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Bill “rediscovered” the pivotal role of UA’s Robert Forbes in creating SRER.

Bill inspired me to dig deeper in the early SRER history and literature and better appreciate that SRER is...



# THE UNIVERSITY OF ARIZONA® SANTA RITA EXPERIMENTAL RANGE



A Range  
of Discovery



COLLEGE OF  
AGRICULTURE &  
LIFE SCIENCES

I hope you are all looking ahead to 2102



Forest Service

Rocky Mountain  
Research Station

Proceedings RMRS-P-30

September 2003



# Santa Rita Experimental Range: 100 Years (1903 to 2003) of Accomplishments and Contributions

Conference Proceedings  
October 30–November 1, 2003  
Tucson, AZ



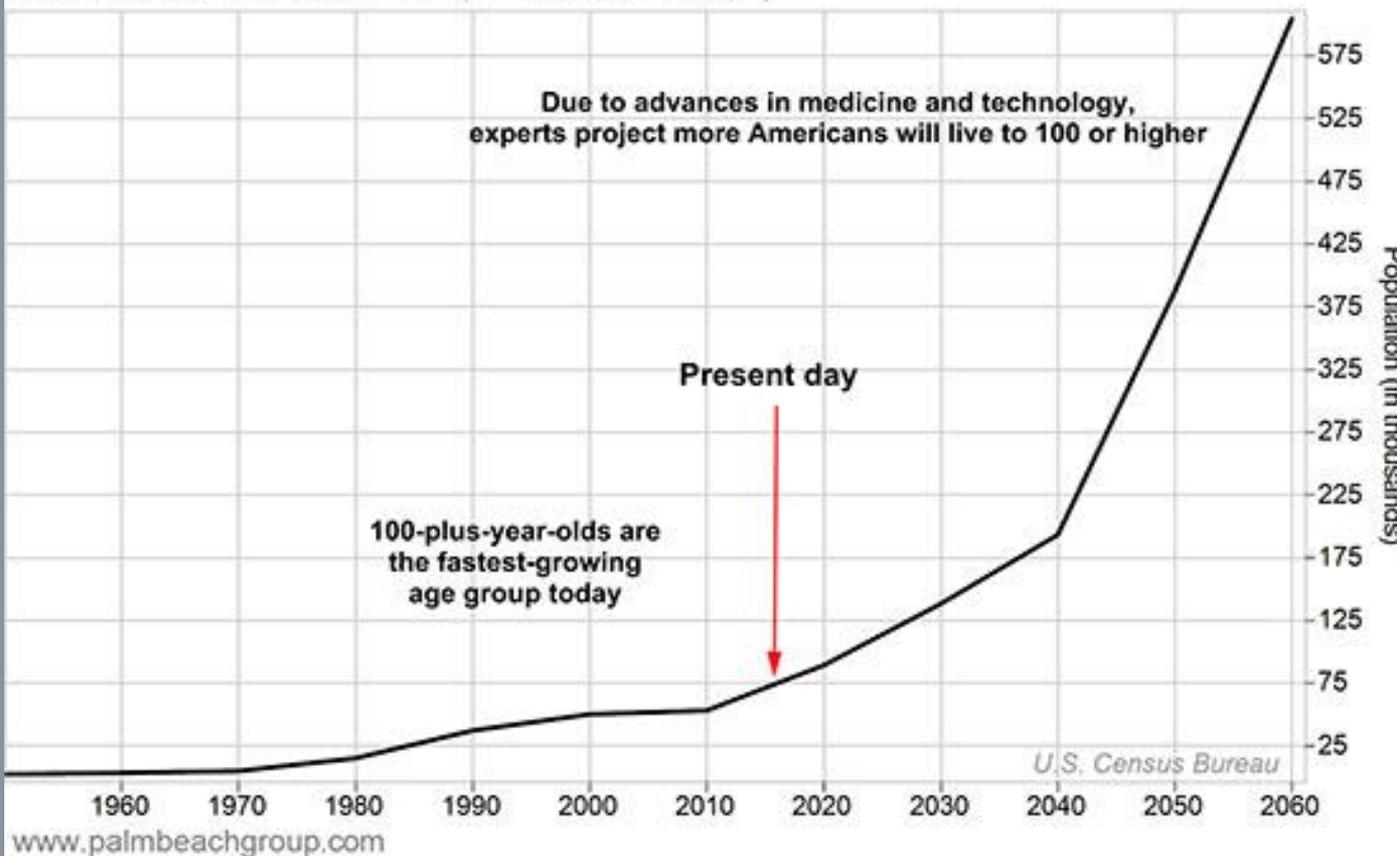
1902



2003



## American Centenarians (From 1950-2060)



The arrow shows how many centenarians exist in America today. The curved line after it shows the projected explosion of the 100-year-old population in the years to come.

<http://www.internationalman.com/articles/the-gravest-threat-to-your-retirement>



If you can be a centenarian, why not be a super-centenarian! Don't rule out being alive in 2102.

~Current Age in 2016	Likelihood of reaching 100*			Your age in 2102
	Year of birth	Male %	Female %	
about 22	1994	20.2	27.5	about 108
about 21	1995	20.5	27.8	about 107
about 20	1996	20.9	28.2	about 106
about 19	1997	21.2	28.5	about 105
about 18	1998	21.5	28.9	about 104
*Estimates as of 2011, Great Britain				



# What will folks want to know about SRER in 2102?

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# History

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Nathan F. Sayre

## Recognizing History in Range Ecology: 100 Years of Science and Management on the Santa Rita Experimental Range

**Abstract:** At the centennial of the Santa Rita Experimental Range, historical analysis is called for on two levels. First, as a major site in the history of range ecology, the Santa Rita illuminates past successes and failures in science and management and the ways in which larger social, economic, and political factors have shaped scientific research. Second, with the turn away from equilibrium-based models in range science—a turn prompted in part by research at the Santa Rita—there is a growing need for history in range ecology itself. I discuss the needs, premises, and events underlying establishment of the Santa Rita in 1903. Then I examine the evolution of research and management recommendations through four major periods from 1901 to 1988, and I discuss the land swap that transferred the Santa Rita to State ownership in 1988 to 1991. Finally, I consider what effects the Santa Rita has had on rangelands and range management in the region. I argue that a static conception of the carrying capacity of Southwestern rangelands was imposed for economic and political reasons, over the objections or reservations of early range scientists at the Santa Rita, and that this may have contributed both to range depletion and to rancorous relations between public agencies and private ranchers in the twentieth century. To meet society's current demands on rangelands, the long-term, large-scale data assembled from the Santa Rita will be critically important.

**Keywords:** range science, range ecology, history, carrying capacity, mesquite, Frederic Clements, semiarid rangelands

**Acknowledgments:** The author gratefully acknowledges Joel Brown, Kris Havstad, Mitchel P. McClaran, Guy McPherson, and especially Phil Ogden for helpful comments and other assistance in the preparation of the manuscript. Thanks also to Barbara Gibson for help with the figures. I remain wholly responsible for the contents.



# And the future

## Contents

### Invited Papers

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Thomas E. Sheridan

## Archive and Laboratory Embedded in the Landscape: Future of the Santa Rita Experimental Range

**Abstract:** The Santa Rita Experimental Range (SRER) is both an archive of past ecological research and a laboratory for continuing research embedded in the southern Arizona landscape. The scientific questions being asked there have changed over the last 100 years, but SRER with its monitoring stations and its legacy of repeat photography still offers a unique opportunity to study environmental change through time. Now that it belongs to the State of Arizona, however, the Arizona State Land Department (ASLD) could conceivably sell it for commercial development if the Arizona legislature were to revoke its special status for “ecological and rangeland research purposes” administered by the University of Arizona. As metro Tucson, Green Valley, and Sahuarita continue to experience explosive growth, State Trust Lands are being auctioned off to real estate developers. Pima County’s Sonoran Desert Conservation Plan is attempting to preserve biodiversity, open space, cultural resources, and working ranches throughout eastern Pima County. The Santa Rita Experimental Range provides one of the best opportunities to do so on State Trust Lands in the upper Santa Cruz Valley.

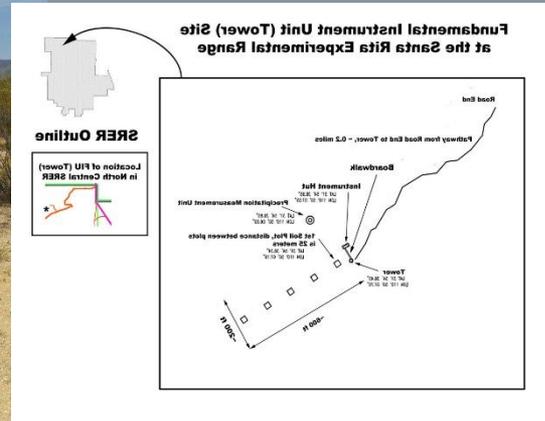
Assuming SRER survives for another century, several research topics suggest themselves: (1) the ecological dynamics of exotic Lehmann lovegrass and efforts to eradicate or control it; (2) the impact of urban and exurban development on native wildlife and vegetation; and (3) the development of grass-fed, hormone-free beef and the networks necessary to market it successfully. But all future research must build upon and respect the integrity of the SRER archive with its ongoing record of vegetation change, hydrological and nutrient cycles, and human efforts to manipulate them.

## Introduction

The future of the Santa Rita Experimental Range (SRER) can only be comprehended within the context of the dynamic political ecology of twenty-first-century Arizona. This makes forecasting a risky proposition at best. When SRER was created in 1903, Arizona was a largely rural territory dominated by extractive industries, particularly copper mining, irrigated agriculture, and ranching. World War II transformed Arizona’s economy, triggering explosive urban growth. By the end of the



# All of you working there are creating the future history of SRER and could/will be featured in the SRER bicentennial



*The challenge for the Santa Rita is to be as relevant in the 21<sup>st</sup> century as it was in the 20<sup>th</sup> century.*

Personal Communication from Mitch McClaran (May 29, 2003)



# History of the Santa Rita Experimental Range

## A continuing quest for relevance

*The challenge for the Santa Rita is to be as relevant in the 21<sup>st</sup> century as it was in the 20<sup>th</sup> century.*

Personal Communication from Mitch McClaran (May 29, 2003)

RISE Symposium, Oct 8, 2016



# History of the Santa Rita Experimental Range

A continuing quest for relevance

- Describe ways SRER was relevant in the early 20<sup>th</sup> century to inform and inspire the continuing quest for relevance





## Definition of RELEVANCE

**1a** : relation to the matter at hand

**b** : practical and especially social applicability



Existence is no more than  
the precarious attainment of  
relevance in an intensely  
mobile flux of past, present,  
and future.

**Susan Sontag**





**This photo taken on SRER in 1922**

***Branding Calves***

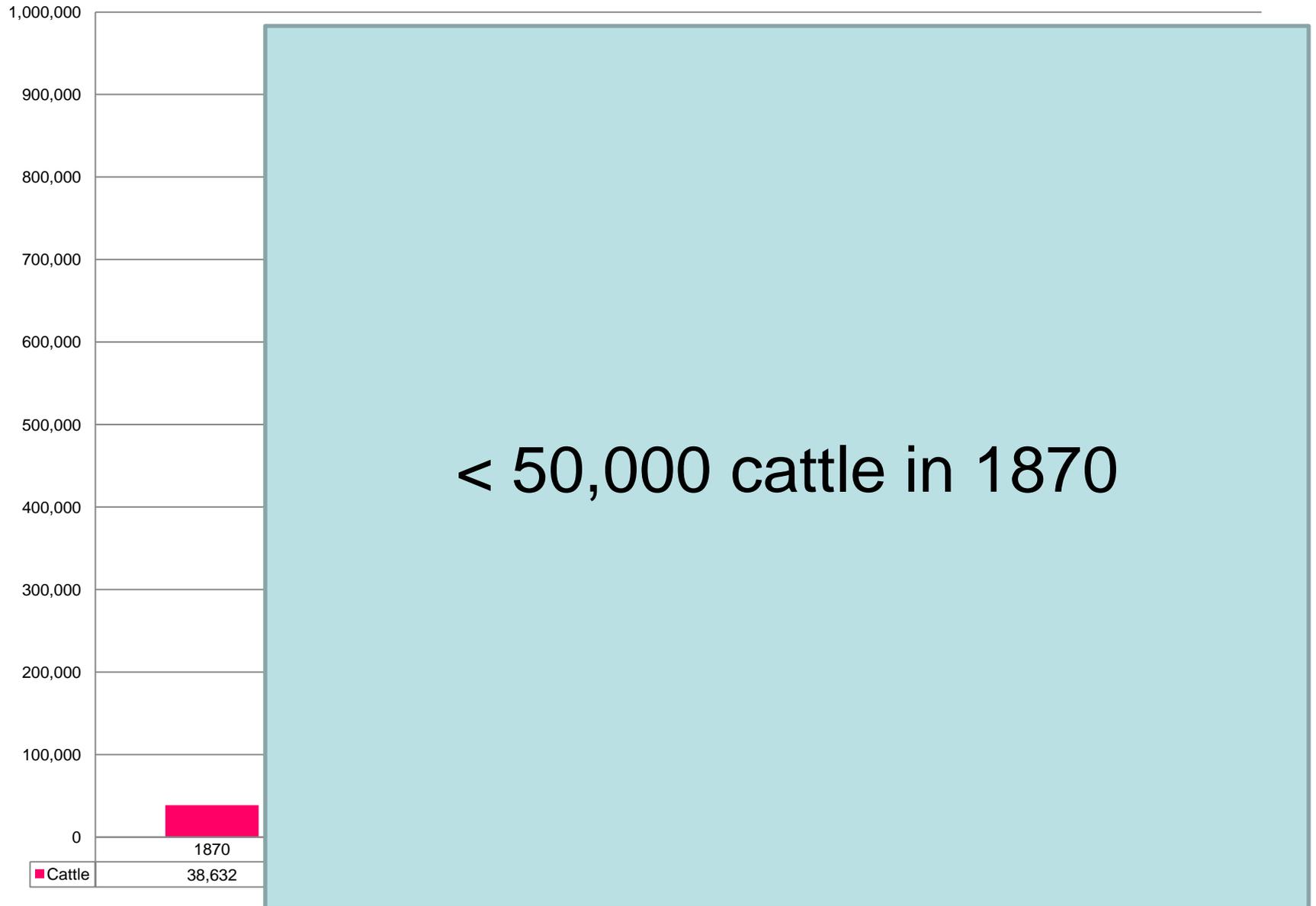
Photographer unknown.  
May 23, 1922.

# Livestock in Arizona Territory

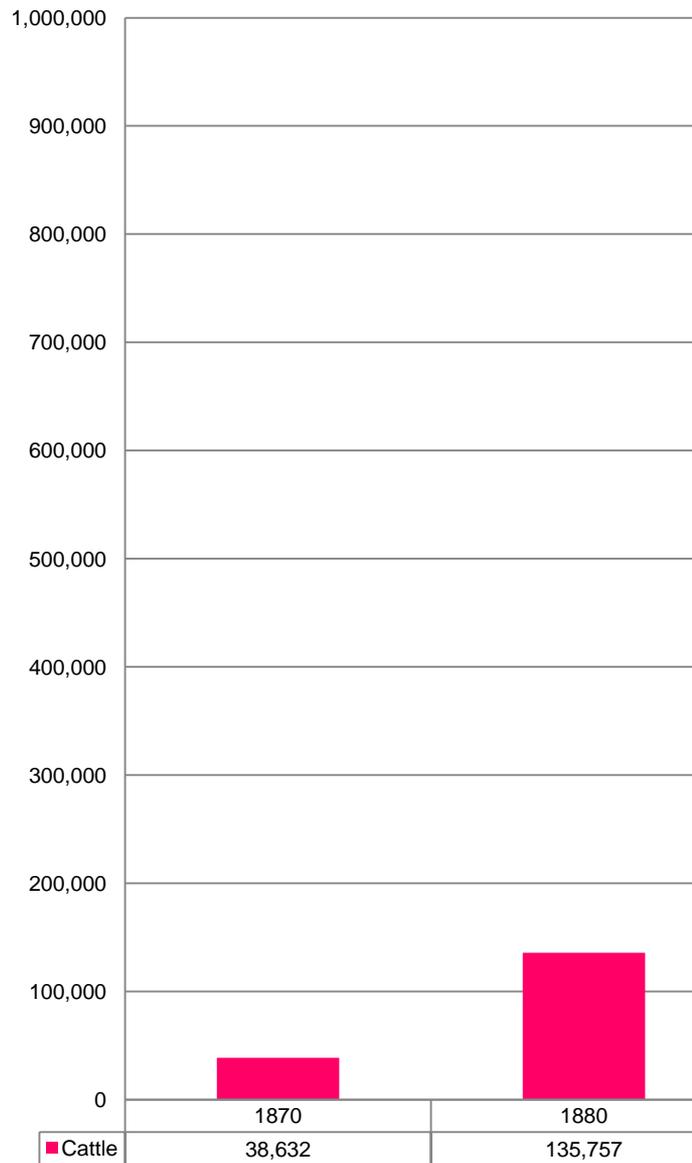
– Starting 1870



**AZ Cattle, U. S. Census**  
(cattle 1870, cattle excluding calves  
1880 - 1910)

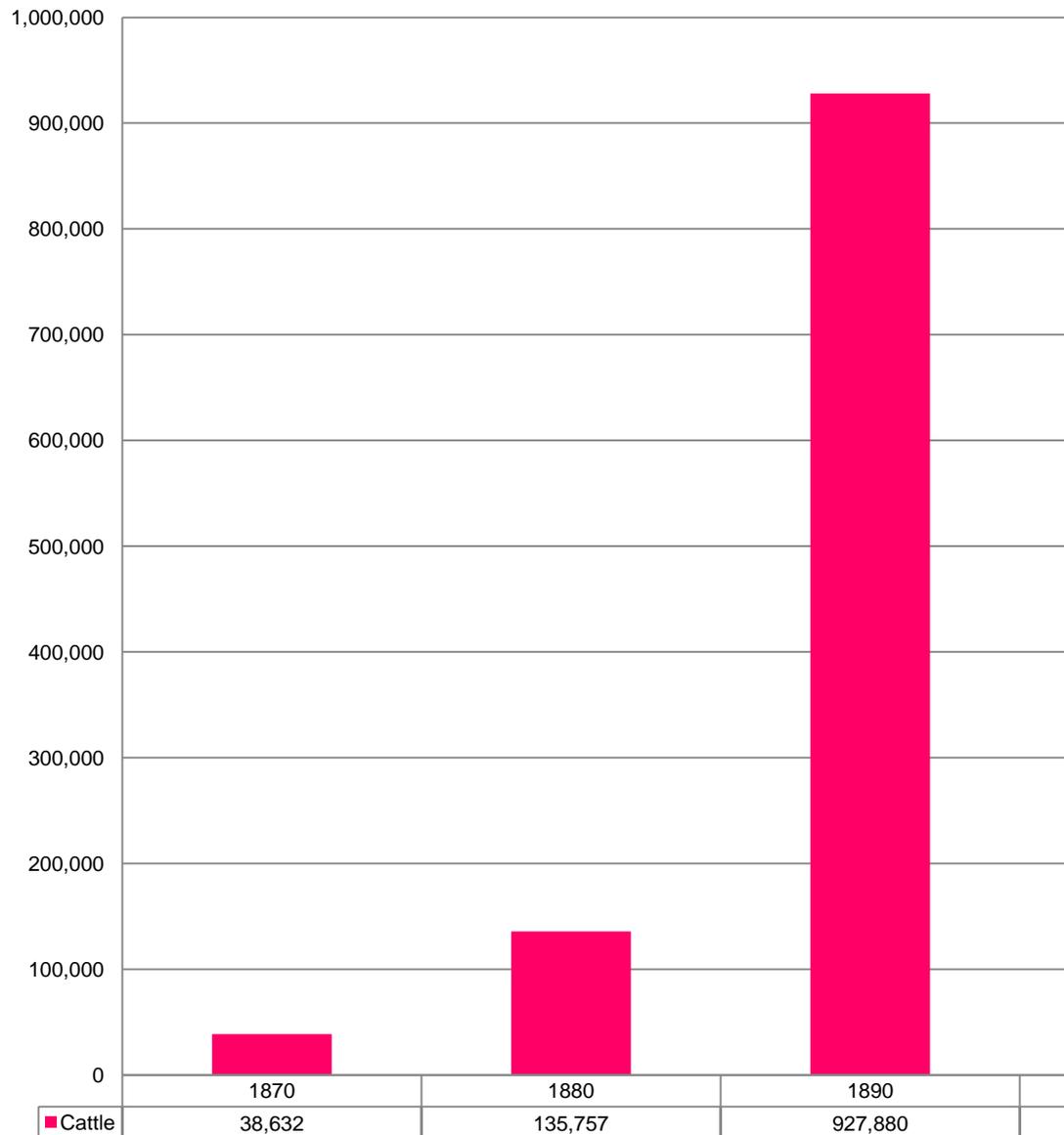


**AZ Cattle, U. S. Census**  
(cattle 1870, cattle excluding calves  
1880 - 1910)



~ 136,000 cattle  
(excluding calves) in  
1880

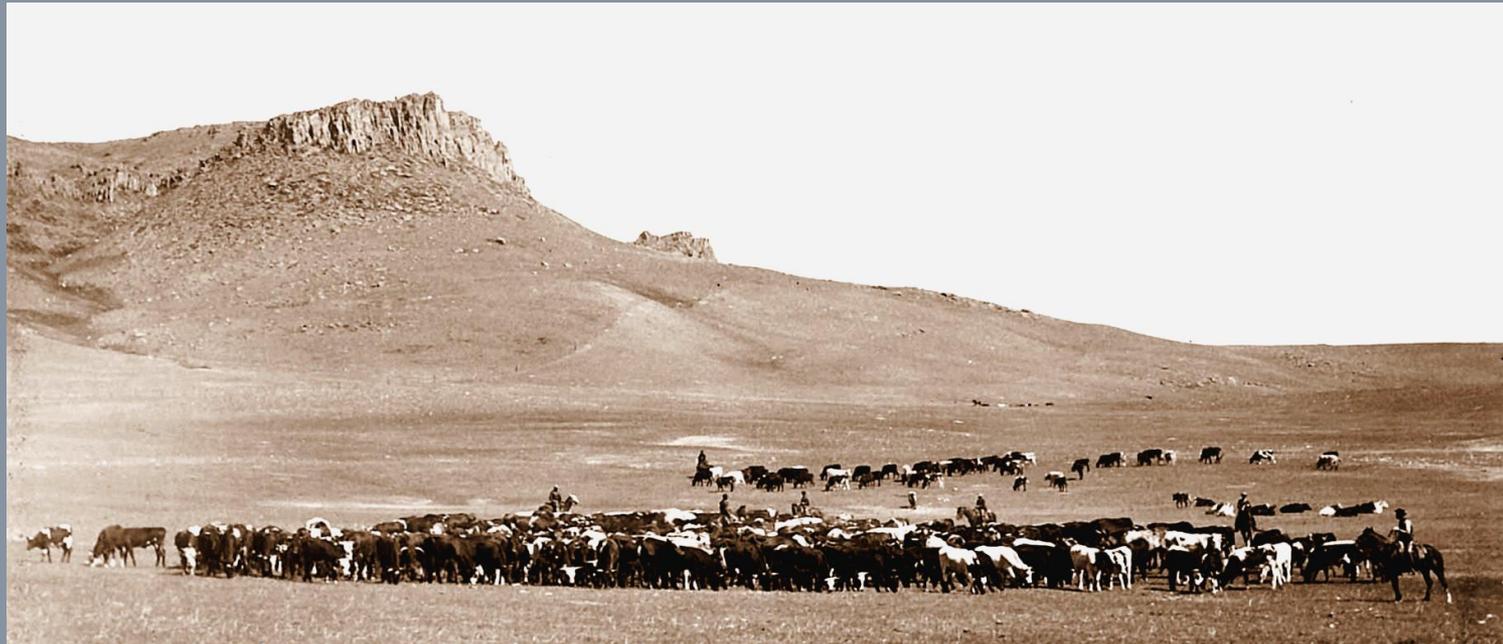
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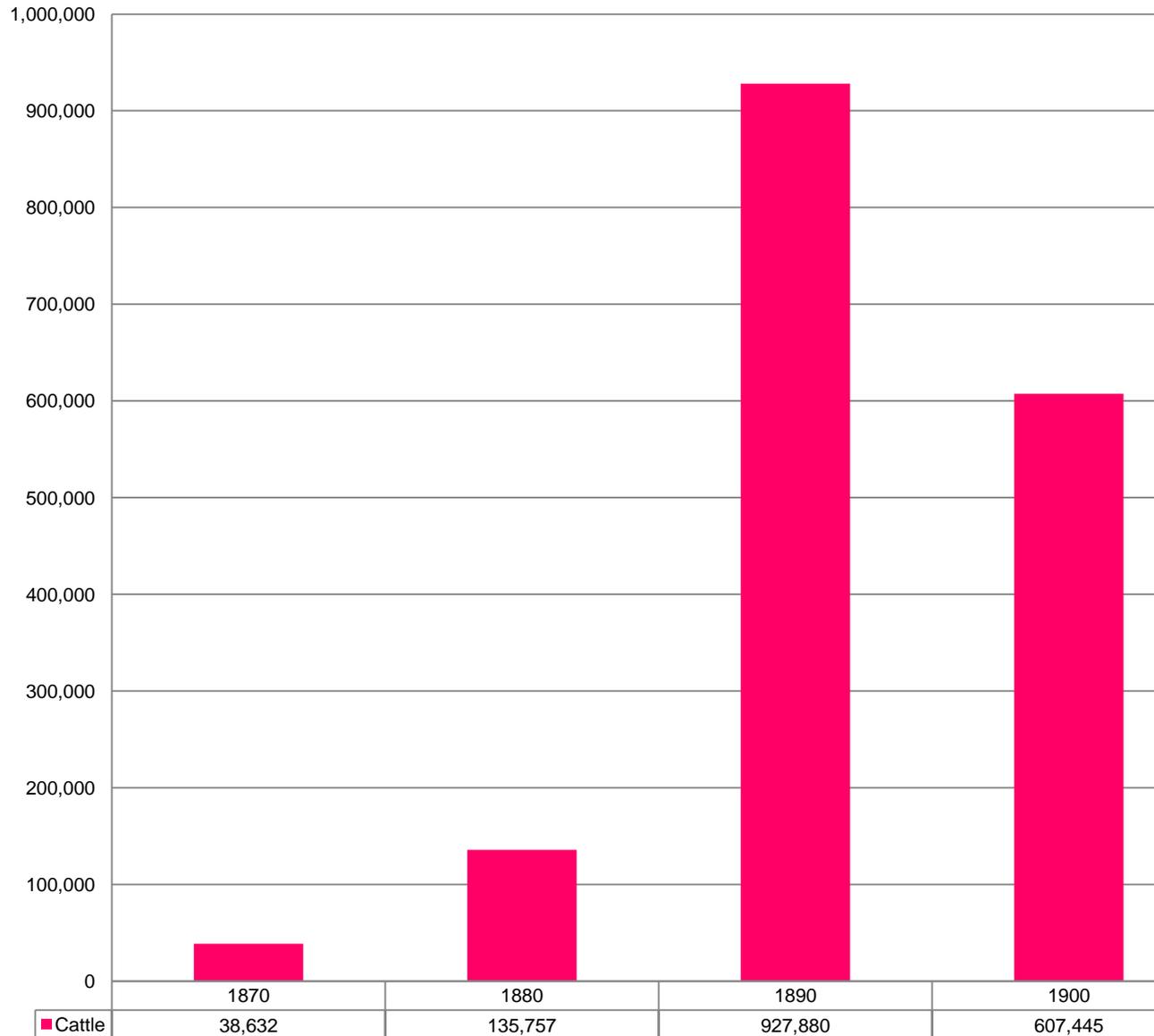
928,000  
~ 1 million  
cattle  
(excluding  
calves) in  
1890

# Livestock in Arizona Territory

- 1870: <50,000 head
- 1880: 230,000 head
- 1890 ~1 million head
- 1900: your guess...



**AZ Cattle, U. S. Census**  
(cattle 1870, cattle excluding calves  
1880 - 1910)

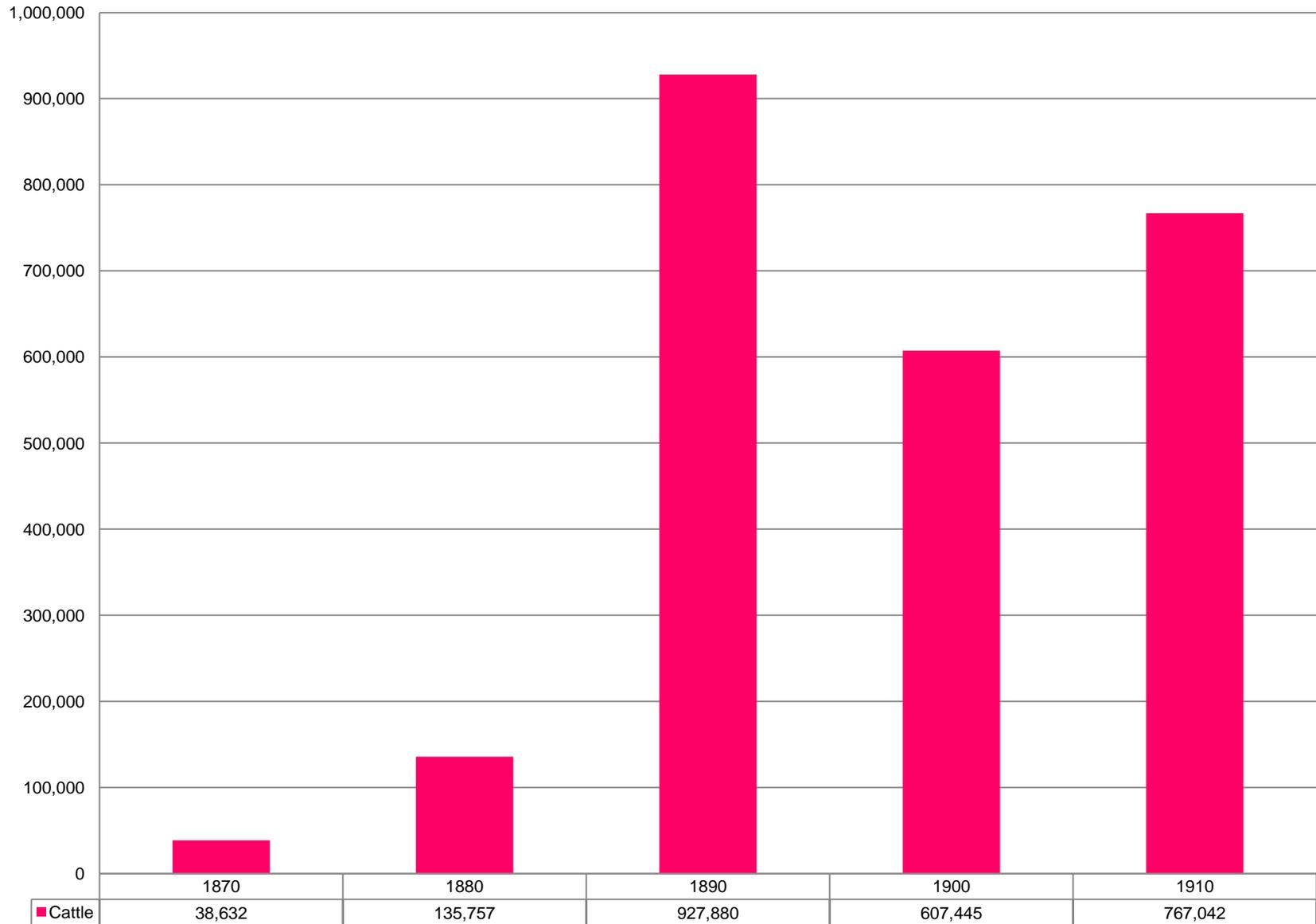


~608,000  
(~230,000  
decrease)

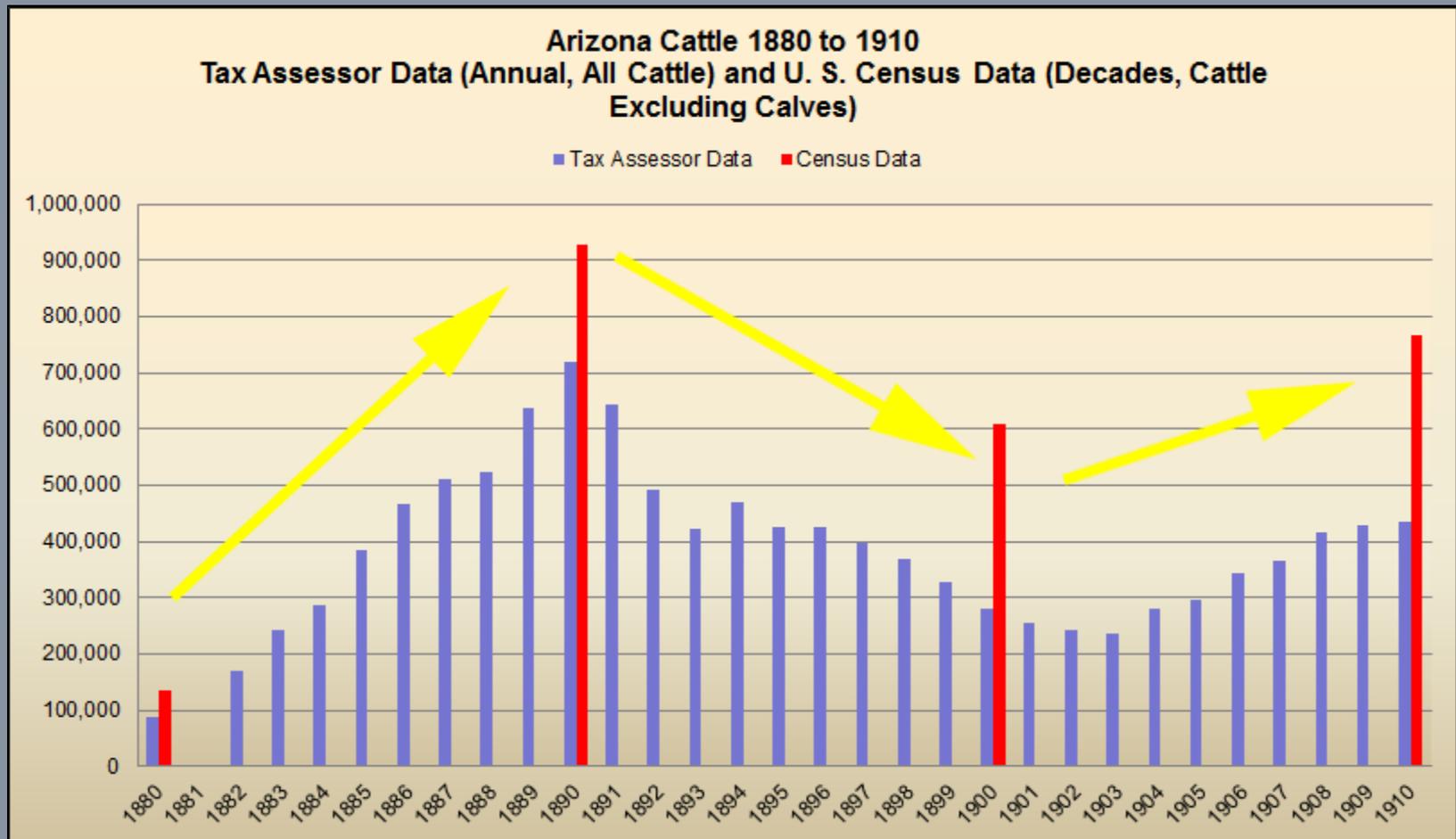
Some  
evidence  
Pima Co.  
lost >50%  
in one year  
(1891 –  
1892)

# AZ Cattle, U. S. Census

(cattle 1870, cattle excluding calves  
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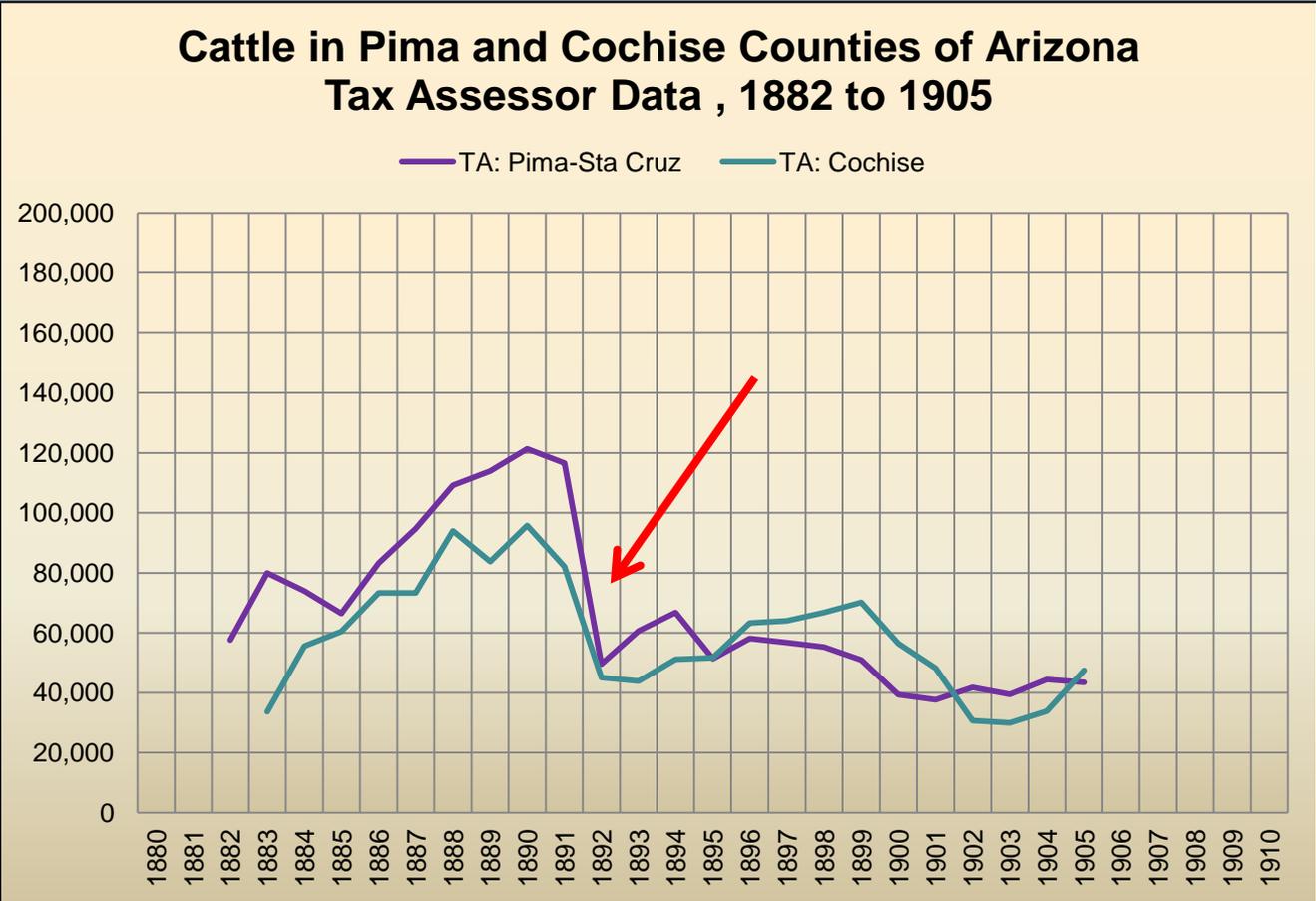
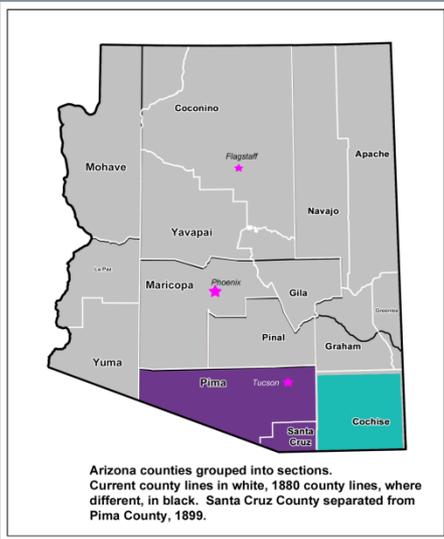


AZ Governor's Reports give Tax Assessor data (cattle and other livestock). Note: reported for the fiscal year July – June.



Tax assessor data suggest cattle in Arizona  
troughed in 1902 – 1903 (=SRER founding)





- 1891 – 1892 ~50% decline in Pima – Santa Cruz County
- Almost as bad in Cochise County





Cattle bones stacked for shipping at Vail's Siding near Rincon Mountains.

Photo by David Griffiths, 1902



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# Cattle deaths vs other outflows

## Colin Cameron:

“At this time [early 1891] no apprehension of loss from starvation entered the mind of anyone.... In the year 1892 many cattle died in May and June, but not until July and August passed without rain did cattle men realize ... that their cattle must be moved at once or their whole investment would be lost. During September and October the bulk of the cattle of southern Arizona was moved to... [Cameron identifies states and territories]. The overstocking of the range was the same through Arizona, but on account of the greater severity of the drought in the southern portion of the Territory the loss was much greater. All ranchmen concede that it was no less than 50 per cent, and some insist that 75 per cent is not too great an estimate.”

Colin Cameron Report, in the *Report of the Governor of Arizona to the Secretary of the Interior*, Government Printing Office (Washington, 1896), pp. 20 – 24.



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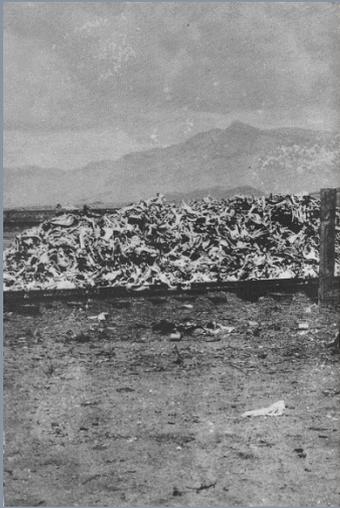
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(Washington, 1896), pp. 20 – 24.



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## Cattle deaths vs other outflows

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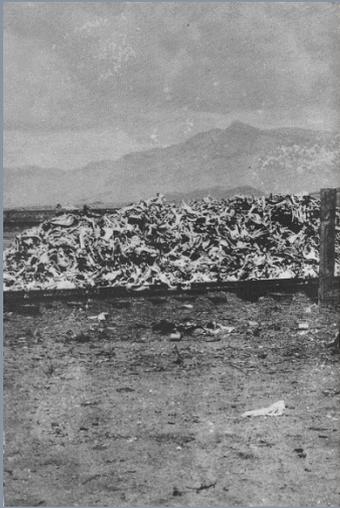
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Colin Cameron Report, in the *Report of the Governor of Arizona to the Secretary of the Interior*, Government Printing Office (Washington, 1896), pp. 20 – 24.





## Cattle deaths vs other outflows J. R. Hastings and R. M. Turner :

“The governor [of Arizona] estimated mortality of fifty and possibly seventy-five percent of the herds.”

Colin Cameron Report, in the *Report of the Governor of Arizona to the Secretary of the Interior*, Government Printing Office (Washington, 1896), pp. 20 – 24.

J. R. Hastings and R. M. Turner, *The Changing Mile, An Ecological Study of Vegetation Change with time in the Lower Mile of an Arid and Semiarid Region*, The University of Arizona Press, (Tucson, Arizona, 1965) 317 pp., see p. 41.



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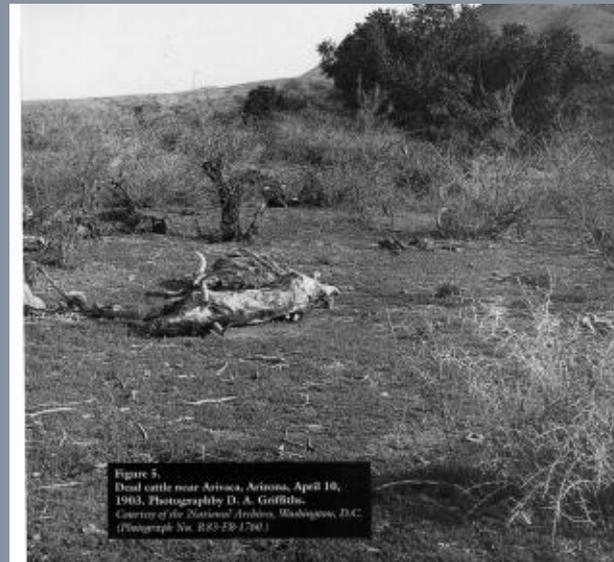
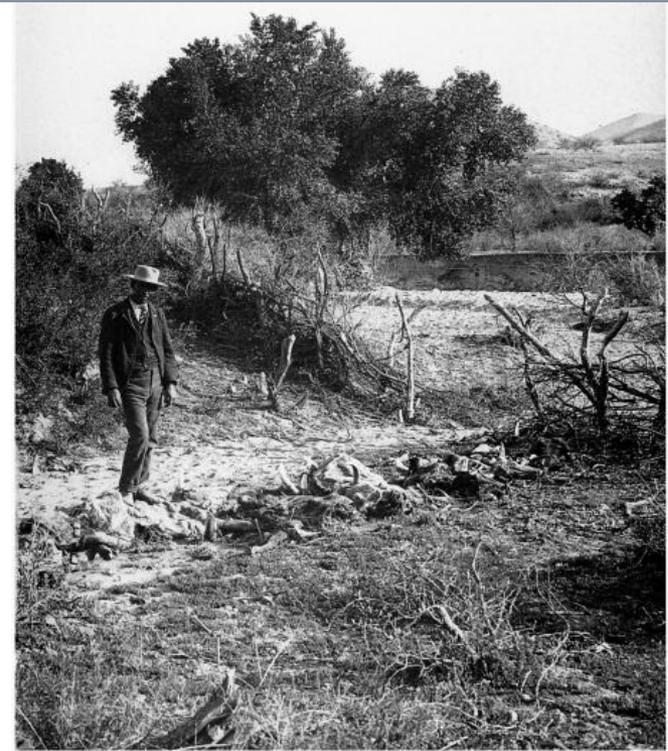
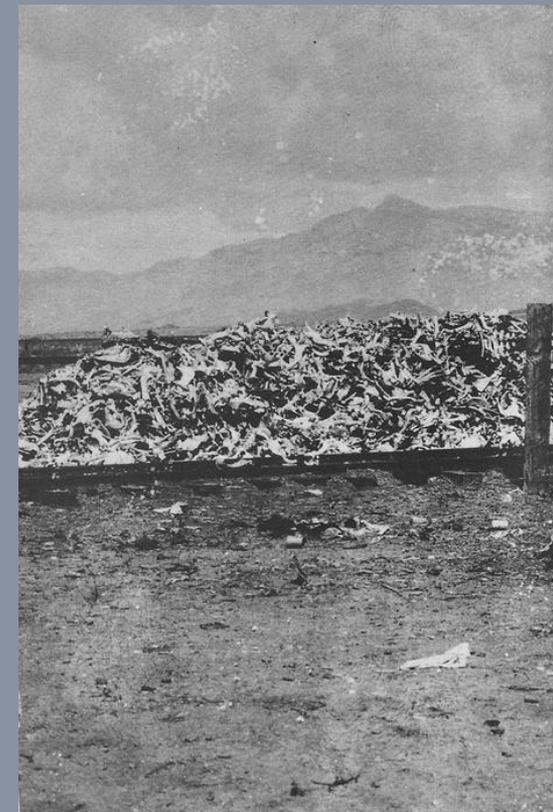


Figure 5.  
Dead cattle near Arivaca, Arizona, April 10,  
1903. Photography D. A. Griffiths.  
Courtesy of the National Archives, Washington, D.C.  
(Photograph No. BGS-23-17801)



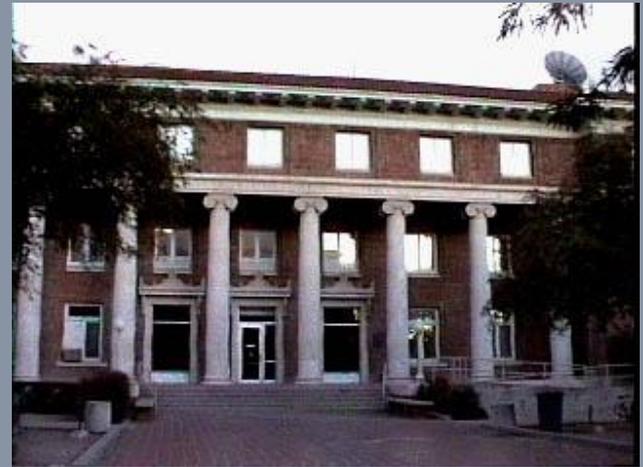
The cattle crash in the 1890s, especially acute in southern AZ, led to establishment of the Santa Rita Experimental Range.



# Robert H. Forbes, AZ Ag Experiment Station 1894, director 1899 – 1917



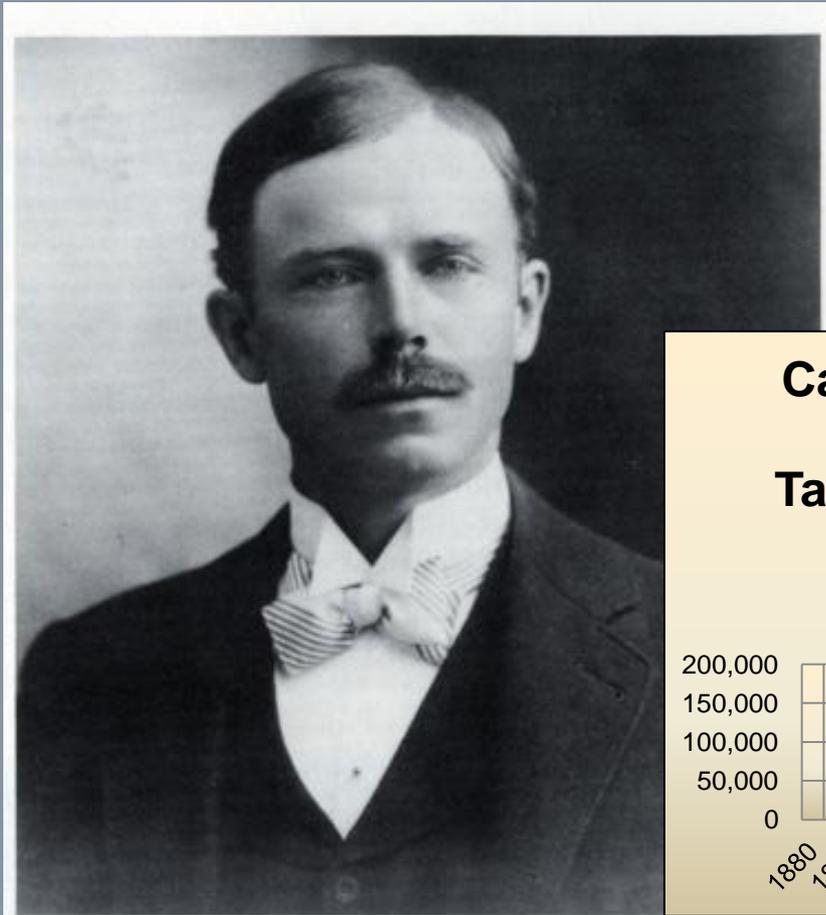
Robert H. Forbes, about 1900.



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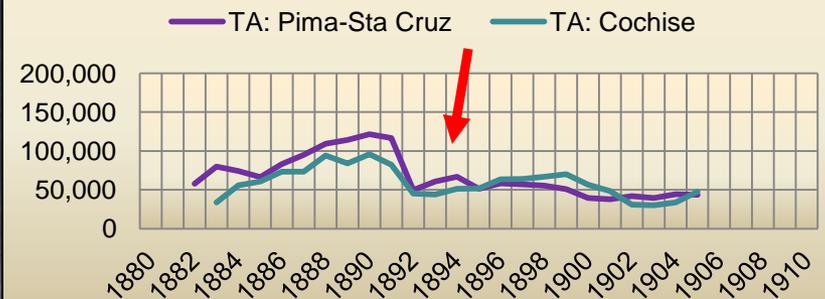


# Robert H. Forbes, AZ Ag Experiment Station 1894, director 1899 – 1917



Robert H. Forbes, about 1900.

## Cattle in Pima and Cochise Counties of Arizona Tax Assessor Data , 1882 to 1905



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**Open or free range** at the time of the cattle crash was unassigned, unfenced, unreserved public (federal) land used by anyone with livestock, access to water, and enough influence.



No. 49727A 3-28-20 [28 March 1920]

“Showing contrast between inside of Pasture 8A [enclosed] and unenclosed range.

”On outside only weeds... inside a good stand of slender grama, black grama, etc.

“At this time poppies in blossom inside, grazed off on outside.

”Santa Rita R. R. [Santa Rita Range Reserve, name of SRER from 1910 - 1921].”



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Open range “**created chaotic conditions** in many western range areas **by the late 1880’s and 1890’s.**” W. D. Rowley, 1985, p. 15.

**First recognized** as a problem by John Wesley Powell (explorer of the Colorado River and geologist) in **1878.**



Robert Forbes, AZ Ag Exp Station 1894,  
director 1899 – 1917

“The **ruinous** methods which seem  
inevitable upon **a public range, which, being  
everybody’s property, is nobody’s care....**”

Robert H. Forbes, University of Arizona,  
**1901**



Robert H. Forbes, about 1900.



Forbes called it “the open range regime.”



Robert H. Forbes, about 1900.



Ranchers were caught in an untenable position: damned if they did overgraze, damned if they didn't... because their neighbors would.



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Once grass cover was gone, erosion was also inevitable

Caption: ...10 minutes after a summer shower, showing the water breaking the sod on a cattle trail, making the first wash or cut in the valley....

Photo published in 1902



VIEW TAKEN IN A GLADE IN THE CAPITAN MOUNTAINS, NEW MEXICO, TEN MINUTES AFTER A SUMMER SHOWER, SHOWING THE WATER BREAKING THE SOD ON A CATTLE TRAIL, MAKING THE FIRST WASH OR CUT IN THE VALLEY.



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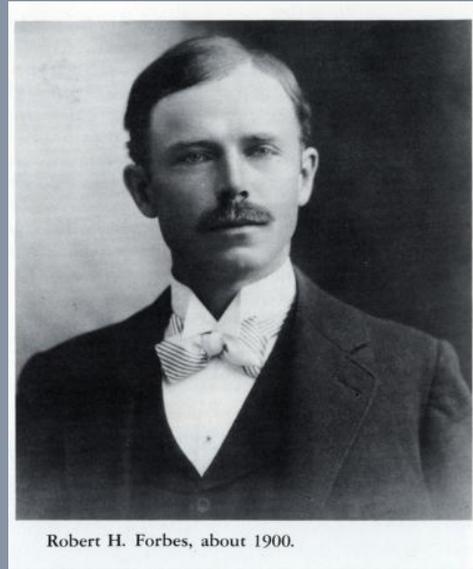
- Forbes wished to learn how to recover devastated rangeland and how to avoid repeating the 1890's catastrophe
- Promoted a large study area for these purposes



Robert Forbes, ready for Africa

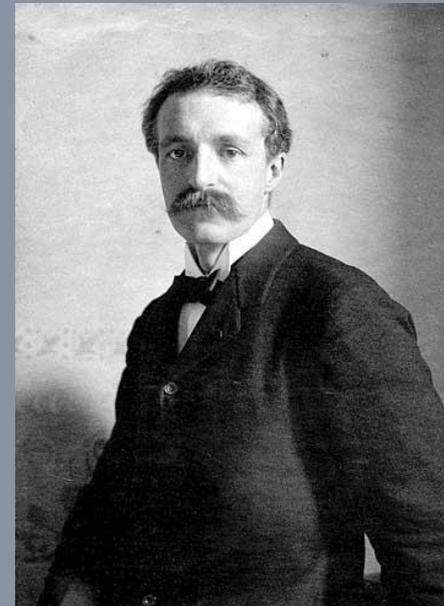


- In **August 1901** at the annual meeting of the American Forestry Association, in Denver, **Robert Forbes (UA)** presents a talk knowing **Gifford Pinchot** (head of USDA's Bureau of Forestry) would be in the audience. He proposes large range reserves to study the problem and create solutions.



Robert H. Forbes, about 1900.

Robert Forbes



Gifford Pinchot, “father” of the US Forest Service, **head of the US Bureau of Forestry, USDA**, a founder of “wise use” conservation philosophy

THE OPEN RANGE AND THE IRRIGATION FARMER.\*

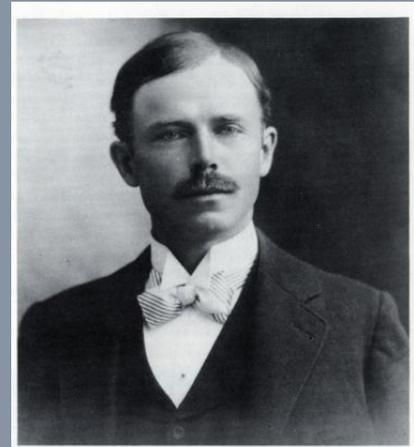
BY PROFESSOR R. H. FORBES,  
Director of Arizona Agricultural Experiment Station.

PART I.

AMONG the great public works, which look towards the upbuilding of the great West, especially important because of its immediate effects upon irrigation, is that of forest preservation and

I refer to the numerous grasses, so characteristic of vast areas of western country. I will speak more in detail of that region best known to me, the Great Southwest, within whose vague boundaries are

in equally arid leaves during makes its gains, when the hunger away its moisture Many forms of leaf-surfaces, or varnish, which utmost. Other ever, less harsh genuity to supply comparative abundance velop extraordinarily penetrate deeply The mesquite t



Robert H. Forbes, about 1900.

Day," "The Influence of Forests on Agriculture and Manufactures." The Tennessee Forest Association has been quite active in its efforts to arouse the people of that state to a full apprecia-

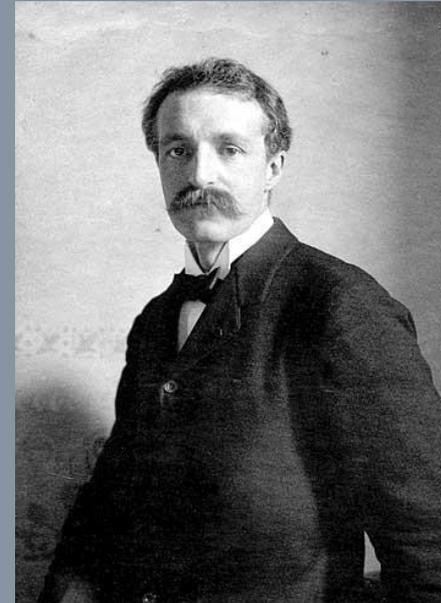
tion of the need of caring for its remaining forests and this meeting should do the cause a lot of good. A full account of this meeting will be printed in the December FORESTER.

GRAZING IN THE FOREST RESERVES.

BY GIFFORD PINCHOT,  
Forester U. S. Department of Agriculture.

TOGETHER with irrigation the grazing question is to-day decidedly the most important problem of the National Forest Reserves. At present only in rare instances does the value of timber

rules based upon theoretical considerations. Local rules must be framed to meet local conditions, and they must be modified from time to time as local needs may require.

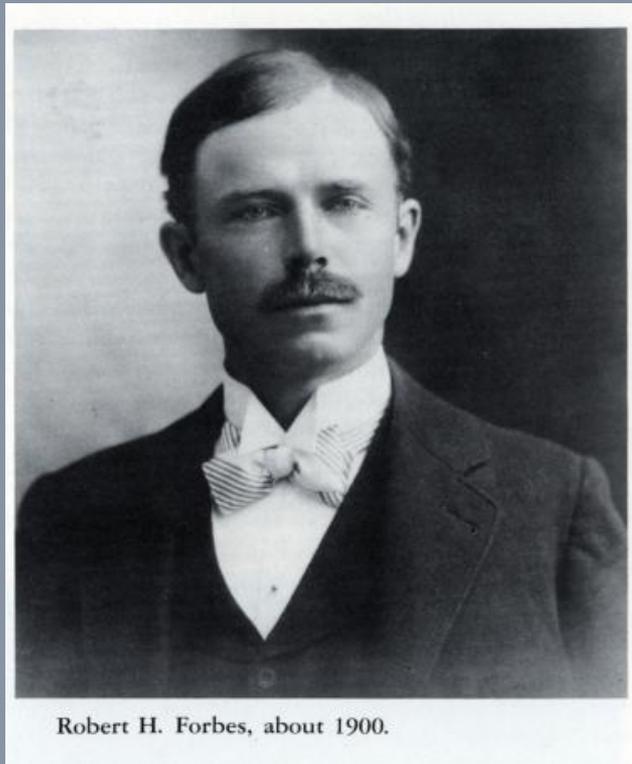


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Papers presented at the AFA meeting, August 1901

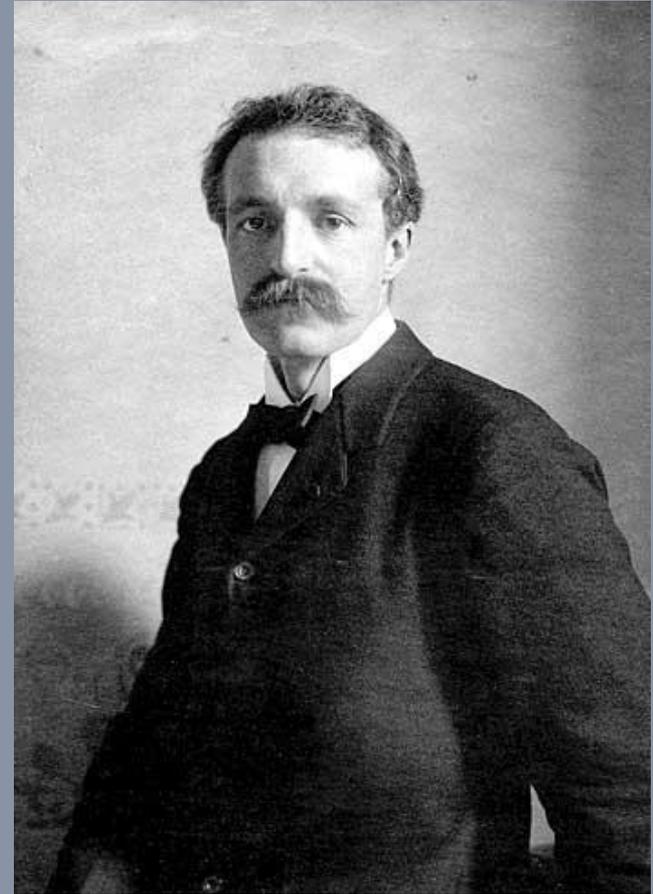


- Pinchot embraces Forbes proposed range reserve.



Robert H. Forbes, about 1900.

Robert Forbes



Gifford Pinchot, “father” of the US Forest Service, a founder of “wise use” conservation philosophy



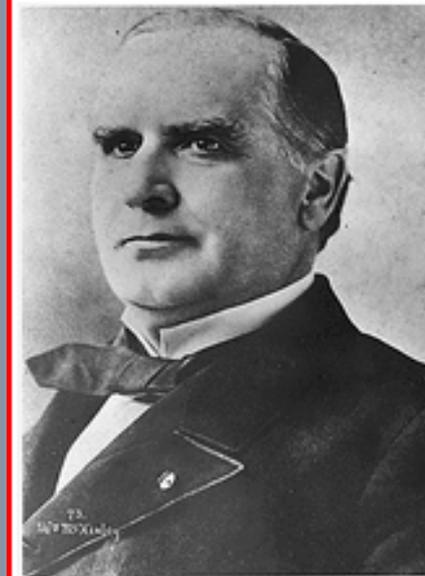
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- (Forbes met with Pinchot August 1901)
- McKinley is assassinated September 1901 during his first year in office



Leon Czolgosz shoots President McKinley with a concealed revolver.



President William McKinley.

*Picture courtesy of the U.S. National Archives and Records Administration.*



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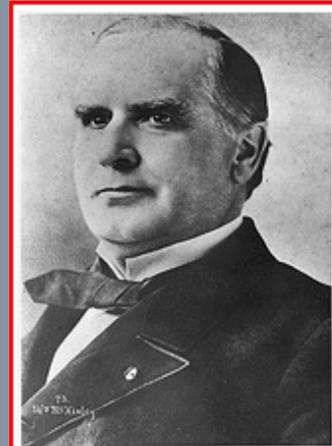


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- (Forbes met with Pinchot August 1901)
- (McKinley was assassinated September 1901 during his first year in office)
- Theodore Roosevelt, VP under McKinley, ascends to presidency

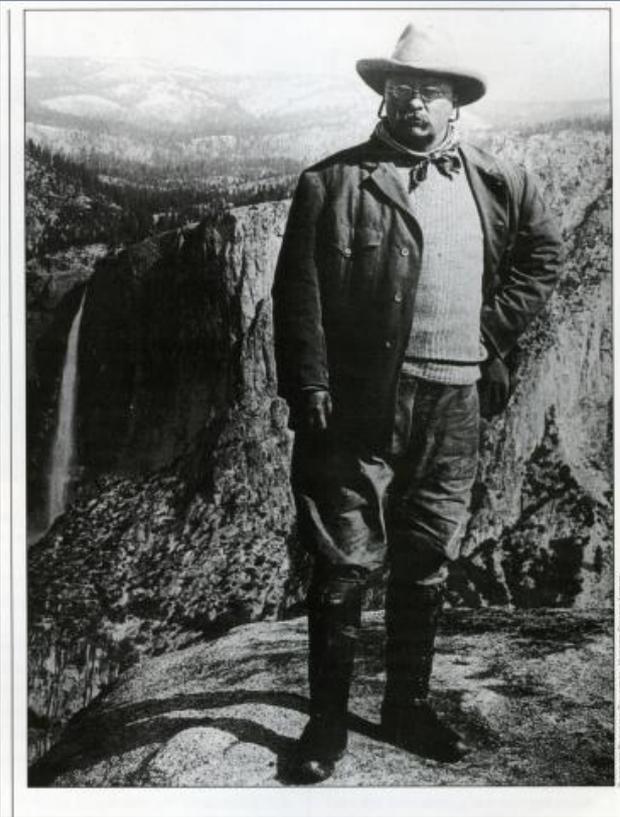


Newspaper sketch of Theodore Roosevelt's inauguration, minus the customary Bible.



President William McKinley.

*Picture courtesy of the U.S. National Archives and Records Administration.*



Teddy Roosevelt establishes the **Santa Rita Forest Reserve** by executive action on April 11, 1902, **just eight months** after Robert Forbes introduced the idea of a Range Reserve to Gifford Pinchot

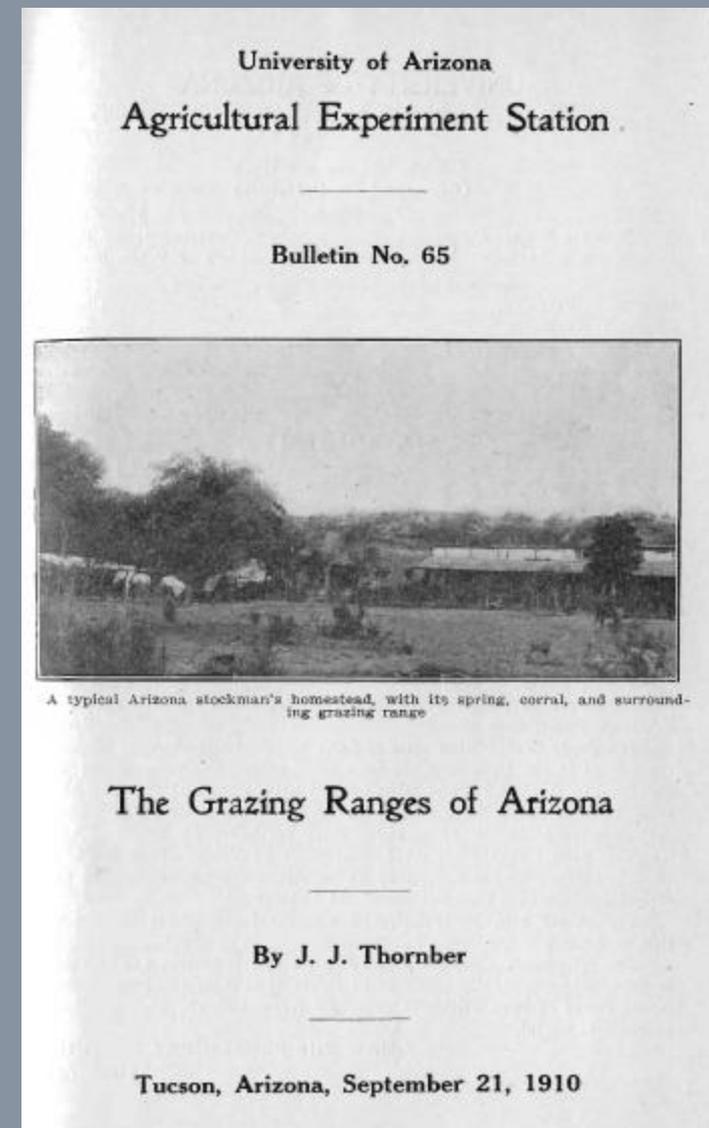


“April 11, 1902, by proclamation of President Roosevelt, the Santa Rita Forest Reserve was established....

“It has always been known that much of this reserve was but thinly forested, and some of it not at all. At the time the reserve was created, however, its purpose was expressly understood to be the study of grazing range problems with a view, if possible, to a demonstration on a large and convincing plan, of range restoration and control.”



Page 247



In 2006 there were 77 formally designated federal experimental forests and ranges, and additional experimental watersheds.

The Santa Rita Experimental Range, dating from 1902, was the first federal outdoor laboratory of any type still functioning today.



**SRER**

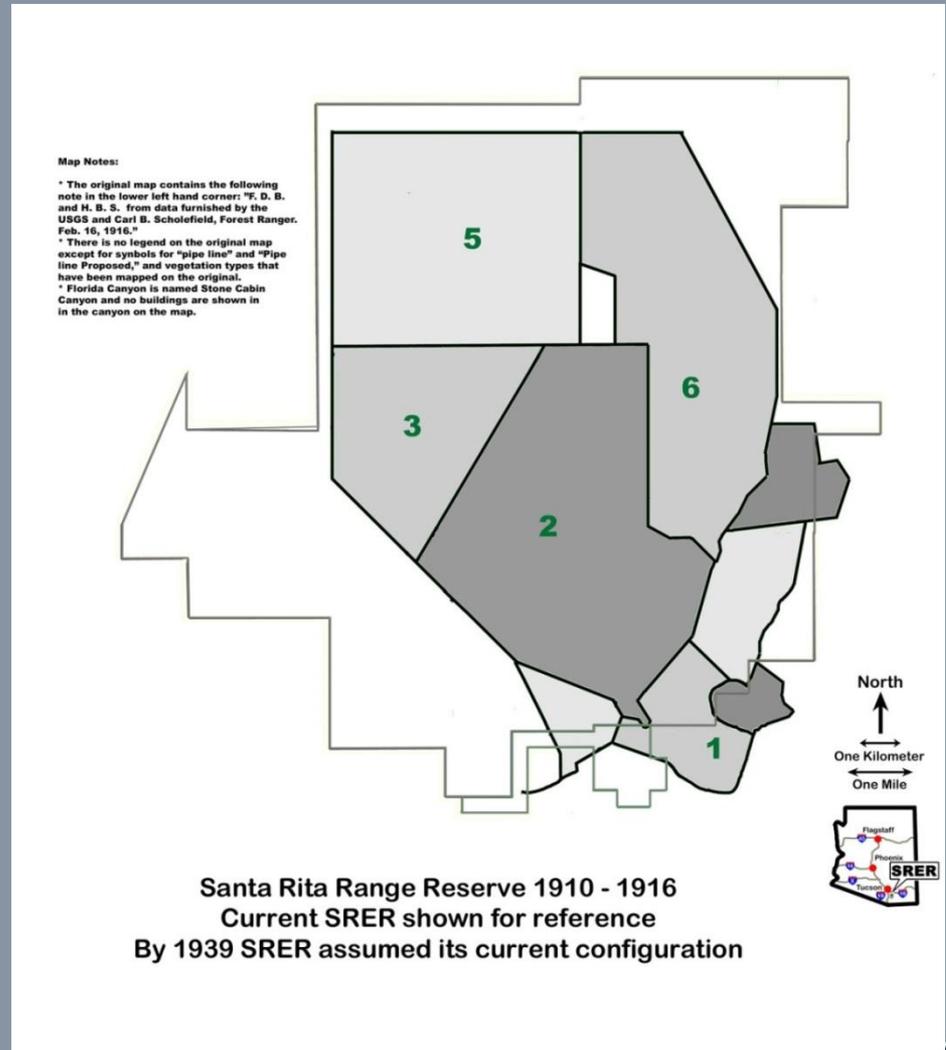
Ft. Valley Exp. Forest  
Established 1908



Jornada Exp. Range  
Established 1912



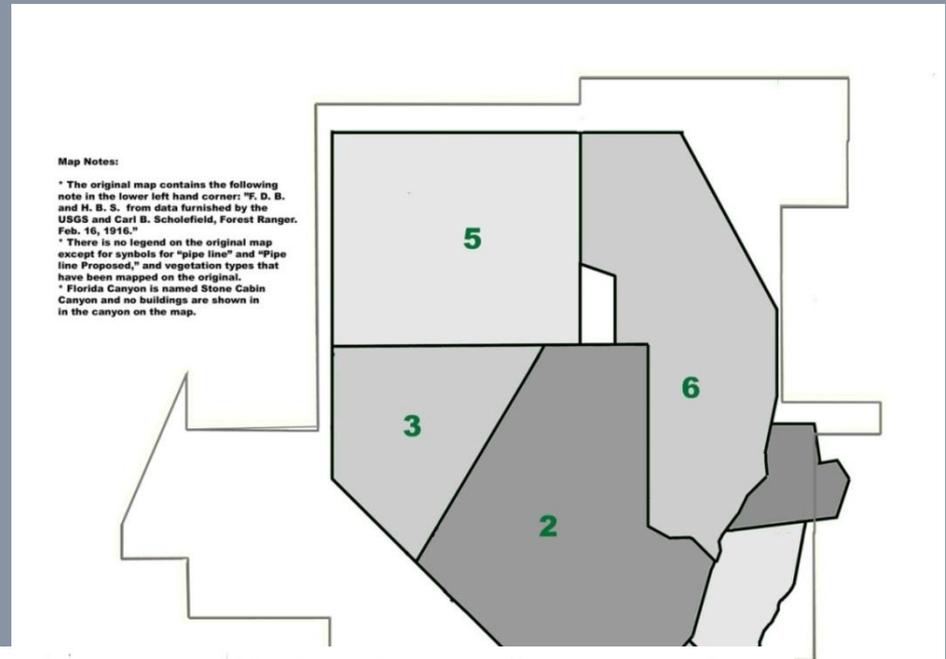
A 49 section area, fenced in 1902, is the oldest continuously protected and studied rangeland in the world.



**SRER**



“That the founding management act of the Santa Rita Experimental Range was fencing its perimeter is emblematic of circumstances at the time.” Nathan Sayre, Centennial Symposium, 2003, p. 3.



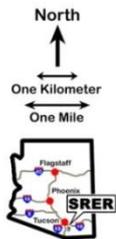
No. 49727A 3-28-20 [28 March 1920]

“Showing contrast between inside of Pasture 8A [enclosed] and unenclosed range.

”On outside only weeds... inside a good stand of slender grama, black grama, etc.

“At this time poppies in blossom inside, grazed off on outside.

”Santa Rita R. R. [Santa Rita Range Reserve, name of SRER from 1910 - 1921].”





## ***The Santa Rita Experimental Range***

- ***How to recover the range from overgrazing***
- ***How to prevent overgrazing and boom - bust cycles***
- ***I.e. sustainable management***



***Observing Grazing Behavior from a Truck***

Photo by Matt Culley.  
December 1937.



***Roadster at Protected Area***

Photo by R. R. Hill. September 12, 1919

# How SRER Research helped change the course of Wildlife and Resource Management



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LIFE SCIENCES

“By... 1929, the Predator and Rodent Control Branch of the US Biological Survey was a force to be reckoned with. Brown 2012 p. 172.



Up to a dozen wolves were taken in southeastern Arizona in the late 1940's. By 1950 “the day of the wolf was finally over.” David Brown, Bringing back the Game, 2012, p. 182

Lobo killed with cyanide shell at Santa Rita. Another photo showing this kill says it came from the Red Tank Area of SRER.

Unmounted, un-numbered photo that appears to be an enlargement of A47-32. On back: "Lobo wolf killed with cyanide shell at Santa Rita in June of 1947 - This is the first lobo caught in many year - and the first ever caught by the Fish & Wildlife Trapper in picture. Photo by Culley." [Other photos in this series say May 1947.]

1910's – 1940's: crop and forage damage by rodents (including rabbits) led to eradication programs

“Cooperative campaigns for the Control of ground squirrels, prairie-Dogs, and jack rabbits.” W. B. Bell

YEARBOOK  
OF THE  
UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

1917

COOPERATIVE CAMPAIGNS FOR THE CONTROL OF  
GROUND SQUIRRELS, PRAIRIE-DOGS, AND JACK  
RABBITS.

By W. B. BELL,

*Assistant Biologist, Bureau of Biological Survey.*

**N**ATIVE RODENTS cause losses of crops in the United States amounting to many millions of dollars each year. Everywhere present, when a region is first settled they persist and frequently adapt themselves in a surprisingly short time to feed upon cultivated crops. Because of their great abundance and remarkable fecundity they have resisted successfully the sporadic individual efforts of the tillers of the soil to eradicate them. Their long-continued inroads into



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Bell, W. B, (1917):

“In States west of the Mississippi River prairie-dogs, ground squirrels, pocket gophers, rabbits, cotton rats, and field mice have taken a continually increasing toll from the crops of wheat, oats, corn, barley, and other cereals... and from pasture ranges.... **The value of crops destroyed annually from these sources in the United States has recently been estimated to be in excess of \$150,000,000.**” p. 226

In 2015 dollars = about **\$3 billion**



Bell, W. B, (1917):

“With due foresight, proper organization, and a direction of campaigns by men trained and experienced in approved methods, **success in the eradication of noxious rodents is practically assured.**”

p. 233



UNITED STATES  
DEPARTMENT OF AGRICULTURE

YEARBOOK 1920



DEATH  
to the  
RODENTS

By W. B. BELL,

*Assistant Biologist in Economic Investigations,  
Bureau of Biological Survey.*

Damage from rodents and rabbits now = \$500 million  
( >\$8 billion 2015 dollars)



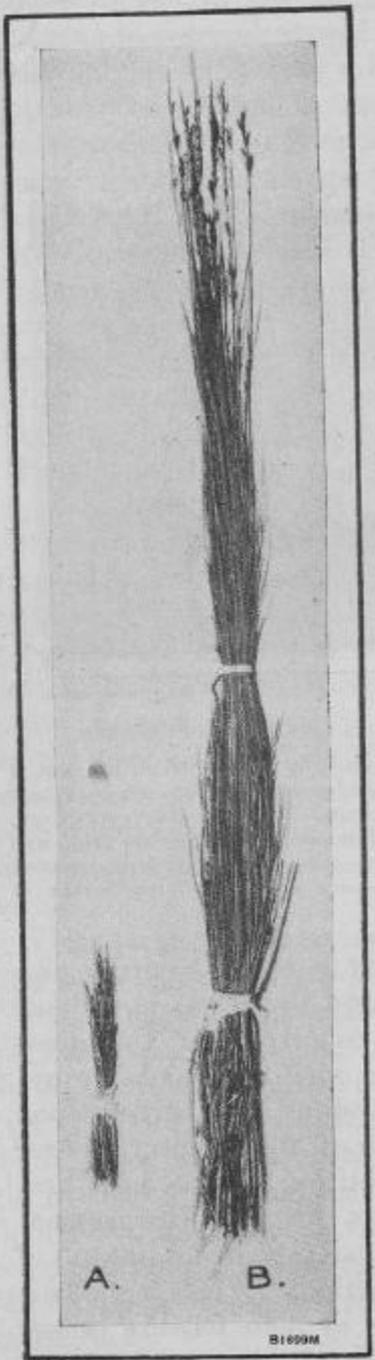
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LIFE SCIENCES

Bell, W. B. (1920):

Re: jack rabbits and rangeland pastures

“Large areas of Government lands, cleared of rodents by Biological Survey field parties, had shown quick recovery of forage grasses and marked increase in the number of cattle and sheep that could be carried on them. Smaller demonstration plots... showed grass knee high on land where rodents had been destroyed... in contrast with... land immediately adjoining, where the rodents had been left in their usual numbers.

p. 426

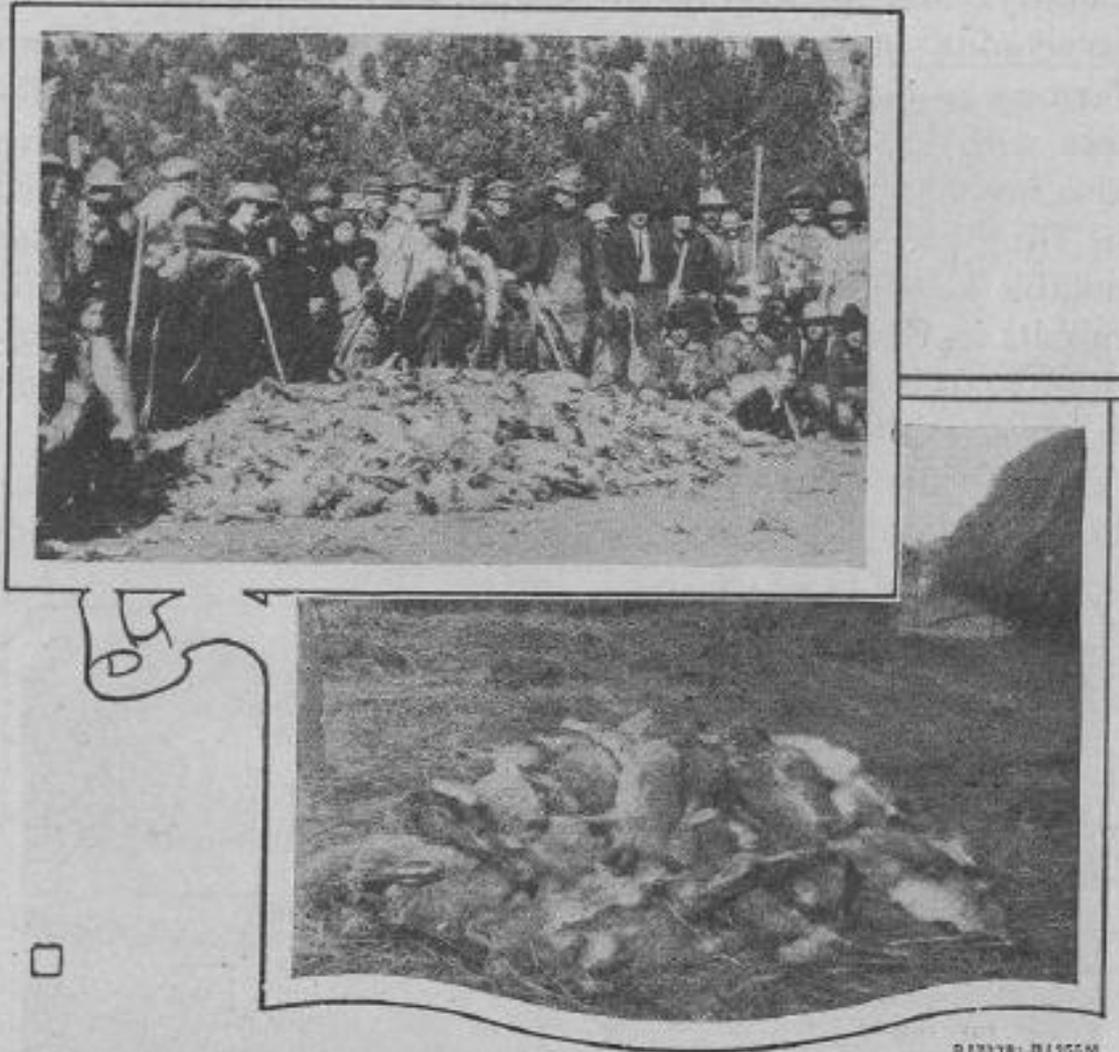


Typical Grass Specimens from  
Experimental Plots.

A. The best samples found in the inclosure where the prairie-dog population was normal. B. Sample of normal production in adjacent plot, where prairie dogs had been eradicated and reinfestation prevented.



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### Poison and Drives Get Results Against Jack Rabbits.

Farmers and stockmen, tired of seeing growing crops and stacked hay destroyed by jack rabbits, appealed to their Government for assistance. The systematic distribution of poison and the conduct of organized drives have accounted for many thousands of jack rabbits and have afforded practically complete protection from their depredations in localities where the work was undertaken.

Bell, W. B. (1920)  
Caption: "Poison  
and Drives Get  
Results Against  
Jack Rabbits."  
p. 435

# How to Combat

Rabbits, Gophers, Prairie Dogs, Coyotes, Ants  
and Grasshoppers

---

BY ARTHUR L. PASCHALL

---

Tucson, Arizona, November 15, 1917

“Both jackrabbits and cottontails can be controlled and largely exterminated by systematic poisoning.”  
p. 325

Arizona Agricultural Experiment Station, Bulletin 81



Paschall, A. L. (1917): “**everyone over ten years** old should take an active part [in community drives to get rid of jackrabbits].”

p. 321

## RABBITS

Speaking in a general way, there are two kinds of rabbits, the large jackrabbits (two species), and the smaller cottontails. The best time to combat both kinds is in winter when their natural food is scarce. This is also when they do the most damage.

### RABBIT DRIVES

While jackrabbits are usually more destructive than cottontails they are also easier to control by means of community rabbit drives, which is the most rapid way of getting rid of them. In carrying out such a drive the whole community should be interested and every one over ten years old should take an active part.

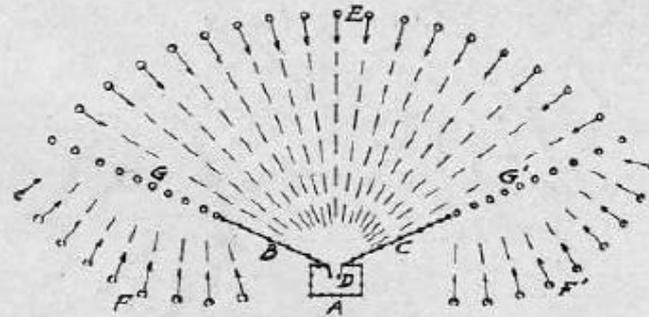
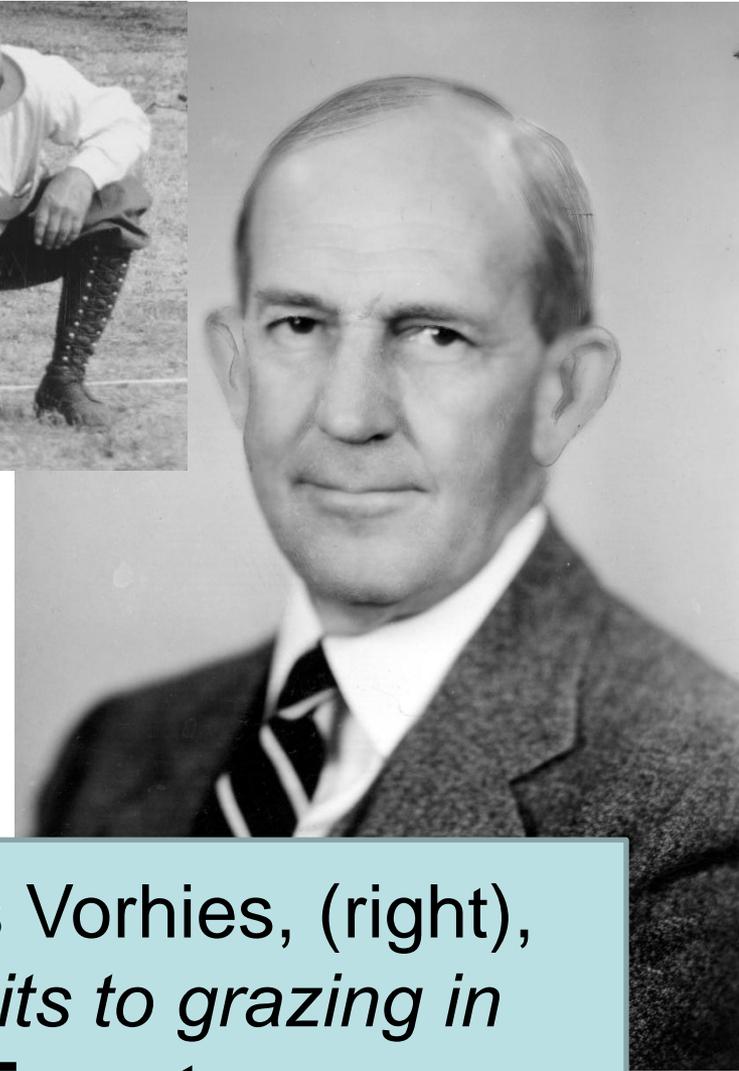


Fig. 2.—Plan of rabbit drive.

*Plan of drive*



# ANTELOPE JACK PIONEERS



Walter Taylor, (left) and Charles Vorhies, (right), 1935, *"The relation of jack rabbits to grazing in southern Arizona,"* **Journal of Forestry**

Taylor, Walter P. 1930. Methods of determining rodent pressure on the range. *Ecology*. 11(3): 523-542.

Taylor, Walter P.; Vorhies, Charles T.; Lister, P. B. 1935. The relation of jack rabbits to grazing in southern Arizona. *Journal of Forestry*. 33(5): 490-498.

Vorhies, Charles T.; Taylor, Walter P. 1933. The life histories and ecology of jackrabbits, *Lepus alleni* and *Lepus californicus* spp., in relation to grazing in Arizona. Technical Bulletin 49. Tucson, AZ: University of Arizona, Agricultural Experiment Station. 117 p.

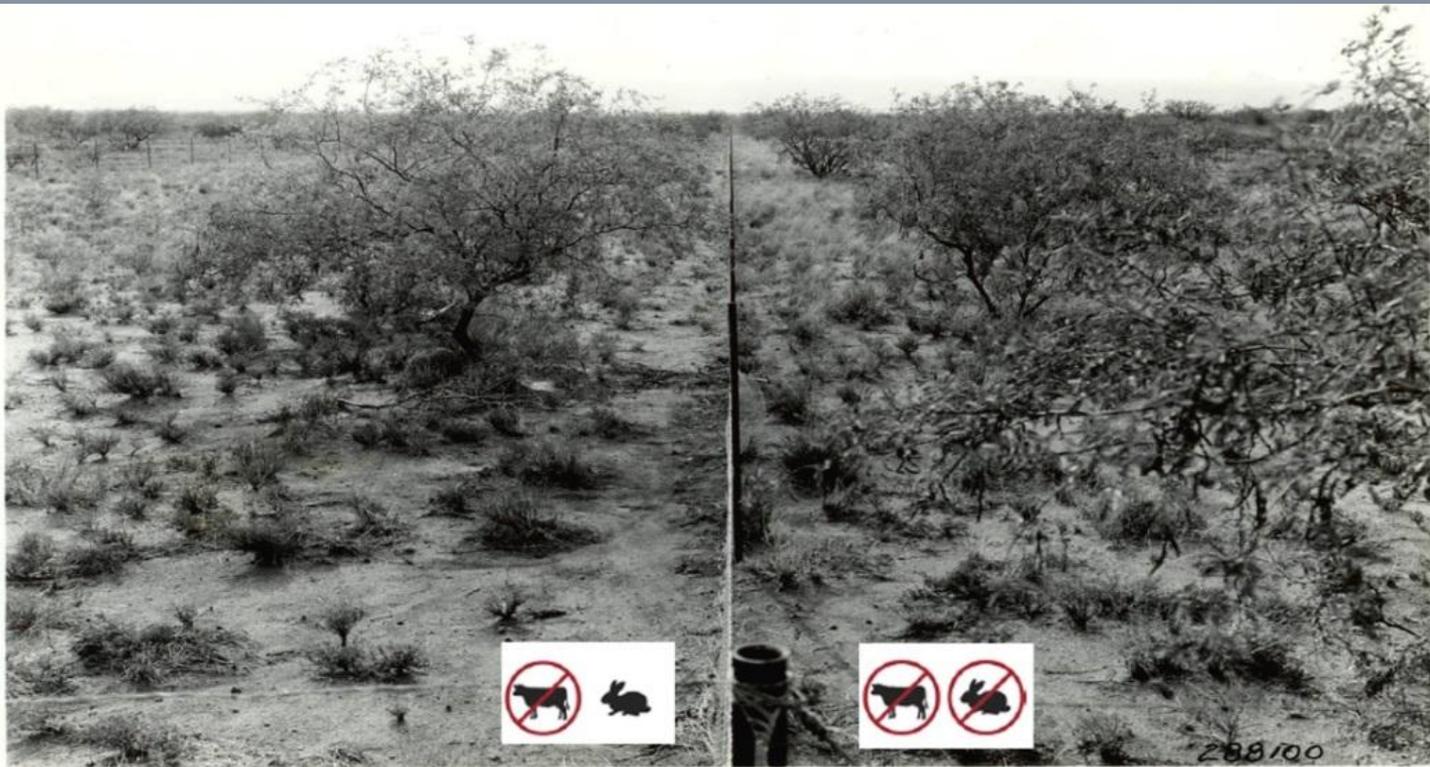
Arnold, Joseph F. 1942. Forage consumption and preferences of experimentally fed Arizona and antelope jackrabbits. Technical Bulletin 98. Tucson, AZ: University of Arizona, Agricultural Experiment Station. 86 p.



## Jackrabbit – range forage relationships studied at SRER, 1920's – 1940's



No. 344402 3/4/37 "Rodent and rabbit cages being installed at Desert Grassland Station by ERA workmen. Photo by Cribbs, 3/4/37. Rat cages are 5 x 10 feet, 4 feet high and rabbit cages are 5 x 20 feet, 4 feet high covered with rodent proof wire. Ground plots were established and rodent proof wire buried to a depth of two feet, so as to prevent the rodents and rabbits from burrowing out. Numerous such plots are provided so that as the rodents eat up the forage in one cage it may be moved to a new location."



Temp. No. I210

Perm. No. 288100

One of a series of photos dated 6/21/33  
Symbols from D. M. Browning, et al., 2014  
(MH)

From east end of north division at Isolation Transect. Looking west and showing contrast between rabbit grazed (left) and rabbit protected (right) areas. Use of perennial grasses on rabbit grazed side is almost as heavy as total use on open grazed range adjacent. Immediate foreground shows plots 35-32.2-43.1(left) and 35-32.3-43.1(right). Photo by S.R.E.R. Light clouds. 1/2 x 22



## Some results from Taylor and Vorhies:

- Jackrabbits preferred plants in order of weeds, grasses and browse with the first two making up the major and about equal parts of the diet.
- “Vorhies and Taylor (1933) determined ... that 74 antelope jackrabbits (*Lepus alleni*) or 148 California jackrabbits (*Lepus californicus*) will eat as much feed as one cow.” Robert H. Humphrey, *Range Ecology*, 1962, p. 123.
  - **Need to kill 1000 jackrabbits (and control numbers to that reduced level) to increase a herd by just 10 cows!**



Taylor and others (1935)... argued that wild animals should be considered in maintaining balanced rangelands.”

Krausman, P. R. and Morrison, M. L. (2003) p. 60 - 61

In: McClaran, Mitchel P.; Ffolliott, Peter F.; Edminster, Carleton B., tech. coords. Santa Rita Experimental Range: 100 years (1903 to 2003) of accomplishments and contributions; conference proceedings; 2003 October 30–November 1; Tucson, AZ. Proc. RMRS-P-30. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



## CHARLES TAYLOR VORHIES (1879-1949): ARIZONA'S PREMIER NONGAME BIOLOGIST

DAVID E. BROWN, School of Life Sciences, Arizona State University, PO Box 874501, Tempe, Arizona 85287-4501;

RANDY D. BABB, Arizona Game and Fish Department, 7200 E. University Ave, Mesa, Arizona 85207 and;

R. ROY JOHNSON, 3755 S. Hunters Run, Tucson, Arizona 85730

### ABSTRACT

Few people today appreciate the contributions of Dr. Charles T. Vorhies, who at one time was Arizona's foremost naturalist and nongame wildlife expert. A man of varied interests and extraordinary talents, Dr. Vorhies not only excelled as a research biologist and ecologist, he published his work in numerous scientific and popular articles. Equally at home in the field or on the campus, Vorhies, notwithstanding his early training in entomology, was the foremost authority on Southwest mammals, birds, reptiles and insects. He was also an ardent conservationist, sharing his knowledge with fellow scientists, bird watchers, and sportsmen so that all might benefit from a more knowledgeable outdoor community. A co-founder with Dr. Walter P. Taylor of the Tucson Natural History Association and Arizona Game Protective Association (AGPA) the forerunner of the Arizona Wildlife Federation, Vorhies was in the words of a colleague, "the Arizona Wildlife Federation in person."

*2015 JOURNAL OF THE ARIZONA-NEVADA ACADEMY OF  
SCIENCE 46(1):18-23.*



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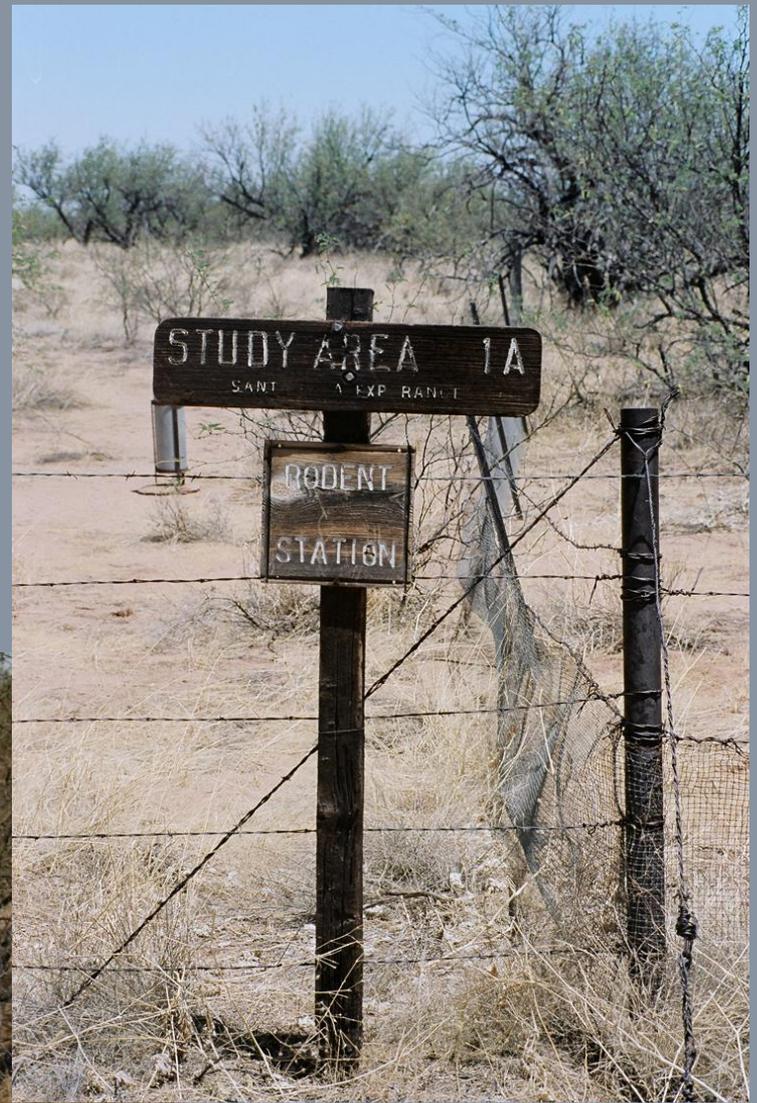
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“Although much of his work involved investigating... ‘pest’ species, he came to value the adaptability of his subjects, considering population irruptions of both species of jackrabbits to be more the result of overstocked ranges than the cause, and **did not want these animals exterminated.**” p. 19





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U. S. DEPARTMENT OF  
AGRICULTURE  
FARMERS' BULLETIN No. 1428

SAVING LIVESTOCK  
FROM STARVATION  
ON SOUTHWESTERN  
RANGES



1924

“The [southwest] region would be ideal for livestock raising were it not for the insufficiency of forage in times of drought.”



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# THE OPEN RANGE AND THE IRRIGATION FARMER.

BY PROFESSOR R. H. FORBES,

Director Arizona Agricultural Experiment Station.

PART II.

Oct 1901

Another branch of study applicable to the problem of range reservation is that of the introduction of new species of arid region vegetation capable of taking hold and furnishing additional forage in this country. When we reflect that perhaps half of the areas inhabited by civilized nations are semi-arid in character, including those regions in which formerly flourished the most ancient peoples, the possibilities for discovering drouth-resisting fruits and forage of value are certainly very attractive.

Forbes was thinking about “...the introduction of new species of arid region vegetation capable of taking hold ... in this country.”

p. 255



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LIFE SCIENCES



John James Thornber during deanship, 1922-28.

# Agricultural Experiment Station

Bulletin No. 67



A heavily fruited plant of *Opuntia fulgida*, showing several crops of fruit on the plant at one time. Similar plants have yielded 125 to 150 pounds of fruit.

## Native Cacti as Emergency Forage Plants

By J. J. Thornber

## Nutritive Value of Cholla Fruit

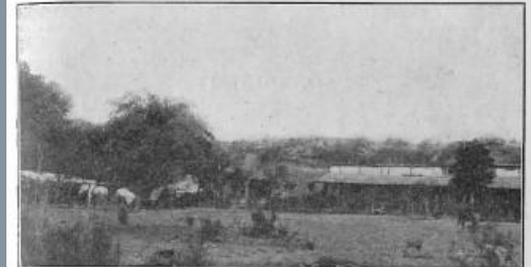
By A. E. Vinson

Tucson, Arizona, December 20, 1911



University of Arizona  
Agricultural Experiment Station

Bulletin No. 65



A typical Arizona stockman's homestead, with its spring, corral, and surrounding grazing range

## The Grazing Ranges of Arizona

By J. J. Thornber

Tucson, Arizona, September 21, 1910



A heavily fruited plant of *Opuntia fulvida*, showing several crops of fruit on the plant at one time. Similar plants have yielded 125 to 150 pounds of fruit.

## Native Cacti as Emergency Forage Plants

By J. J. Thornber

## Nutritive Value of Cholla Fruit

By A. E. Vinson

Tucson, Arizona, December 20, 1911

- Search for dependable forage plants during times of drought
- Observed that cattle naturally turn to eating cacti when forage is lacking, despite “evident discomfort”
- Noted high water content in cacti



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# Compared nutrient values of cholla and hay

TABLE VII.—DIGESTIBLE NUTRIENTS IN CHOLLA FRUIT AND WATER-GRASS HAY.

	Percent digestible materials, with sheep	
	Cholla fruit	Water-grass hay
Dry matter.....	12.8	44.6
Ash.....	1.2	5.9
Protein.....	0.6	3.8
Ether extract.....	0.7	0.3
Crude fiber.....	0.4	17.9
Carbohydrate.....	10.0	16.7



Thornber tested succulents imported in 1899 and 1900 for trials by Prof. J. W. Toumey

## CULTURAL WORK WITH CACTI

### EARLY EXPERIMENTS

In 1899 and 1900, Professor J. W. Toumey, a former botanist of this Station, secured promising varieties of cacti from various parts of the Southwest, also from Argentina, Chile, and Sicily, and made plantings on the University grounds looking to the selection and propagation of varieties that might be of value for growing in this region. Upon Professor Toumey's departure, nothing more was done with this subject until the early spring of 1904, when it was taken up by the writer. The fate of this collection of cacti, many of which were introduced spineless or semi-spineless species, is not only interesting but suggestive of what might be expected under like conditions on the grazing ranges. A substantial barbed-wire fence which

They hoped to find non-thorny drought tolerant succulents.



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Forbes and Thornber conclude:

- Non-native spineless cacti are difficult and expensive to defend against rodents in desert conditions and shrivel under the extreme desert heat
- Forbes admitted to having been wrong in 1901, as shown by research programs he instituted and predicted would succeed
- Concluded to look more at “native, hardy” species, including burning off native cacti spines

1. Under desert conditions spineless cacti are difficult and expensive to defend against their rodent enemies.

5. Native, hardy, spiny varieties, which may be cheaply prepared for cattle by singeing, are more practicable under present economic conditions.





A heavily fruited plant of *Opuntia fulvida*, showing several crops of fruit on the plant at one time. Similar plants have yielded 125 to 150 pounds of fruit.

## Native Cacti as Emergency Forage Plants

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## Nutritive Value of Cholla Fruit

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Tucson, Arizona, December 20, 1911

# Kerosene burner used on SRER in pasture 6, 1919



Burning spines from "The Cholla" for feeding stock during dry spring of 1919 on Ruelas range in Pasture #6.



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- Forbes had a falling out with University administration and left (to work in Africa) in 1917.



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- If he had stayed what emphasis would have been placed on continued testing and planting of introduced plants on SRER?



- Forbes had a falling out with University administration and left (to work in Africa) in 1917.
- If he had stayed what emphasis would have been placed on continued testing and planting of introduced plants on SRER?
- This 1911 study may have been the first negative results SRER research project
- To their credit Forbes and Thornber admitted it!



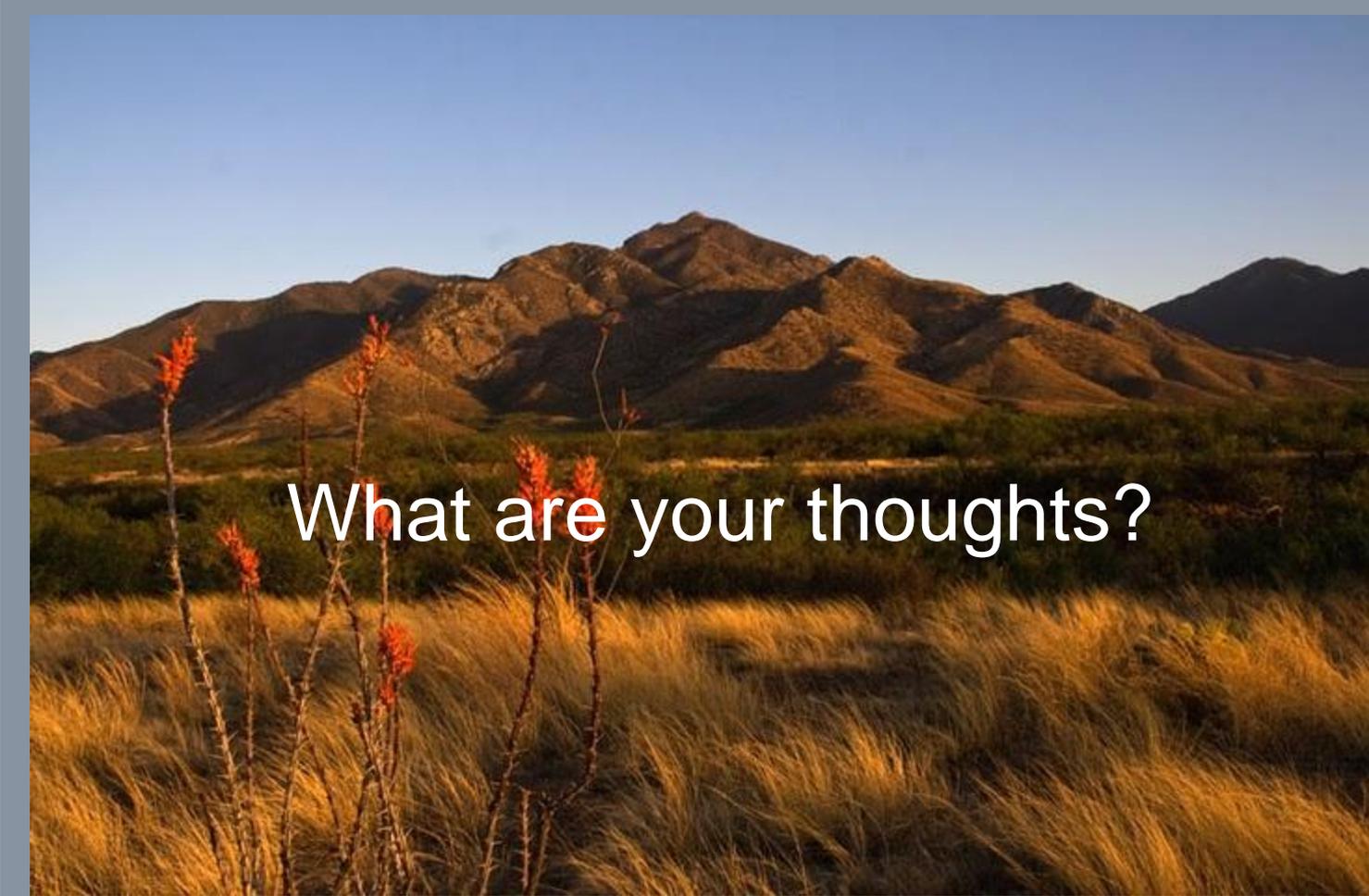
Considering relevance to social and environmental issues, it is harder to decide what SRER studies to exclude than to include



*The challenge for the Santa Rita is to be as relevant in the 21<sup>st</sup> century as it was in the 20<sup>th</sup> century.*

Personal Communication from Mitch McClaran (May 29, 2003)





What are your thoughts?







# Sayre's Periods of Research

- 1901 to 1931: Institutional Consolidation, Revegetation, and Carrying Capacity
- 1932 to 1945: Growth and the Shrub Problem
- 1946 to 1965: Age of Mesquite
- 1966 to 1988: Ecology and the Santa Rita Grazing System



- 1901 to 1931: Institutional Consolidation, Revegetation, and Carrying Capacity

“Two pressing issues dominated the research of this period:

(1) how to restore forage plants decimated by the cattle boom, and

(2) how to measure range resources for management and administration.”

