the reservation is fenced - it could be made a wolf-proof fence.

The alternatives may be the increasing wilderness areas being gobbled up within the National Forest, Bureau of Land Management and National Park-Monument administrations.

For example, at the present time, the National Forest System has one-half million acres classified under the National Wilderness Preservation System

(Total net acreage: 495,614), including the Chiricahua Wilderness (# NF 013) adjacent to 11,180 acres similarly administered by the National Park System (# NP004) - all former gray wolf range and widely utilized by migrant Mexican lobos in Arizona.

In addition to the above, the U. S. Forest Service is proposing to add three-fourths of a million acres to the existing Blue Wilderness and other "roadless-and undeveloped" areas of the Apache-Sitgreaves National Forest in Arizona - also all former principal range of resident and migrant Mexican gray wolves.

An additional 406,450 acres of "roadless and undeveloped" (wilderness) land area is being proposed to be added to the Coronado National Forest - "exclusion" areas which include such traditional natural wolf range as the Chiricahua Mountains; the Peloncillos; Santa Ritas; the Pajaritas; Huachucas; Santa Teresas; Winchesters; Grahams; Galiuro; and Rincons (See Map and Inventory brochures - available on request - RARE II, Roadless and Undeveloped Area Inventory, September, 1977, Southwestern Region, United States Department of Agriculture, Forest Service, Albuquerque).

These "proposals" to The Congress include millions of acres of some of the choicest land and scenery in the Western United States, as "Wilderness".

Unless the management plan includes "gray wolves", one may well ask: "How 'wild' IS 'Wilderness'?".

For comparative thinking, one can point, for example, to the current program, fraught with complex logistics, costs and distance, by which exotic blue foxes are being eradicated from the Aleutian island chain, 2,000 miles southwest of Anchorage, for the also legitimate reintroduction of rare and endangered Aleutian Canada geese. (Aleutian Islands National Wildlife Refuge).

The gray wolves of Mexico and the Southwestern United have as high a value to posterity.

Acknowledgments

The author is grateful in memoriam to Everett M. Mercer, William S. Casto, Dorr D. Green, Dr. Charles T. Vorhies and J. Stokley Ligon - all of whom are now gone with the gray wolves they knew so well - for access to personal files, papers, notes, memoirs, photographs and correspondence with the author over more than three decades, and for many memorable hours of priceless palaver around countless campfires with each of them.

Had he lived, this report might have been Everett Mercer's.

To Mrs. Helen Mercer; to Howard J. Martley of the old PARC days, now retired; and to B. Ira Judd, Ph. D., Professor Emeritus, Arizona State University, sincere thanks for counsel and unflinching encouragement.

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