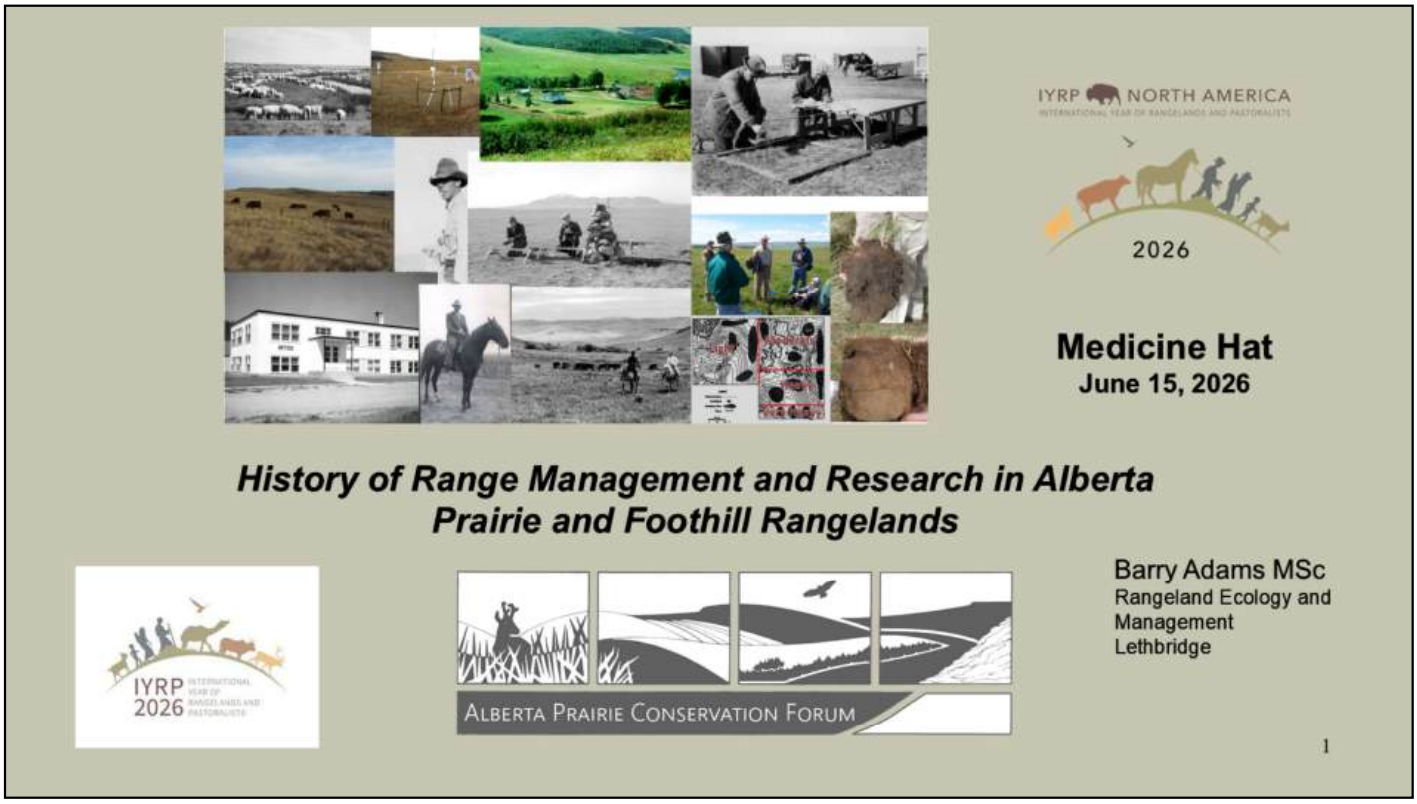


This presentation was first developed for the Alberta Grazing Leaseholders Association back in 2020 and I have been expanding it as we move into the International Year of Rangelands and Pastoralists.

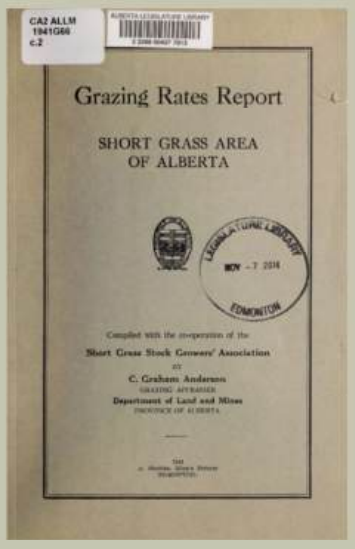
This special year in short is intended to celebrate the land and the people that occupy and manage these native/natural ecosystems.

In this talk I will explore the origins of ranching in both the US and Canada and also the art and science of rangeland management.

I will be referring in particular to the place that Agriculture Substation Onefour has in that history.

Reference documents up next

Grazing Rates Report
Anderson 1941



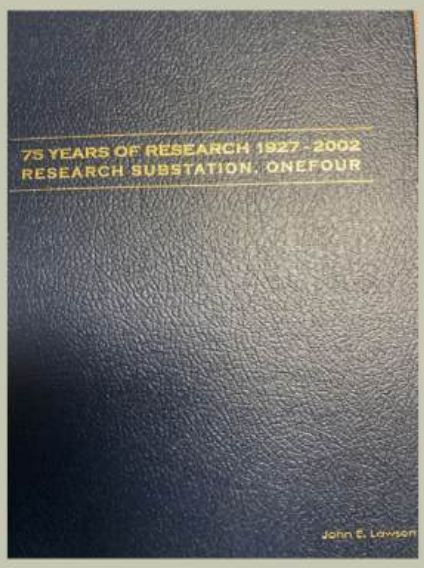
2

-A key publication is the Grazing Rates Report was commissioned by the Province and undertaken by Graham Anderson (the Grazing Appraiser), and published 1941.

It tells a remarkable tale of how rangeland research emerged in prairie Alberta through a collaborative approach between ranchers and researchers whereby the Onefour Range Research Station came in to being.

75 Years of Research 1927-2002
Research Substation, Onefour

J.E. Lawson



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"75 years of Research" is a detailed account of research at Onefour prepared by Dr. John Lawson, a livestock scientist, it runs to 283 pages.

Europeans brought sedentary grazing with no basic understanding of sustainable stocking. A Blackfoot Elder and an Archeologist give us insights to what might have been amiss with early ranching.

Before the fences…

- Over thousands of years, bison migrated between plains and parkland/foothills landscapes driven by cycles of the season, drought, predators and the influence of Indigenous people.

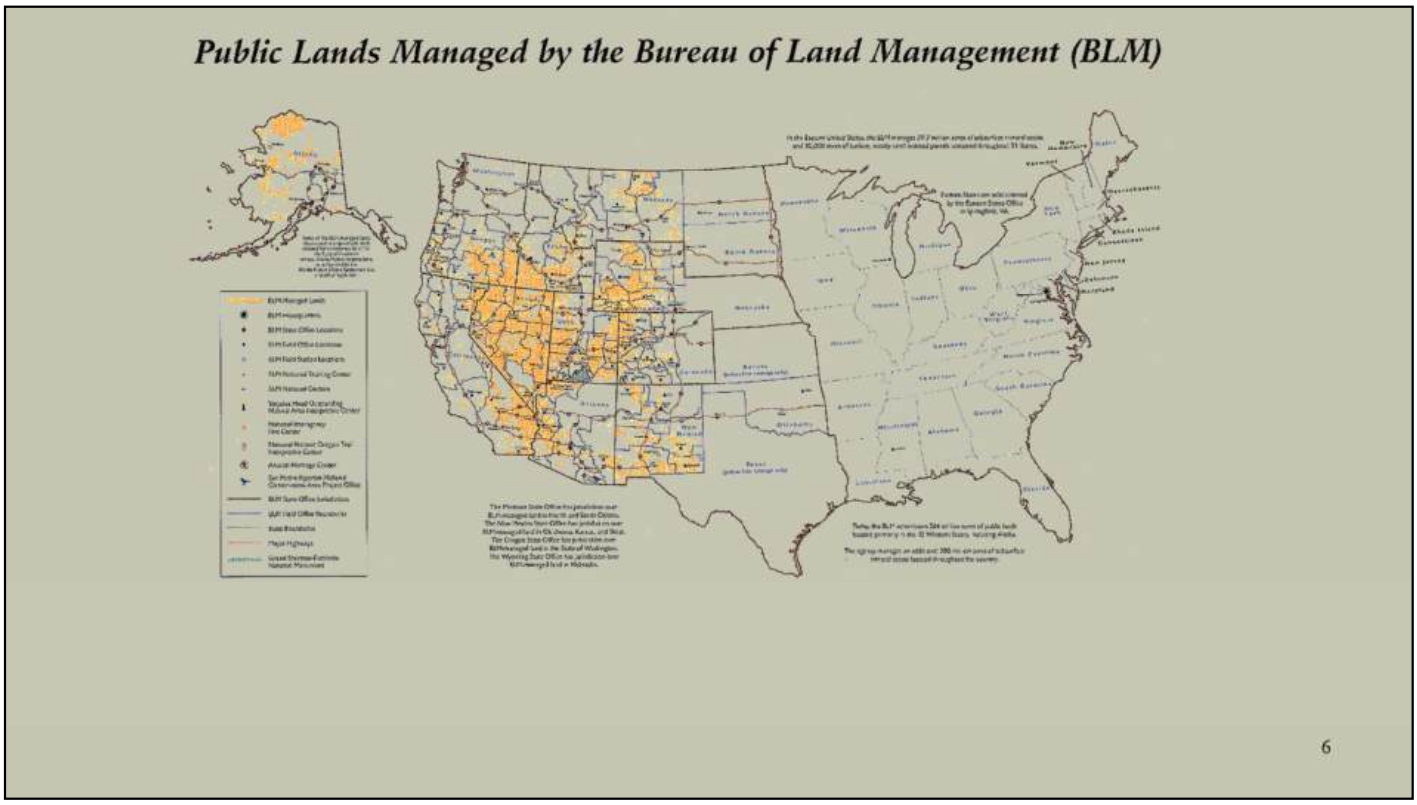
Henry Epp 1988

5

Our basic notion is that Over thousands of years, bison migrated between plains and parkland/foothills landscapes driven by cycles of the season, drought, predators and the influence of Indigenous people.

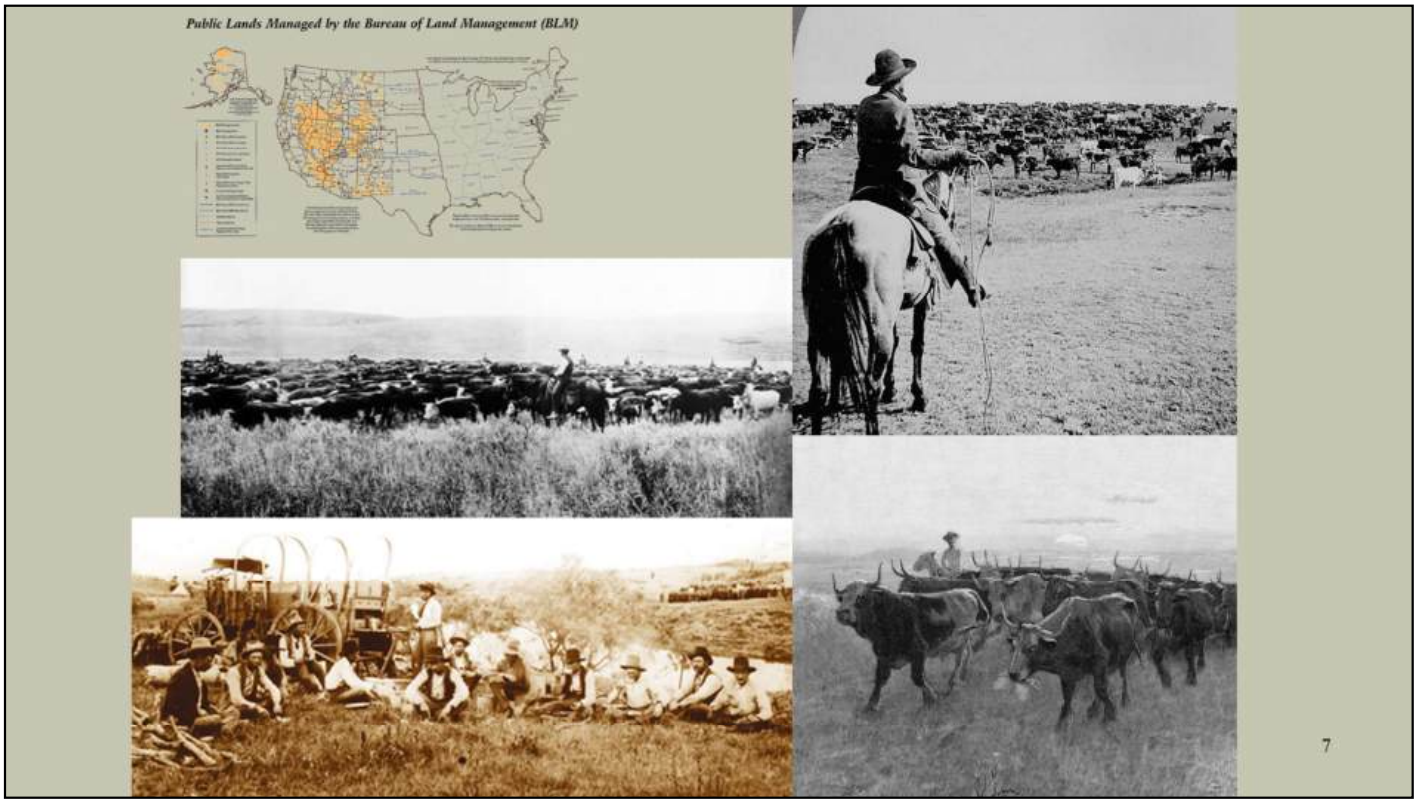
These rocks on the Piikani reserve near brocket are part of the boulder train, just like the big rock at Okotoks.

They are markers of the annual migration of bison



We start by looking south of the border.

The rangelands of the western US were used as free range for many decades, with the public domain not coming under any regulatory control until 1898



The growth of the cattle industry on the Northern and Central Great Plains began in the early 1870's.

Most of the cattle used for base herds in the plains area came from Texas.

By the mid-1880's cattle had reached peak numbers on most Western ranges and range exploitation was at a maximum, followed by some dramatic losses in livestock due to drought, bad winters and starvation.

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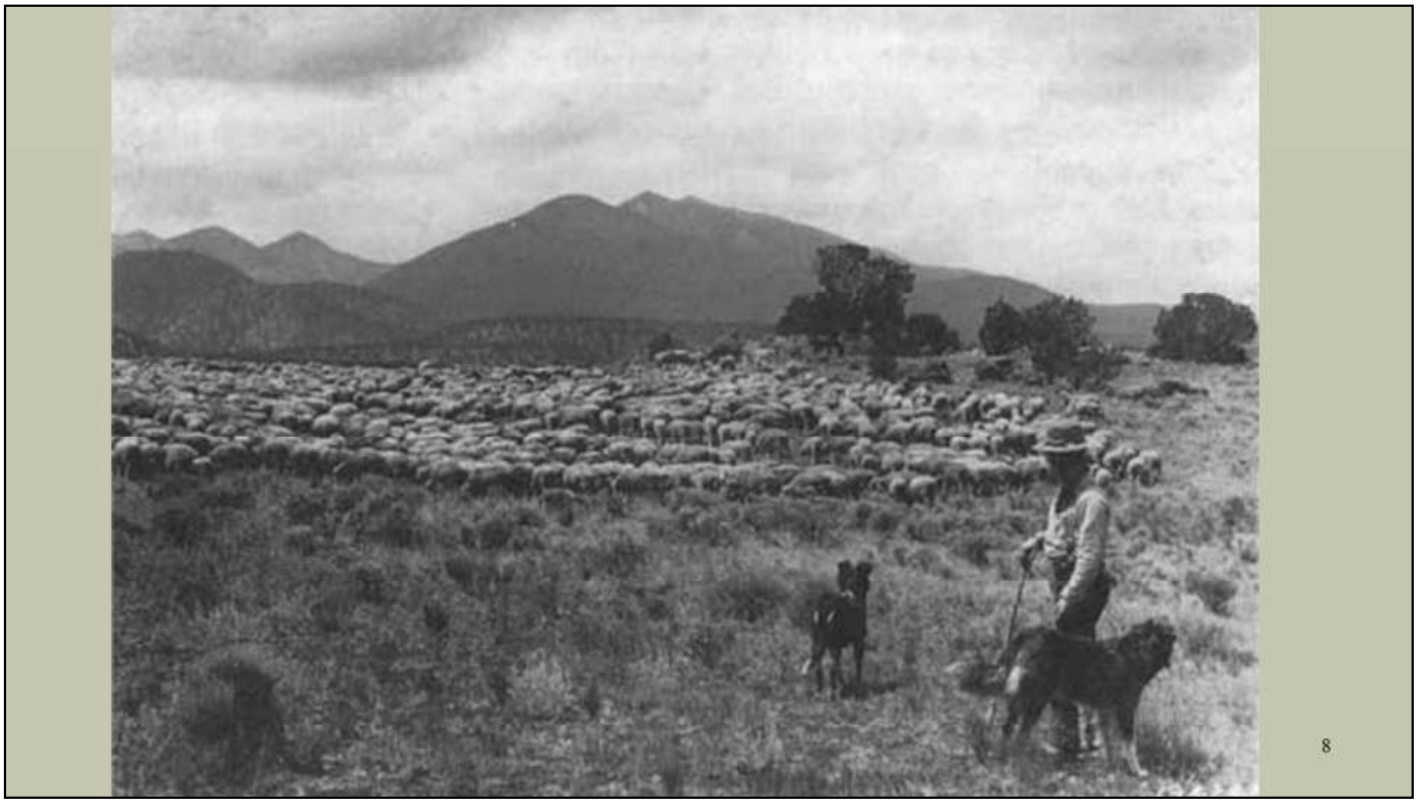
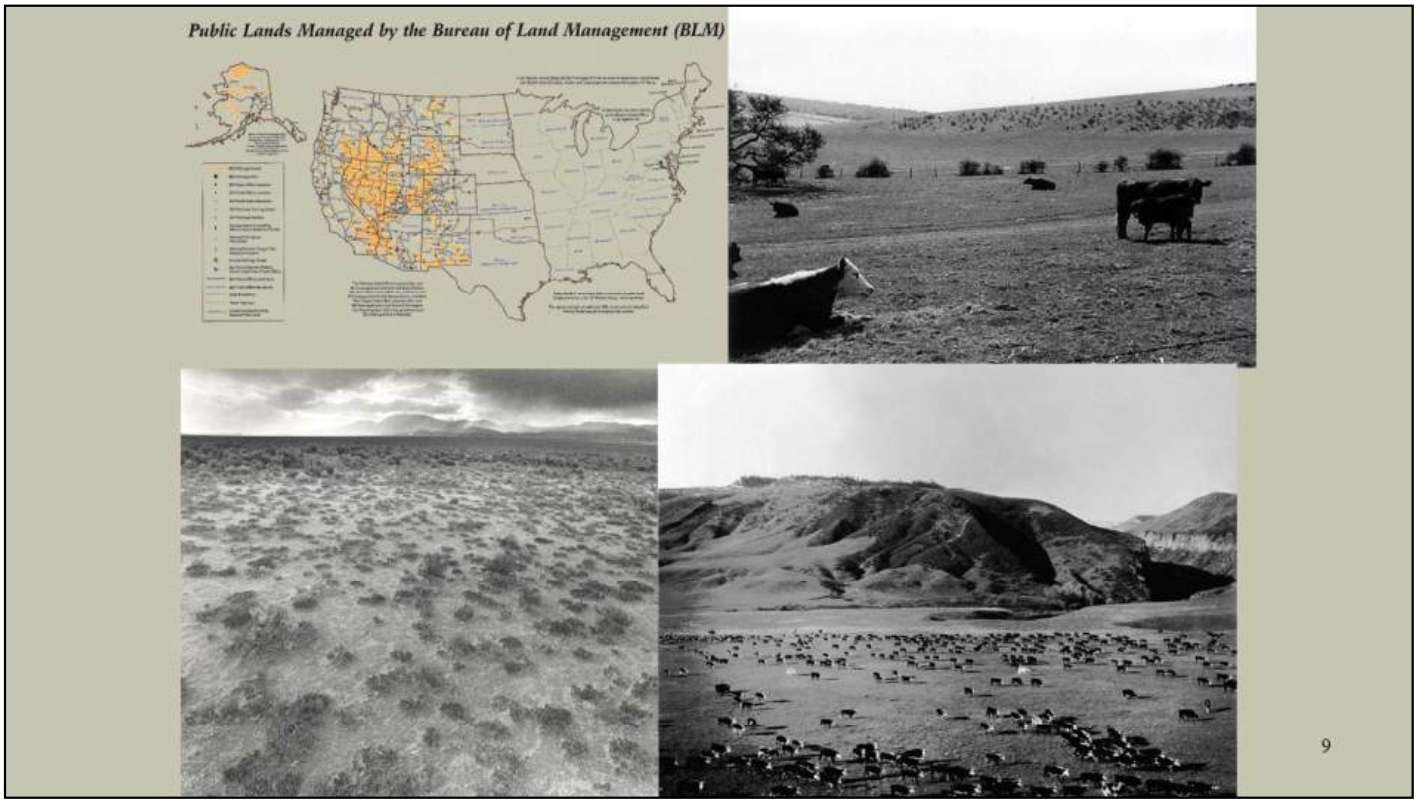


Also, there was considerable conflict between cattlemen and sheepmen in the 1890's and early 1900's.

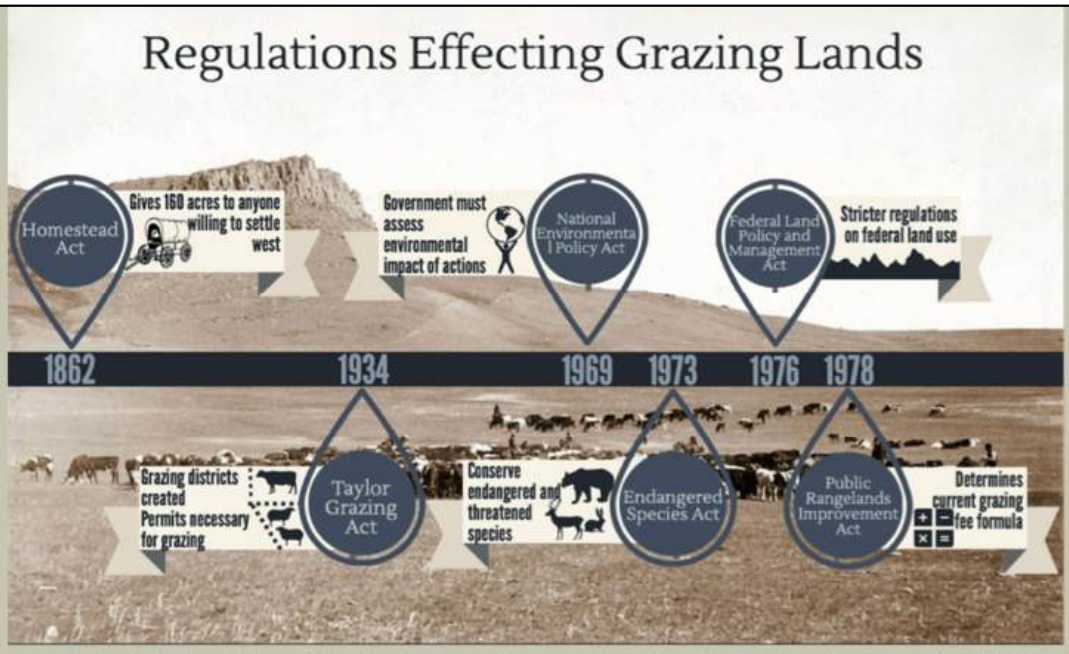
The sheepmen were mobile and cattlemen were not, so double grazed ranges were badly overgrazed.



Part of this demand was driven by the scarcity of farmland resulting in a shift in focus to livestock production, federal lands became grazing commons.

Between 1880 and 1910, there was a great reduction in the rangeland resource. This reduction was caused by overgrazing and conversion of rangeland to farmland.

At this point, the poor management of the nations rangelands started to become an issue.



The Taylor Grazing Act came into effect in the United States in 1934.

10

Eventually the Taylor Grazing Act 1934 act was passed to manage public lands and stop the destruction

caused by overgrazing, particularly in the western states.

Coming back to Canada in a moment but first

This is a story I heard in Omaha NB in 1999, presented by James Stubbendieck, Professor of Grassland Ecology at the U of N. The full story was never published and so I have pieced this together

So, as the western rangelands cratered, those trends were being noticed and there emerged a response from the science world.

The Bessey Seminar, officially called the Seminarium Botanicum, was a student scientific club at the University of Nebraska, led by botanist Charles E. Bessey, that originated in the late 1800s and was influential in the early 1900s. It was a hub for student and faculty to develop the "new botany," which shifted focus from static taxonomy to the functional aspects of ecology. The club's informal structure and Bessey's hands-off mentoring style fostered innovation, and its members became key figures in the founding of American plant ecology.

Bessey's guiding philosophy was "Science with Practice," which meant scientific discovery should be useful in real-world applications.

The Bessey Seminar – University of Nebraska

Dr. Charles Bessey, Professor of Botany.

- The University of Nebraska–Lincoln long history as leader in the study of rangeland and prairie ecology and management.
- A number of pioneers in rangeland ecology were educated and conducted research at the University of Nebraska.
- The Botanical Seminar and Bessey System was concerned with the economic implications of botany – concerned with the everyday problems of Nebraska farmer.

12

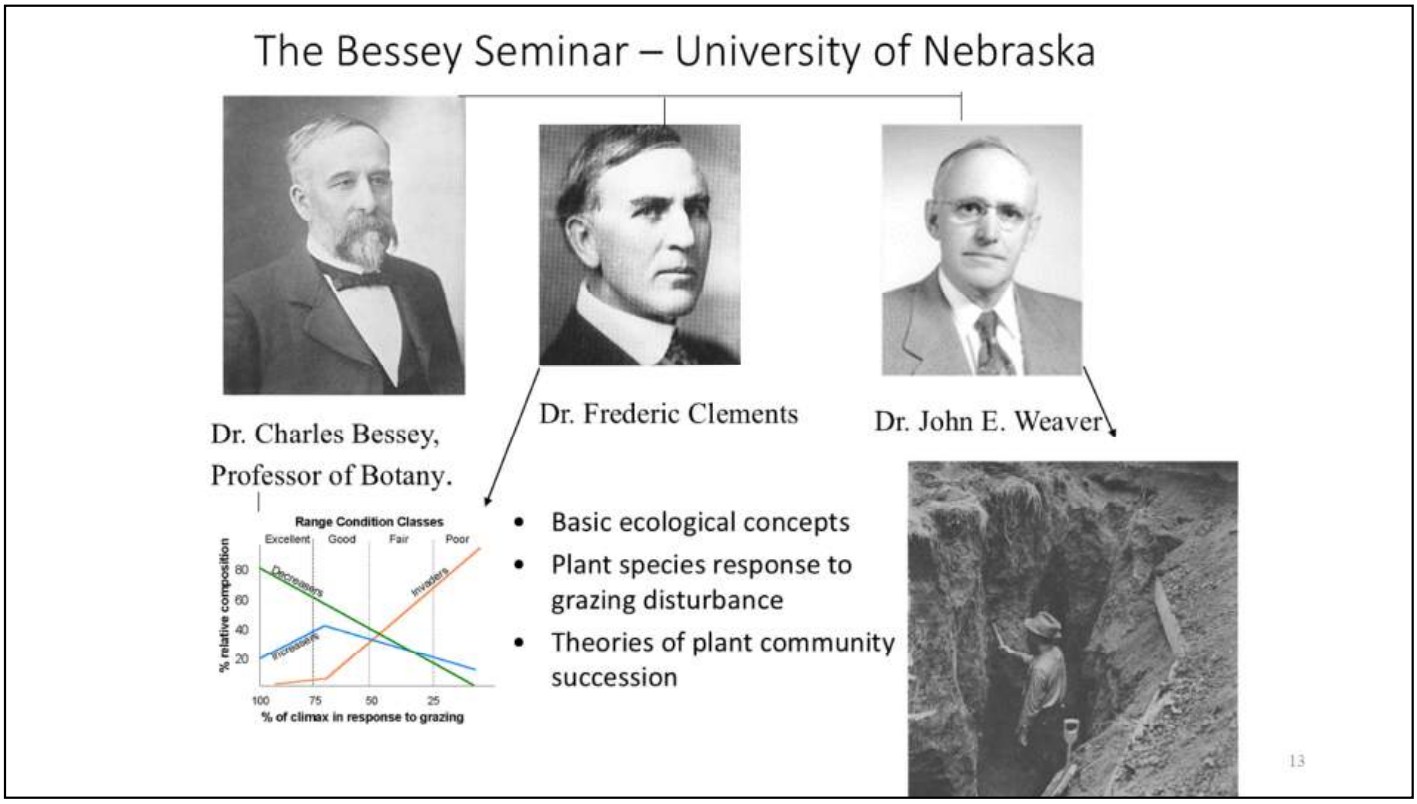
The University of Nebraska–Lincoln has a long history of being a leader in the study of rangeland and prairie ecology and management.

A number of pioneers in rangeland ecology were educated and conducted research at the University of Nebraska.

The Botanical Seminar and Bessey System was concerned with the economic implications of botany – concerned with the everyday problems of Nebraska farmer.

- Bessy was besieged by questions from people on the land

So we learn that Bessey's priority with his students was influenced by what was happening out on the land and by the people who looked to him for some guidance.



Two very big names that came through UNB as students, then as professors, were Frederic Clements and John Weaver.

They were pioneers advancing:

- Basic ecological concepts

- Plant species response to grazing disturbance

- Theories of plant community succession

And of course every student of RM should recognize Clements grazing response graphic

John Weaver produced the first graphic showing the effect of grazing impact on native grass roots.

The Bessey Seminar – University of Nebraska

Dr. Charles Bessey,
Professor of Botany.

Dr. Arthur W. Sampson

Considered the Father of Range Management

- 1910 conducted first grazing system experiments in Oregon; developed concept of deferral
- Published the first range management text book.
- First to formulate basic principles of range management.

14

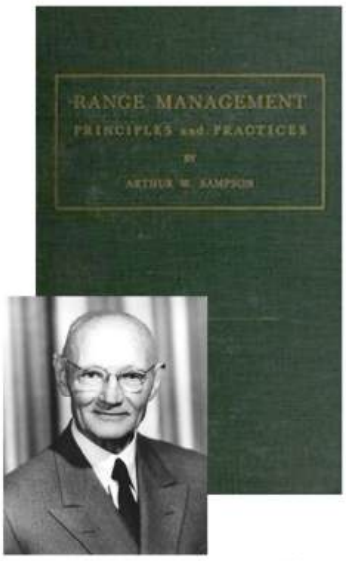
My hero is Dr. Arthur Sampson:

Considered the father of range management. As a student, Sampson was a very strong athlete. He would make a daily trek up a local highland and replace the charts for a university weather stations, and further, he was a boxer and known as the “Utah kid”(slide)

- 1910 conducted first grazing system experiments in Oregon; developed concept of spring deferral, that is, to provide early growing season rest before grazing would start

- And, first to formulate basic principles of range management

Principles of Range Management by A.W. Sampson



15

Published the first range management text book.

Principles of Range Management

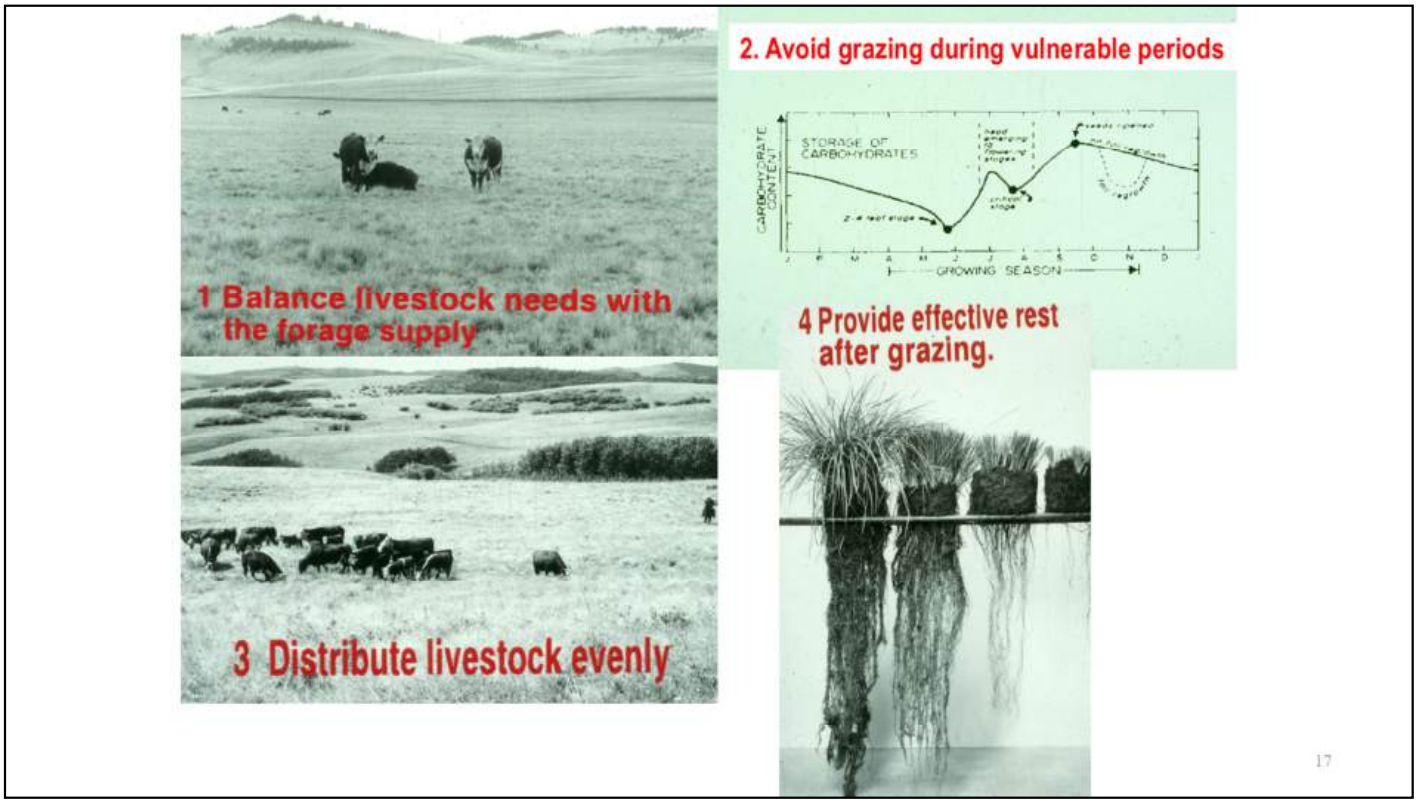
SAMPSON

- Balance grazing demand with supply - Stocking rate
- Season of grazing
- Distribution of grazing across landscape
- Match kind and class of livestock

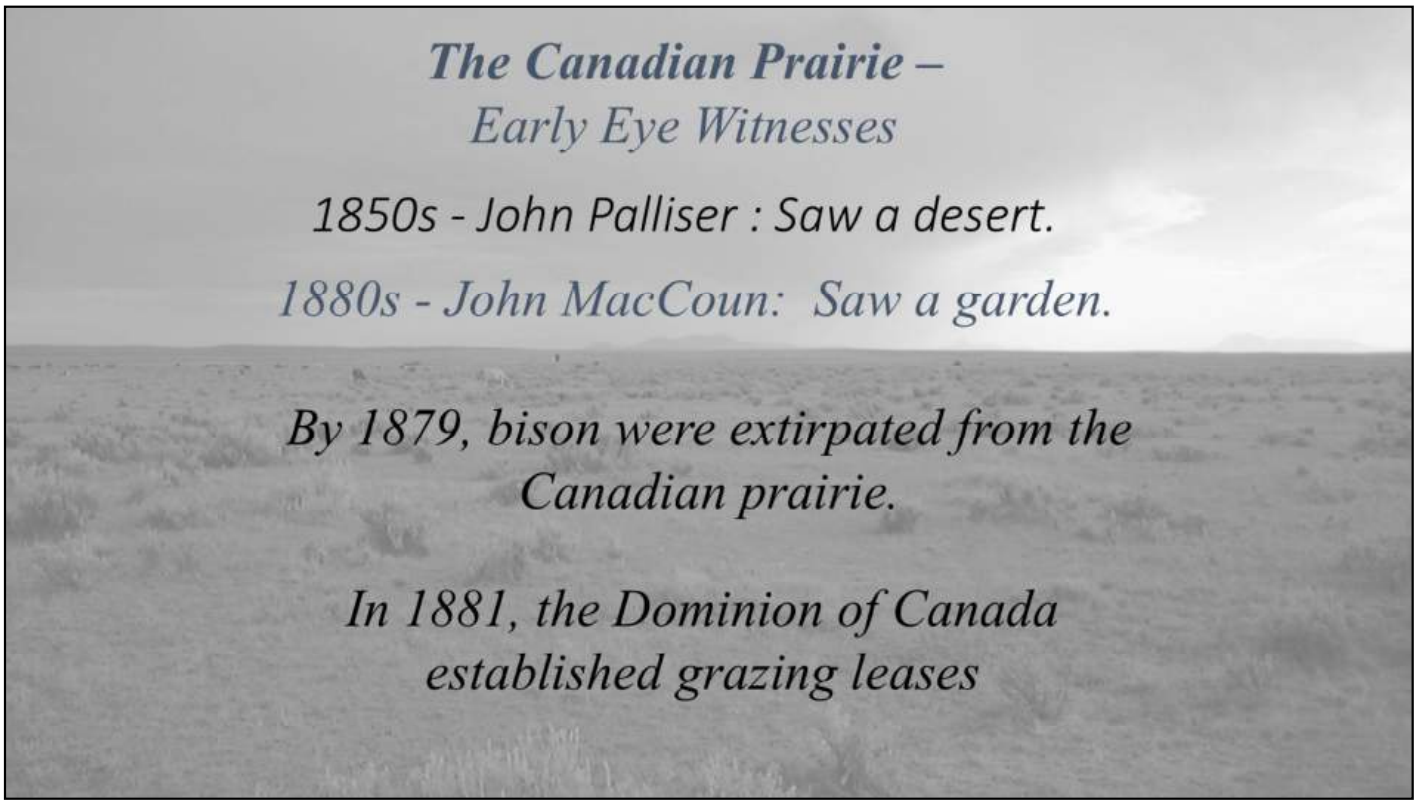
ALBERTA

- Balance grazing demand with supply - Stocking rate
- Season of grazing
- Distribution of grazing across landscape
- Effective rest after grazing

16



We continue to see the practices defined by Sampson in practice today informed by the experience of ranchers and rangeland research.



Now, what about the Canadian scene?

-*Early eyewitnesses (CLICK)* *1850s - John Palliser : Saw a desert.*

-1880's John MacCoun *(CLICK)* ; Saw a garden

-By 1879 *(CLICK)* , bison were gone from the Canadian prairie

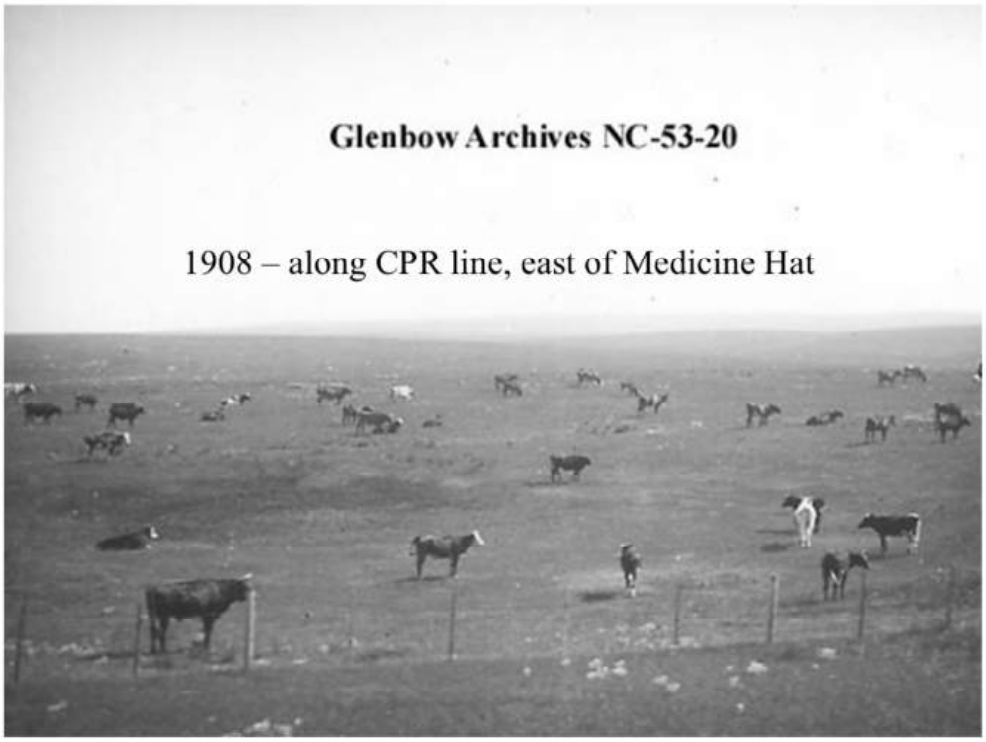
-In 1881*(CLICK)* , the Dominion of Canada, through Order in Council established grazing leases

ANDERSONs research

-Period 1881 to 1910 first major phase of ranching on a large scale;

-Policy aimed to attract risk capital to an underdeveloped area
-Leased granted for up to 21 years,
-required stocking up to capacity within three years of being issued
-as we will see the hitch was blanket stocking rate value to ensure that leases were utilized;
-policy was aimed at preventing speculation

I NEED TO PAUSE HERE



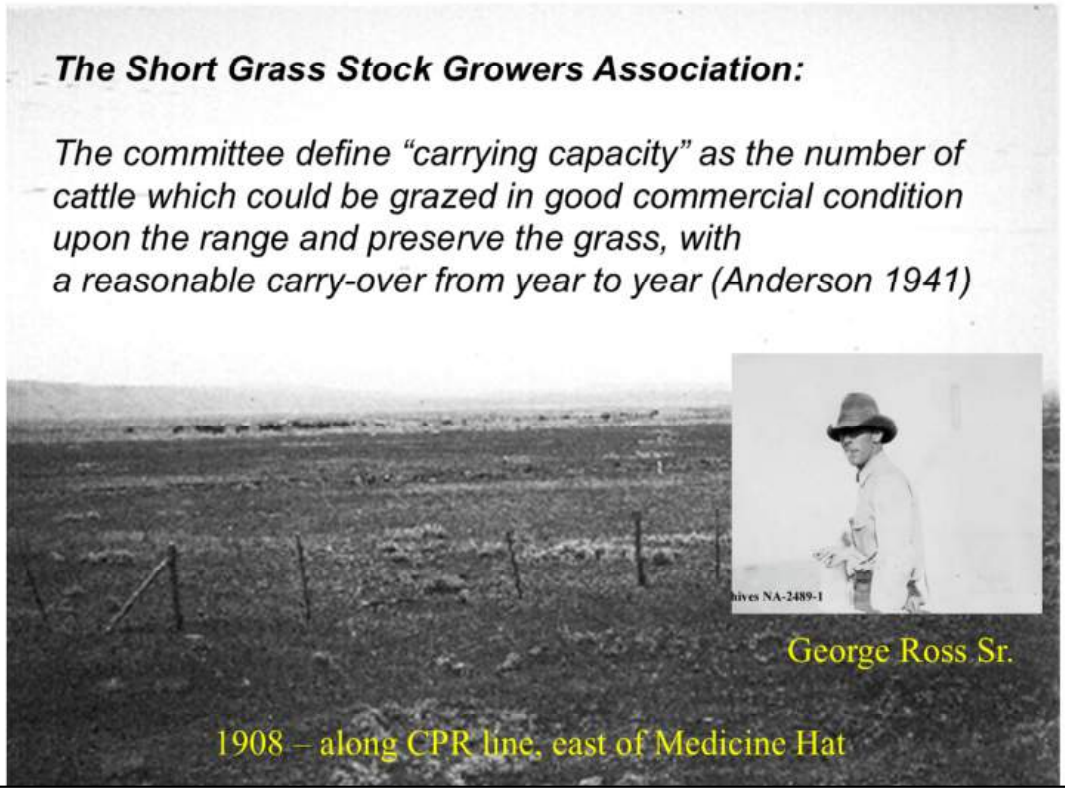
-We find that Dominion of Canada grazing lease policy of the day magnified the pressures of climate and settlement on rangelands.

-And the RUB is: That required stocking rate was 10 acres/head/per year.

-Grazing lease policy did not address differences in the productivity of the land.

-Since grazing lease taxation and rental rates were not based on the reasonable economic returns of ranching, or the sustainable capacity of ecosystems, therefore there were compelling economic pressures to overgraze.

-The inequities of the system were felt most strongly in the semi-arid southeast where range pasture productivity is 20% of that on foothills ranges.



Local ranchers with leaders like George Ross Sr., in an organization named the Short Grass Stockgrowers Association (later amalgamating with WSGA) raised questions to their elected officials about the state of the range

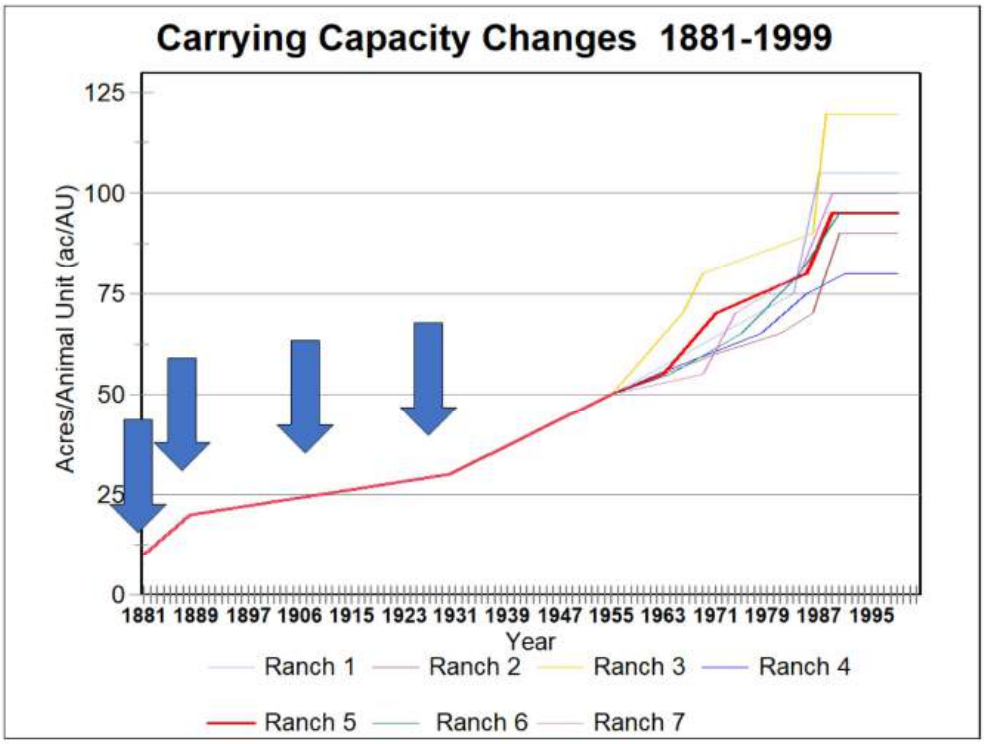
So we see from the earliest days, the ranching community plays a pivotal role in the development of rangeland research which was so desperately needed to guide the grazing practices of the ranching industry.

The SGSA appeared to be one of the first forums to promote the new and evolving concepts of range management.

And they provided and early definition of carrying capacity:

CLICK The committee define "carrying capacity" as the number of cattle which could be grazed in good commercial condition upon the range and preserve the grass, with

a reasonable carry-over from year to year (Anderson 1941)



21

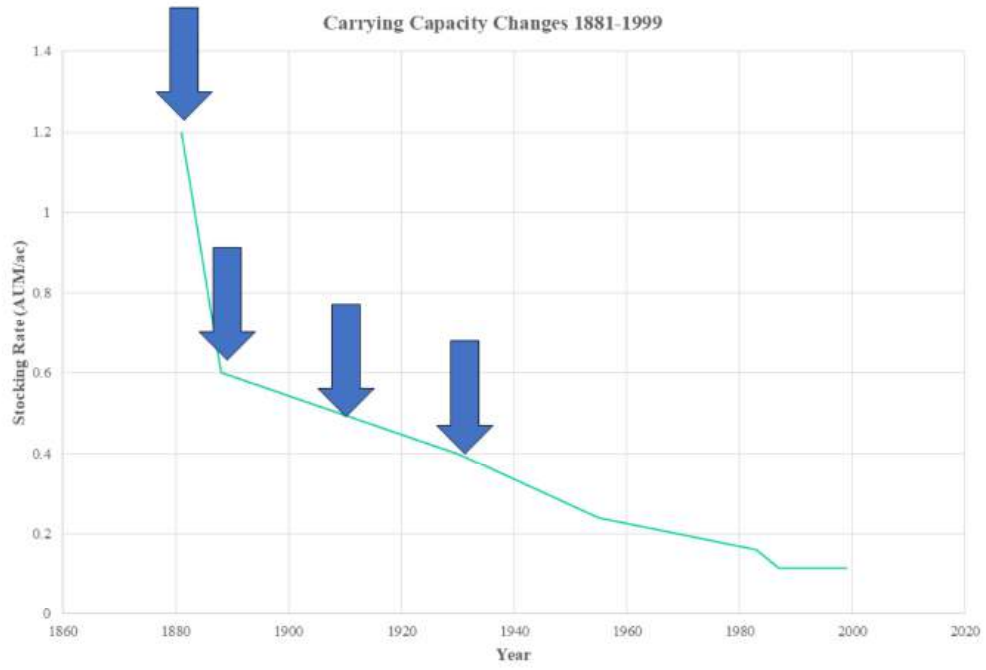
So what is this? Old fashioned depicting of CC, acres per animal unit year. This was developed to share with wildlife researchers the history of ever lighter stocking over a century, the additional lines are stocking levels scattered through the sage grouse area of focus.

CLICK Arrow 1 – grazing leasing established by dominion of Canada

CLICK Arrow 2 – the short grass ranchers push back

CLICK Arrow 3 - extreme pressure period with homesteading and demand for grass for horsepower

Arrow 4 – overgrazing crisis comes to a head



22

Arrow 1 – grazing leasing established by dominion of Canada

Arrow 2 – the short grass ranchers push back

Arrow 3 - extreme pressure period with homesteading and demand for grass for horsepower

Arrow 4 – overgrazing crisis comes to a head

The Dominion Experimental Farms Service established the first rangeland research program in Canada at Onefour, near Manyberries Alberta.

"This station was established at the request of the stockmen in 1927 by the Dominion Department of Agriculture, in cooperation with the Gilchrist Brothers of Wildhorse, Alberta" (Hargrave 1949).

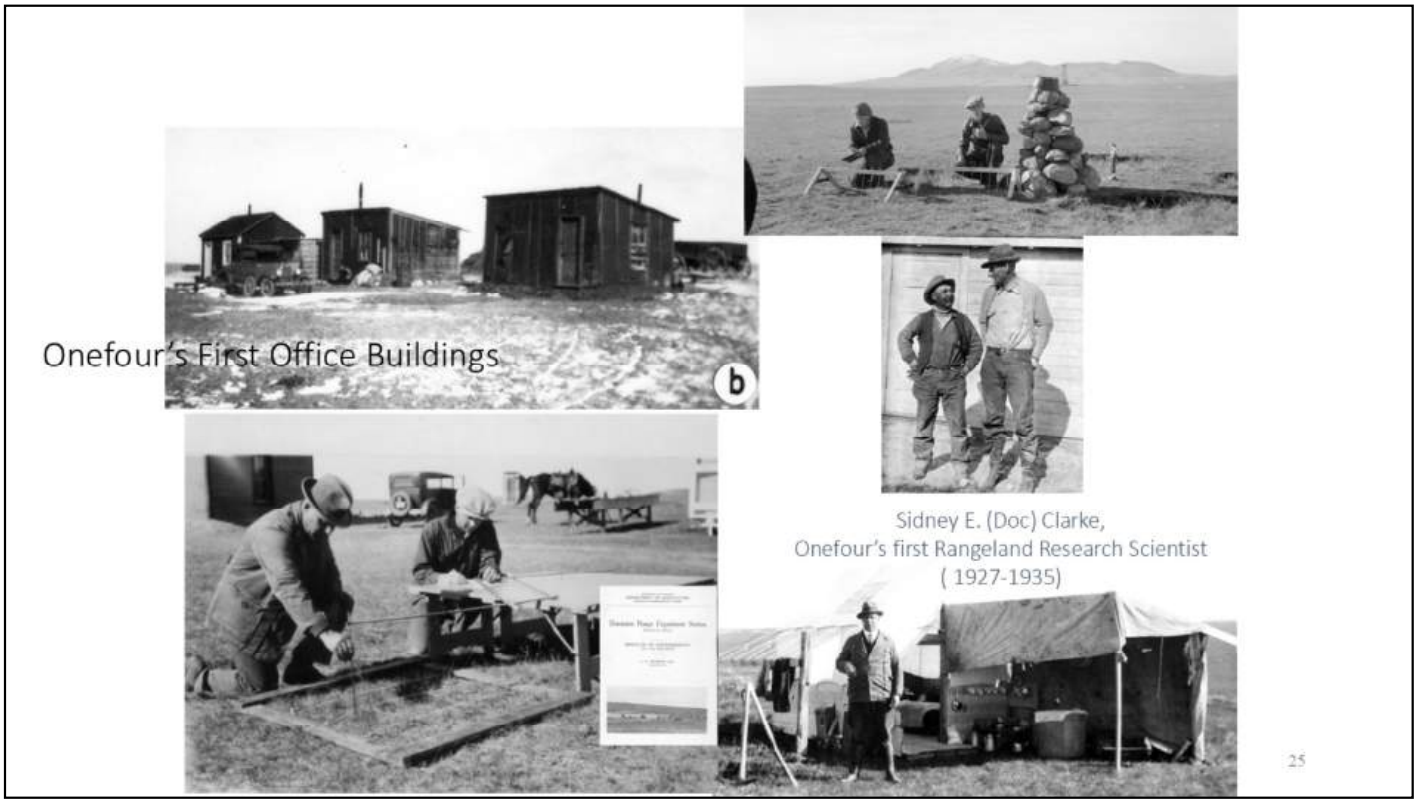
The research program provided the first scientifically based guidelines on stocking rates and range management practices in the country.

The Gilchrist Brothers

24

The Onefour backers

Those that watch what happens and those that make it happen – the Gilchrist Brothers were the latter, they made it happen.



Studies began immediately as their was a sense of urgency driven by the ranching community.

Upper right is an example of how heavily grazed things were by the late 1920 (1927 photo)

Lower left, early studies show these plant communities are dominated by blue grama, these technicians are mapping plant cover with a planigraph.

Lower right is Dr. Sidney Clark (University of Nebraska) who with Dr. Tisdale, were the first to describe the plant communities in the area as "short grass prairie" – and we will come back to that.

Over the years Onefour was a vastly important research site, with extensive facilities to handle livestock and range research and with accommodation to handle full time and seasonal staff.

There was a resident community that interacted with the local ranching community and welcomed visitors from far and wide.

Historical notes:
Clay Chattaway, Bar S

Mosquito Creek Round-up

Shorty (Eddie) Moreno

- He was part Nicola Indian and part Mexican, born in 1883.
- He raised a family on the Douglas Lake ranch then worked all over the country, BC (Guichons), Alberta, Saskatchewan, and parts of Montana.
- Drove cattle from Calgary to Dawson City, Yukon in 1909.
- Went overseas in WW1 with the Lord Stathconas, stationed in England breaking horses for the Cavalry.
- Was well known in the Foothills Ranchs where he worked for many years on the Rocking P and Bar S for Rod Macleay and also on the Waldron and the Bar U.
- He left the country in 1957, retiring to home base in the Nicola Valley where he died in 1960. He is buried in the Nicola Band's graveyard near Douglas Lake.

27

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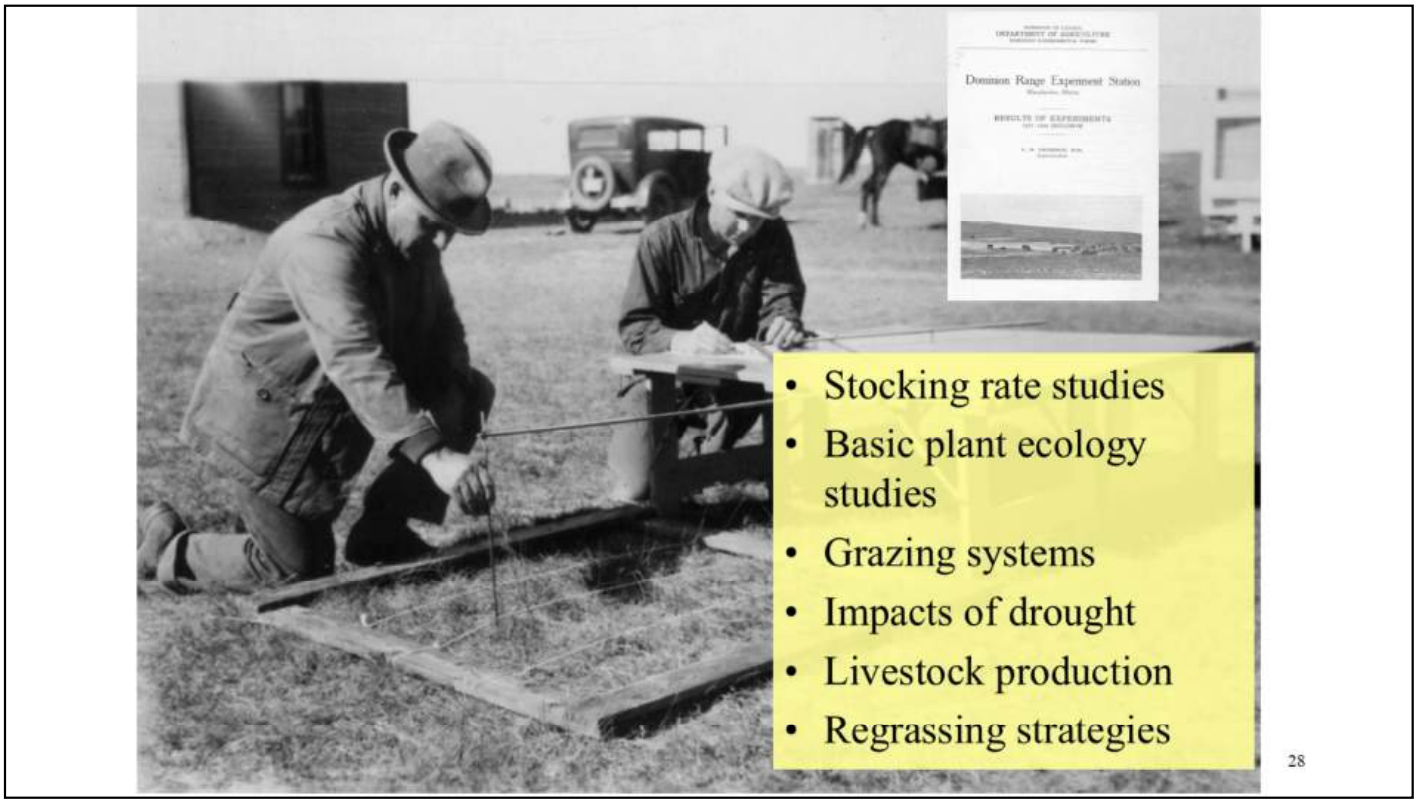

A broad suite of rangeland studies were undertaken at Onefour including (CLICK)

Stocking rate studies

Basic plant ecology studies

Grazing systems concepts like complementary grazing

Livestock production

Regrassing strategies

Stocking Rate Study

Sheep grazed at three rates for 19 years

- Light (6.2 ac/AUM; 74 AUY)
- Moderate (5.0 ac/AUM; 60 AUY)
- Heavy (4.2 ac/AUM; 50 AUY)
- NWG N&T grass declined with heavy grazing
- Plant community maintained with light to moderate use.
- Previous study by Clark reported a sharp decline in range condition with as little as 5 years of heavy grazing

29

The first stocking rate study was carried our with sheep, likely because it worked with the available manpower and resources.

Light (6.2 ac/AUM; 74 AUY)

Moderate (5.0 ac/AUM; 60 AUY)

Heavy (4.2 ac/AUM; 50 AUY)

- NWG N&T grass declined with heavy grazing

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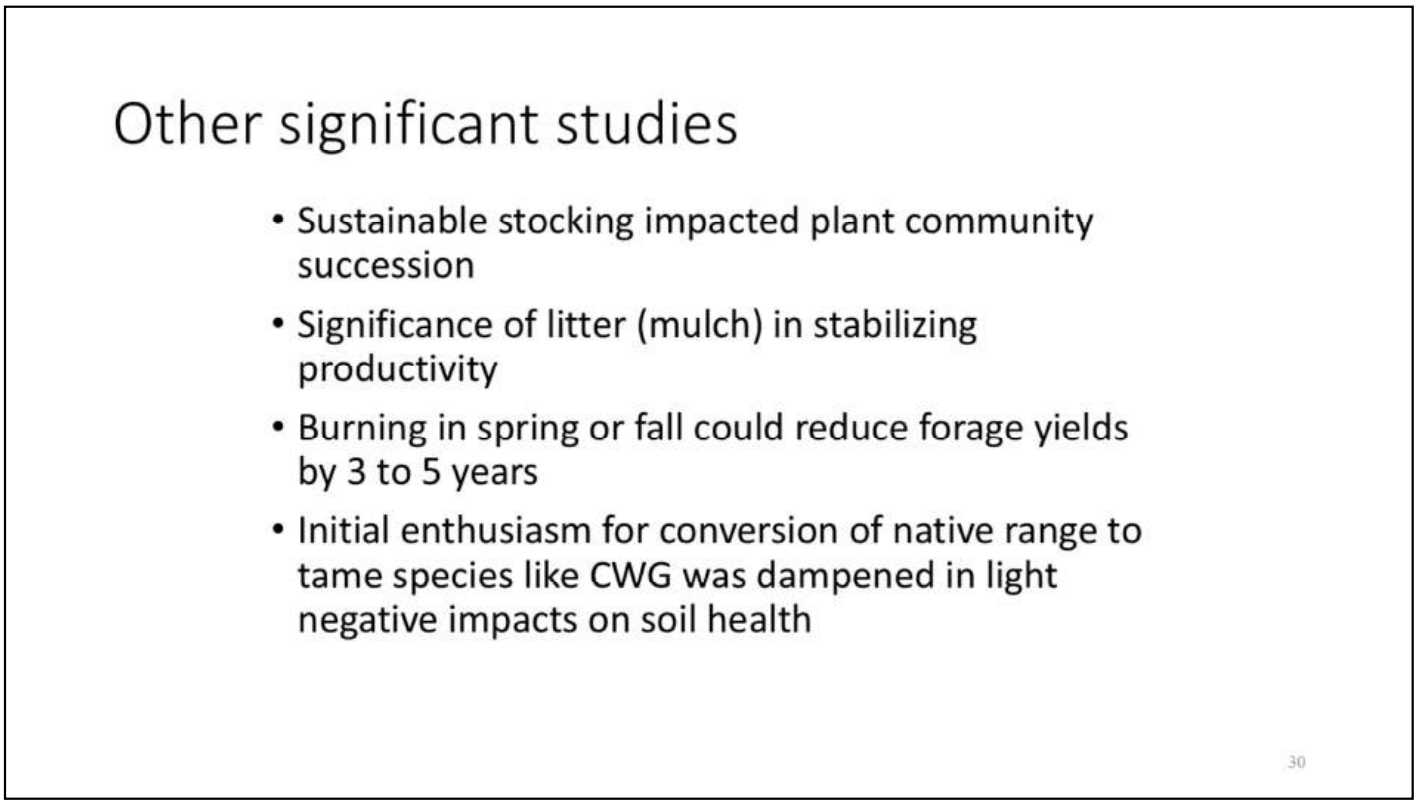


(Click)Sustainable stocking impacted plant community succession

(Click)Significance of litter (mulch) in stabilizing productivity

(Click)Burning in spring or fall could reduce forage yields by 3 to 5 years

(Click)Initial enthusiasm for conversion of native range to tame species like CWG was dampened in light negative impacts on soil health

Whereas the cost of grass to leaseholders, as charged by the Provincial Government in rent and taxes, heretofore has not been based on the productive values of various range areas;

*....therefore be it resolved that .....with a view to rating grazing land according to its **earning capacity** in relation to livestock values, **based upon investigations and surveys already conducted in the short grass area**."*

George Ross Sr.

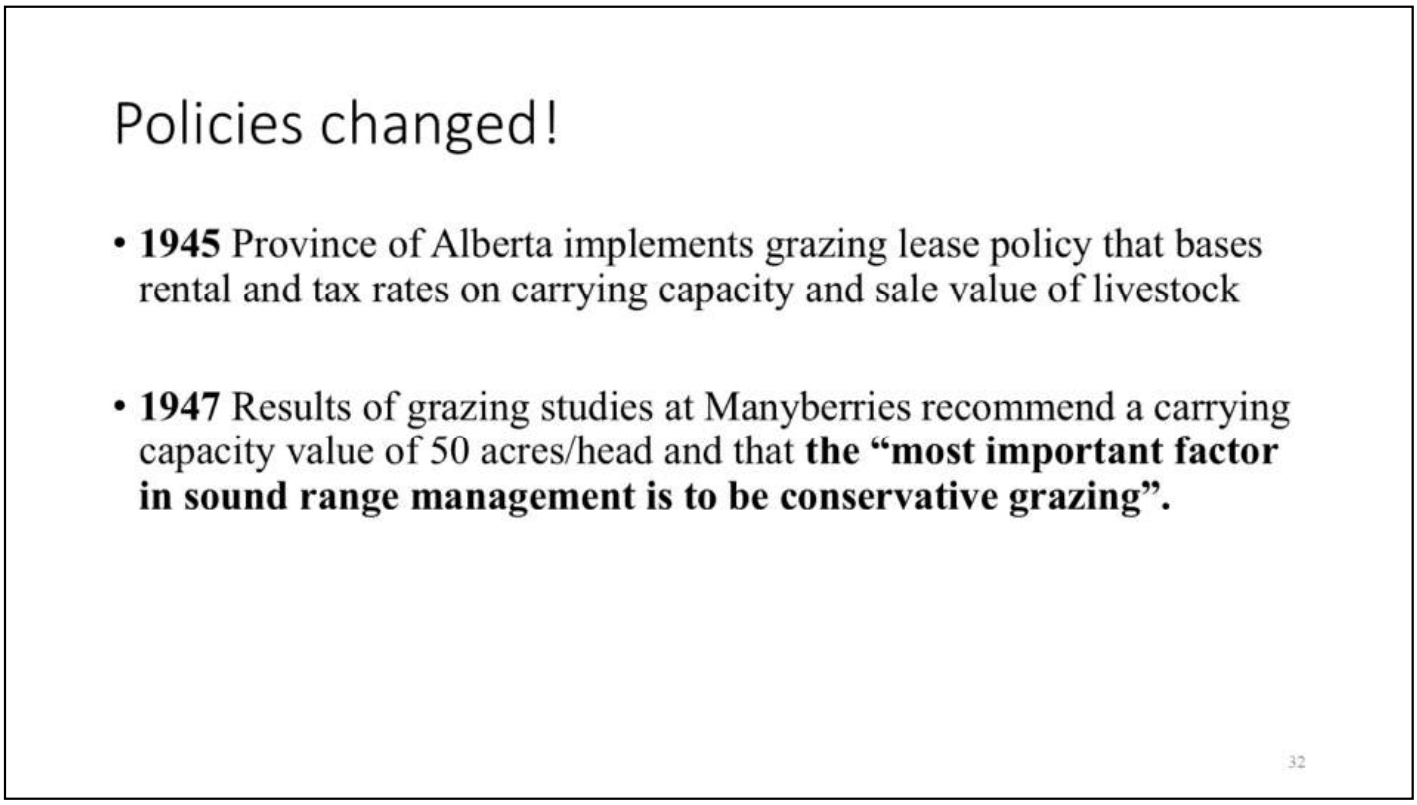
31

So, time has passed, Onefour had been generating research findings and facilitating dialogue, it was time for the industry to approach government to address grazing policy issues.

This came at the annual meeting of the Short Grass Stock Growers Association (SGSA) and at their annual meeting in 1938, in Medicine Hat, passed the following resolution:

CLICK *Whereas the cost of grass to leaseholders, as charged by the Provincial Government in rent and taxes, heretofore has not been based on the productive values of various range areas;*

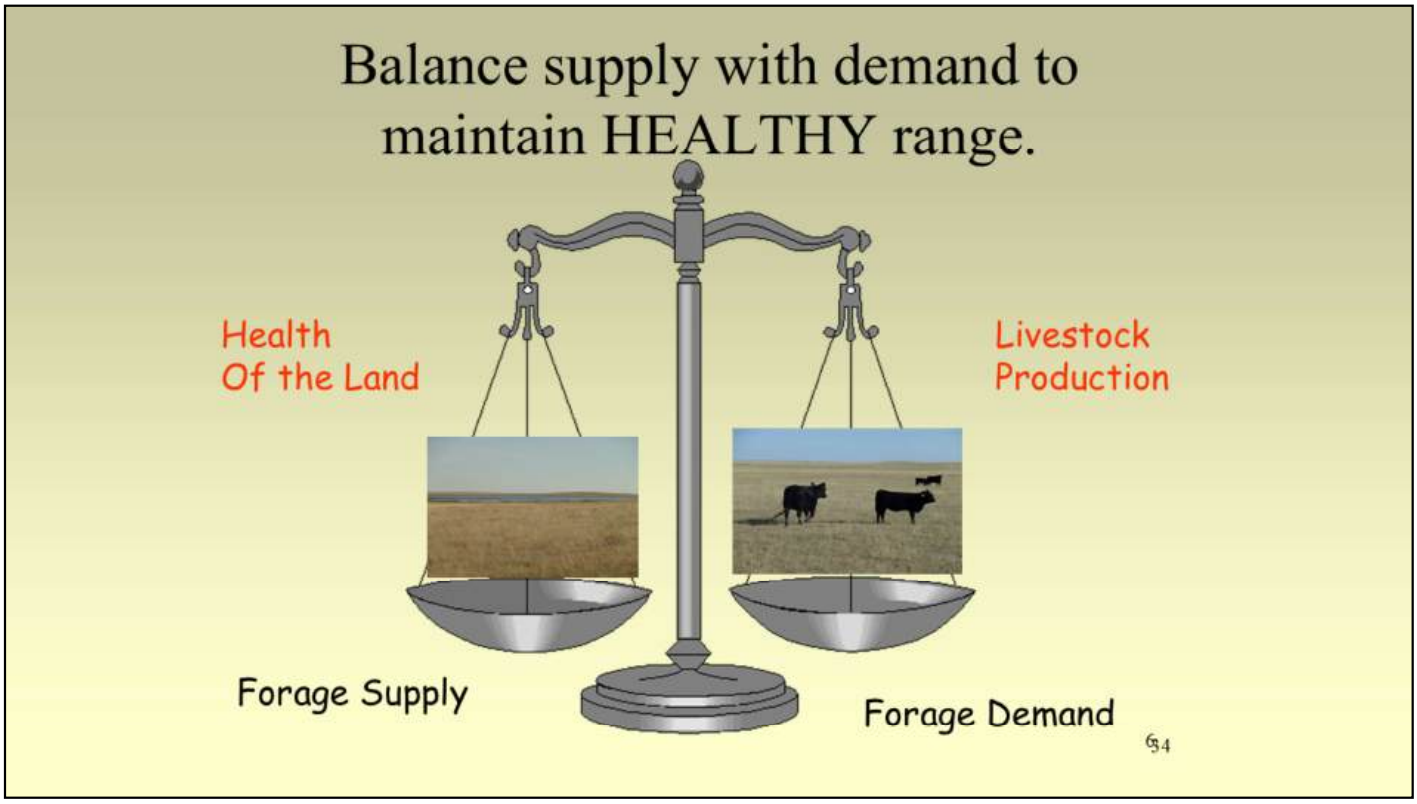
*....therefore be it resolved that .....with a view to rating grazing land according to its **earning capacity** in relation to **livestock values**, **based upon investigations and surveys already conducted in the short grass area."***



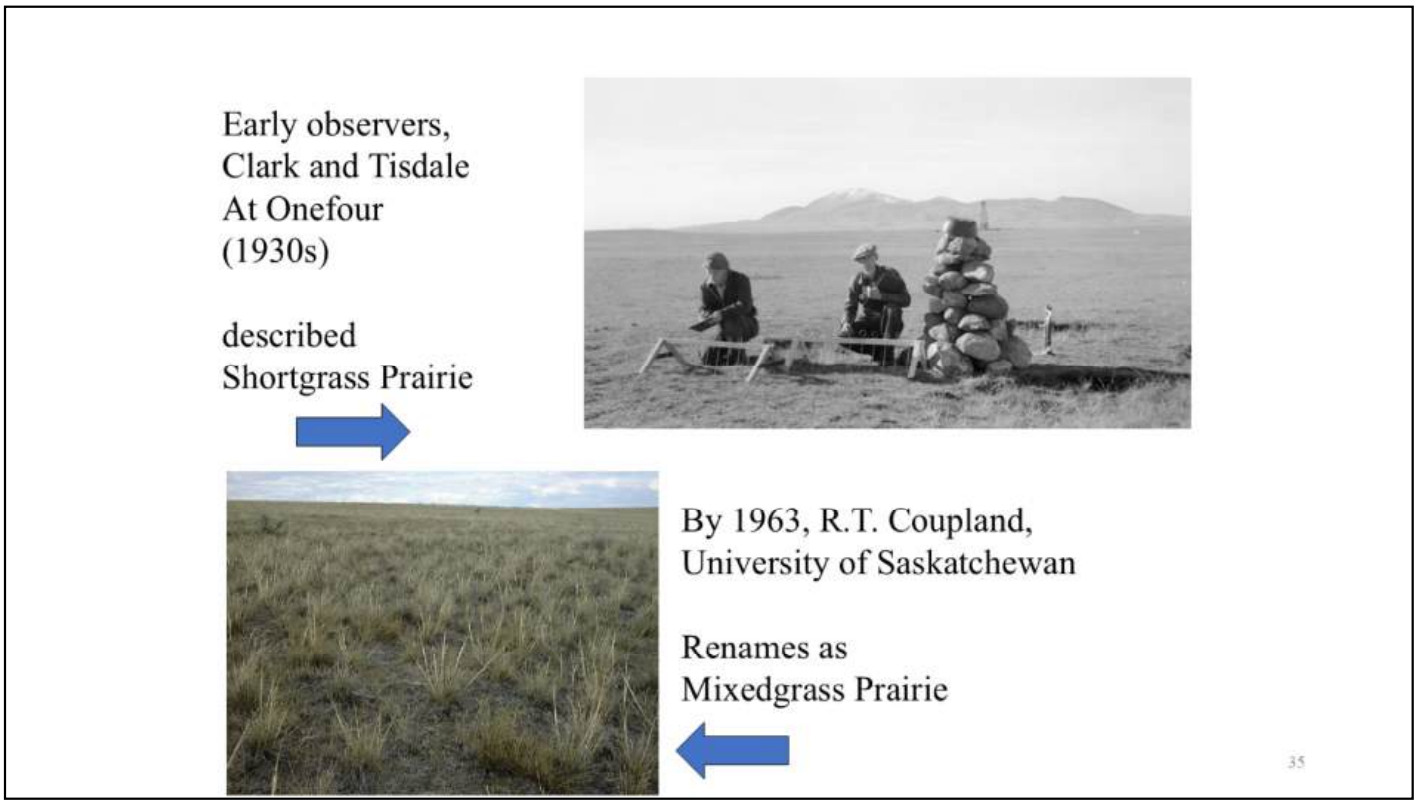
1945 Province of Alberta implements grazing lease policy that bases rental and tax rates on carrying capacity and sale value of livestock

CLICK 1947 Results of grazing studies at Manyberries recommend a carrying capacity value of 60 acres/head and that the **"most important factor in sound range management is to be conservative grazing".**


A.E. Cross:
If you take care of the grass, it will take care of you!
So, what happened?



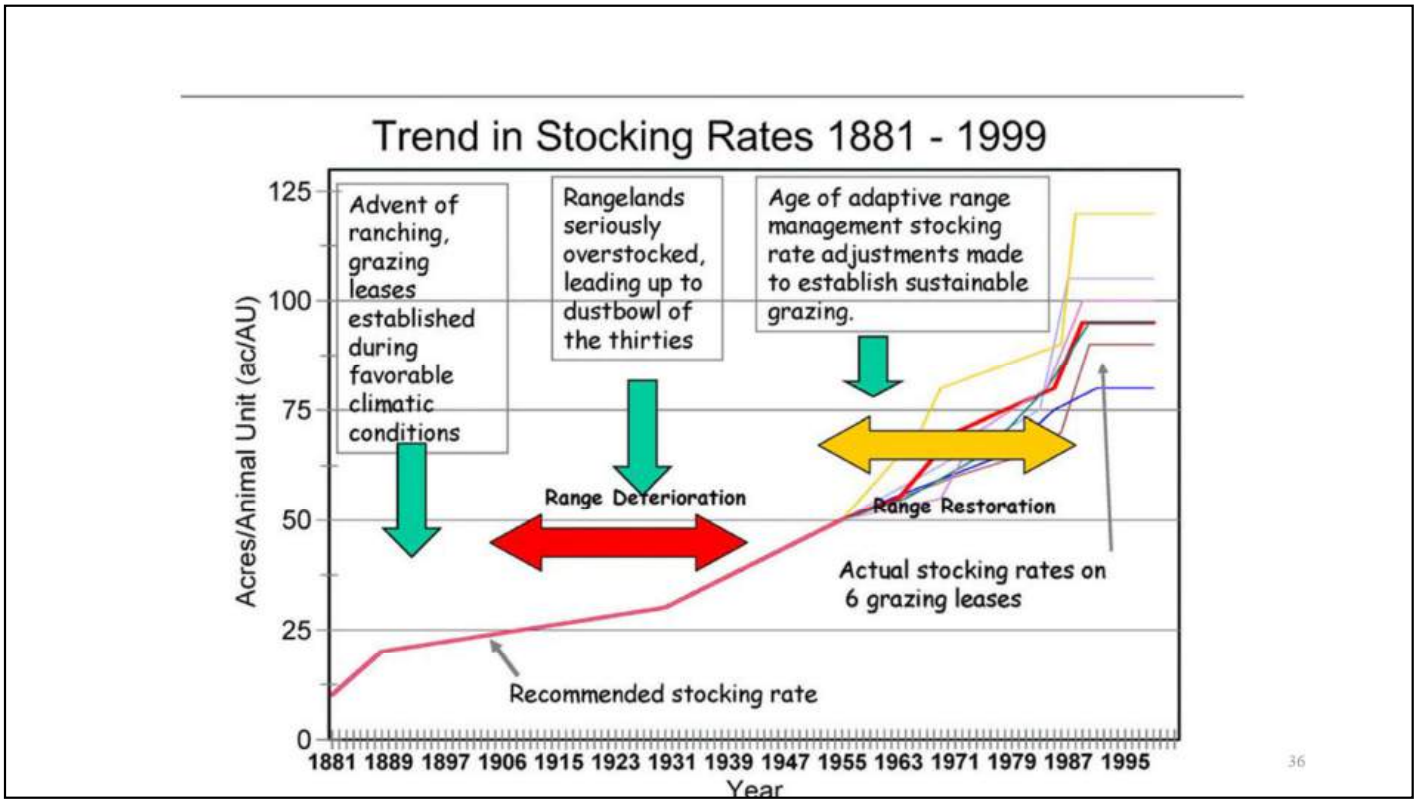
Sampson's first principle of range management is being addressed. CLICK



You will recall that Clark and Tisdale described the area as short grass prairie,

In 1963, based on studies through the 1940's and 50's, Robert Coupland (University of Sk) concluded that the character the area should be described as Mixedgrass prairie, CLICK given the re-emergence of mid grasses like Needle and Thread, Wheat grasses and Porcupine grass,

Oh yes, Coupland was a graduate of the University of Nebraska – John Weavers student.



So to recap, we see phases of evolving management in an area of dry Mixedgrass prairies south of Medicine Hat.

The red line is the GOC and GOA recommended stocking rates from 1881 to roughly present day (AUYears)

Range degradation problems in those early decades of the century, came to a head in the thirties.

Dust bowl drought began to intensify starting in 1928. The year's following were very dry and ranges were over-stocked as farmers and ranchers struggled to survive.

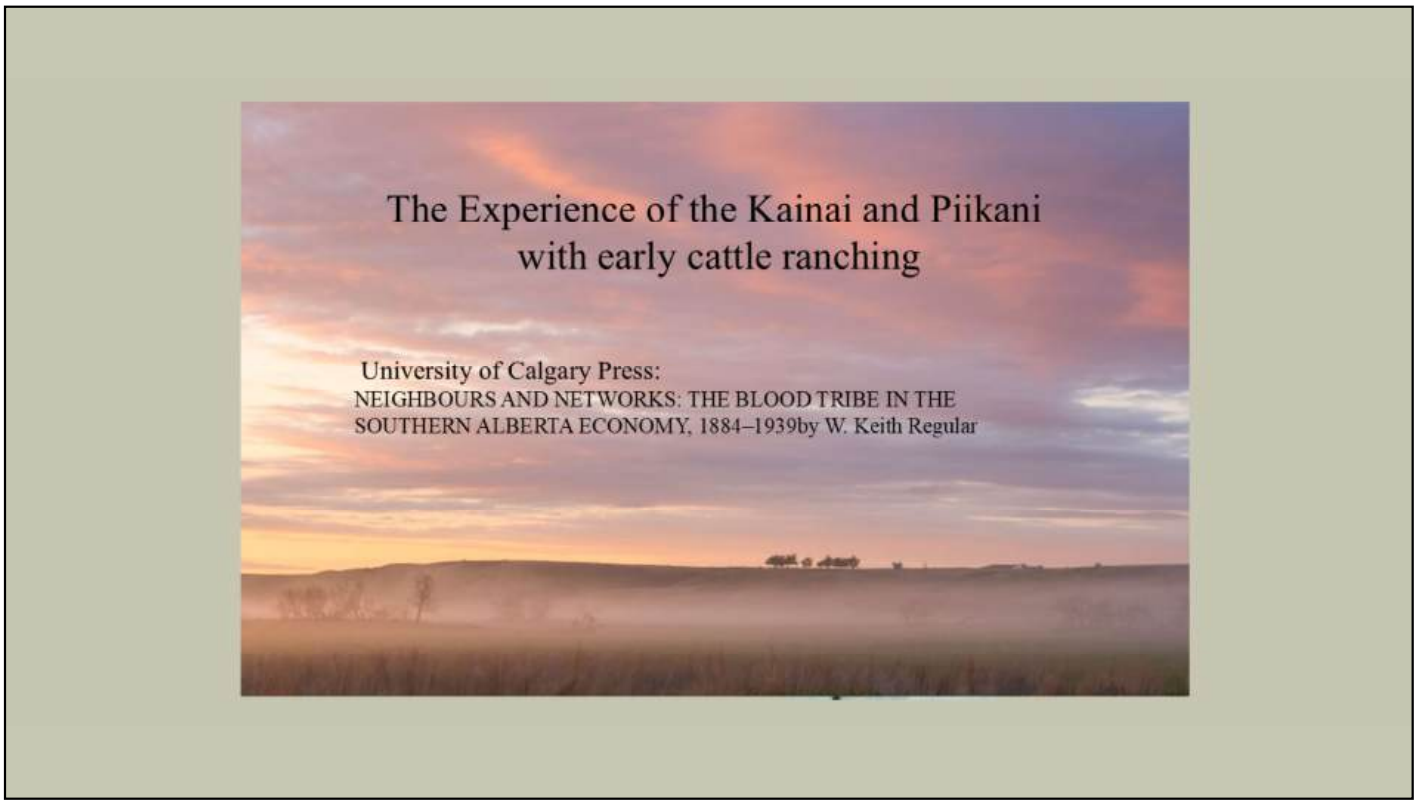
As livestock numbers peaked in the 1930's stocking rates were decreased to 30 acres per AUY and then again to 50 acres per AUY.

ADAPTIVE MGT and LEARNING

These changes were driven by Ag Canada work and later this was with the ongoing dialogue of ranchers with provincial Grazing Lease staff.

Range management principles and practices are becoming well rooted, concepts like monitoring, range condition, the value of carry over and litter, importance of water development for animal distribution, cross fencing to facilitate rotational

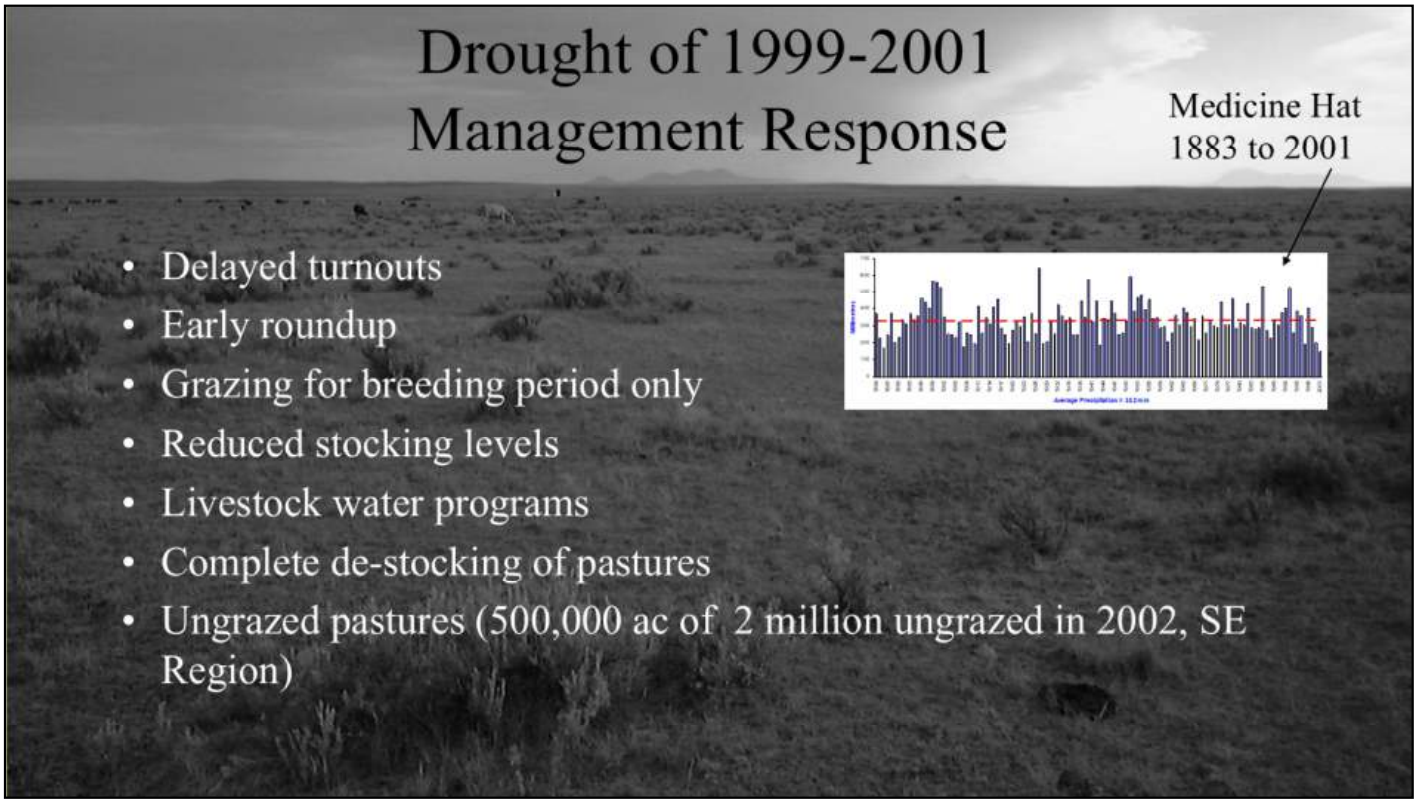
grazing; all of these factors have evolved and contributed to healthy rangelands.



Before start to wrap up with some of the key legacies Ag Canada's research and the ranching communities stewardship, I will take us back for a moment to describe what was happening with the Blackfoot in the early years of ranching.

CLICK Regular

NEIGHBOURS AND NETWORKS: THE BLOOD TRIBE IN THE SOUTHERN ALBERTA ECONOMY, 1884–1939by W. Keith RegularISBN



Delayed turnouts

Early roundup

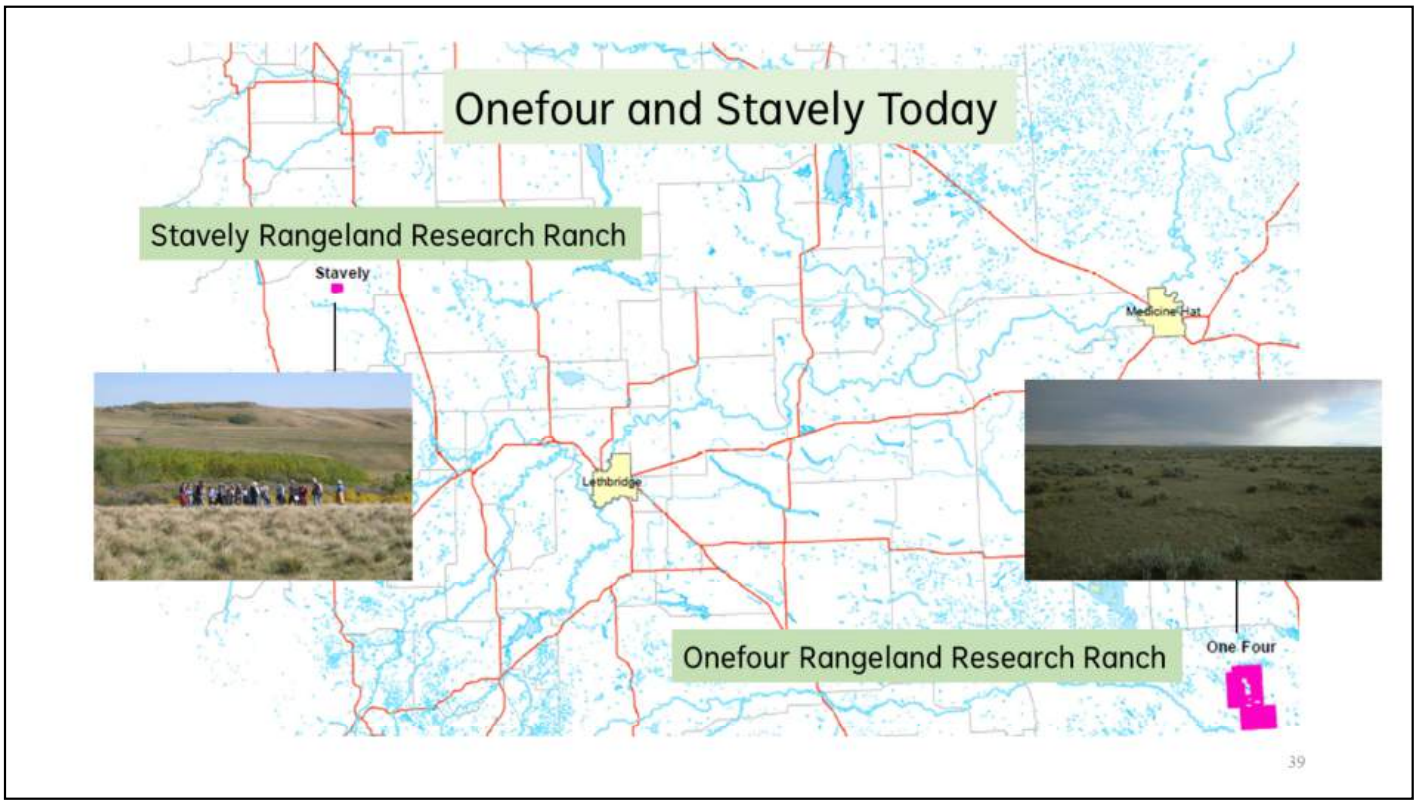
Grazing for breeding period only

Reduced stocking levels

Livestock water programs

Complete de-stocking of pastures

Ungrazed pastures (500,000 ac of 2 million ungrazed in 2002, SE Region)



In 2013 the GOC decided to close the two substations.

In that year the GOA moved to retain these lands as Research Ranches where research and conservation activities could continue with local ranchers utilizing grazing opportunities and providing stewardship of the sites.

-The initial impact was to replace the deep-rooted and productive rough fescue with shorter and shallow-rooted species including Parry's oatgrass and Idaho fescue.

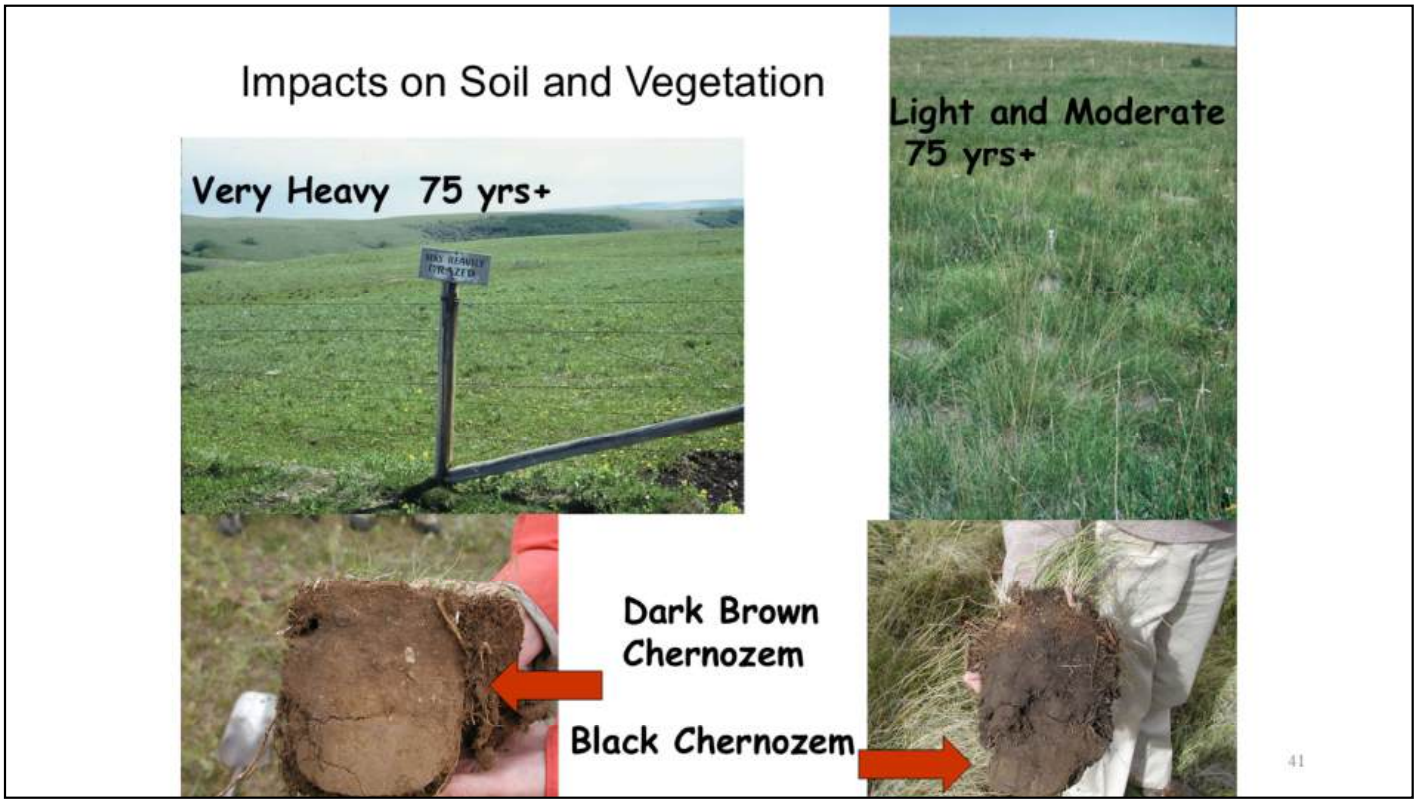
-With very heavy grazing, the plant community was further modified to dominance by Parry oatgrass but included many weedy species such as common dandelion, sedges and pussytoes.

-Rough fescue was largely eliminated from the stand after five years of heavy grazing and the lowest level of range condition was recorded after 13 years of very heavy stocking (Willms et al. 1985).

-Forage production declined by 50% from a stable average of 1780 lb./ac. and became far more variable and more dependent on current precipitation (Willms et al. 1985).

-Stocking at 1.5 ac/AUM was judged as the best of the four rates to sustain the plant community.

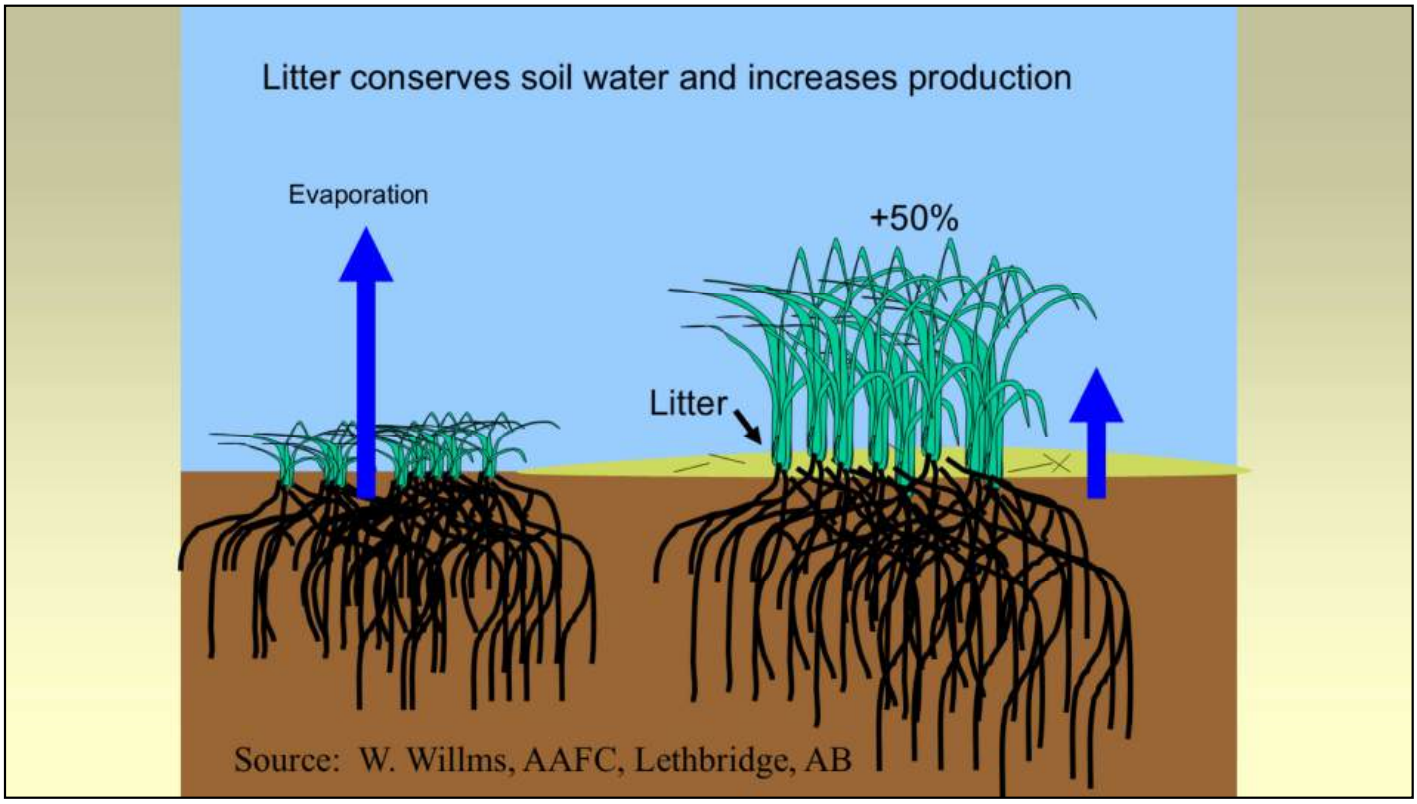
The VH grazed would have to be managed very much like an annual community i.e. could be productive with frequent rainfall additions but very little forage during drought.

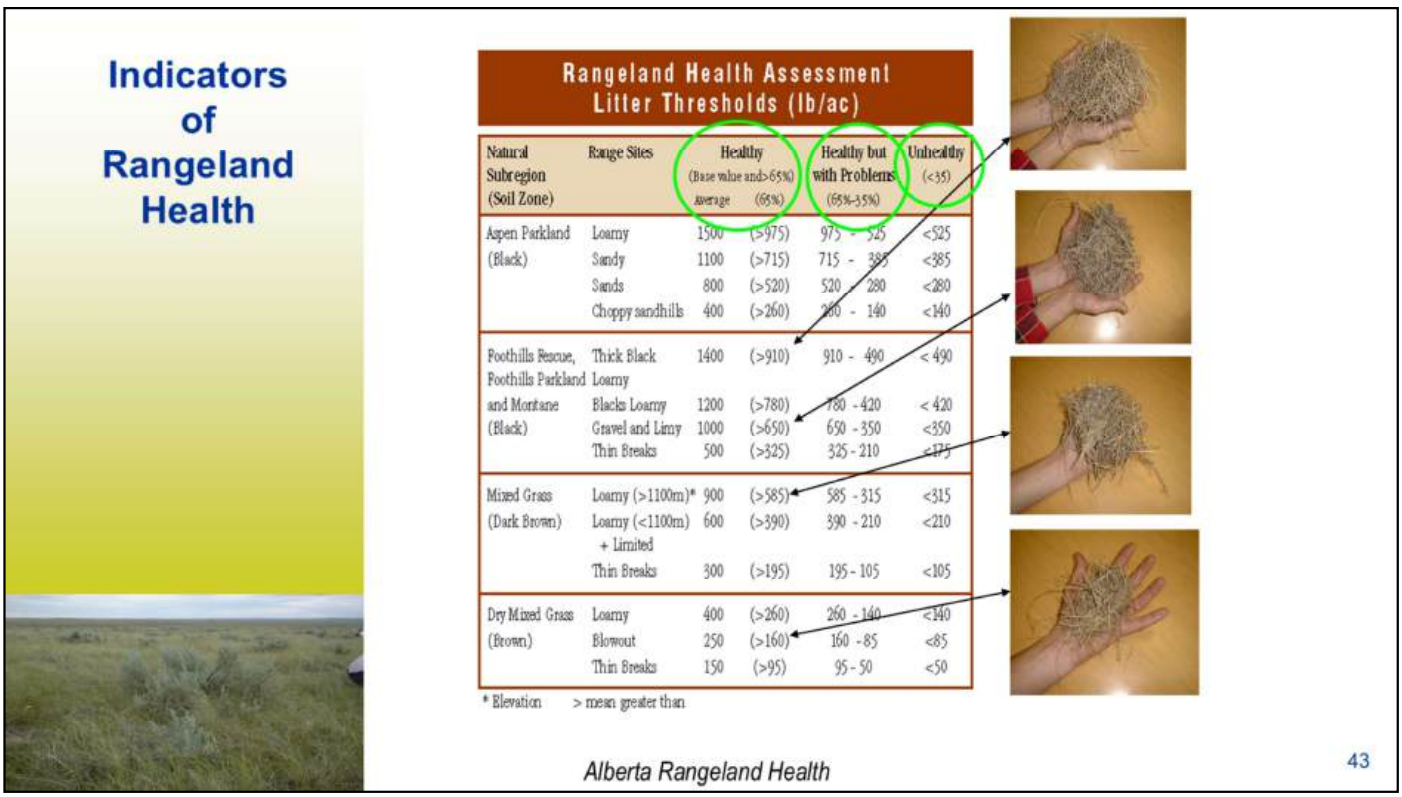


The soil responses to very heavy stocking followed those of the vegetation, i.e., the character of the soil was modified to that of a drier climatic region (Johnston 1962, Willms et al. 1985).

With changes in the vegetation there was a corresponding decline in soil organic matter, loss of soil structure, increased surface sealing increased soil bulk density and reduced infiltration rates (Johnston 1962, Johnston et al. 1971, Naeth et al. 1990).

With reduced levels of surface residue in the form of carryover, there is increased evaporation and reduced snow catch were likely consequences (Dormaar and Willms 1990). The net effect was less soil water to support plant growth and plants with shallow root systems. (NOTE Litter research).


Litter conserves soil water and increases production
Evaporation
+50%
Litter
Source: W. Willms, AAFC, Lethbridge, AB



Thresholds: Healthy - At least 65%; HwP 65%-35%; UnH less than 35%.

Simple and practical methodology-

representative site/s

¼ m square

rake litter

no wood

Compare or weigh (1/4 meter grams X 35.7 = lbs/ac)

- The first big challenge taken on by the Prairie Farm Rehabilitation Administration (PFRA)after it's formation in 1935 was addressing widespread soil erosion and drifting and severe drought conditions that led to the abandonment of millions of acres of farmland during the Great Depression.
- Among other measures a major program of seeding abandoned land back to grass for community pastures (the Community Pasture Program).
- One of the key grasses used in this campaign was CWG **Click, Click,** seeds of which, were provided to Canadian Researchers at the University of Saskatchewan by the USDA in 1911.
- During the 1930s, Crested wheatgrass was seeded extensively to thousands of acres of cultivated land and pasture in Southwestern Alberta and Southeastern Saskatchewan in an effort to reduce soil loss due to erosion.

Robert Coupland was among the first to raise concerns about the widespread seeding of CWG

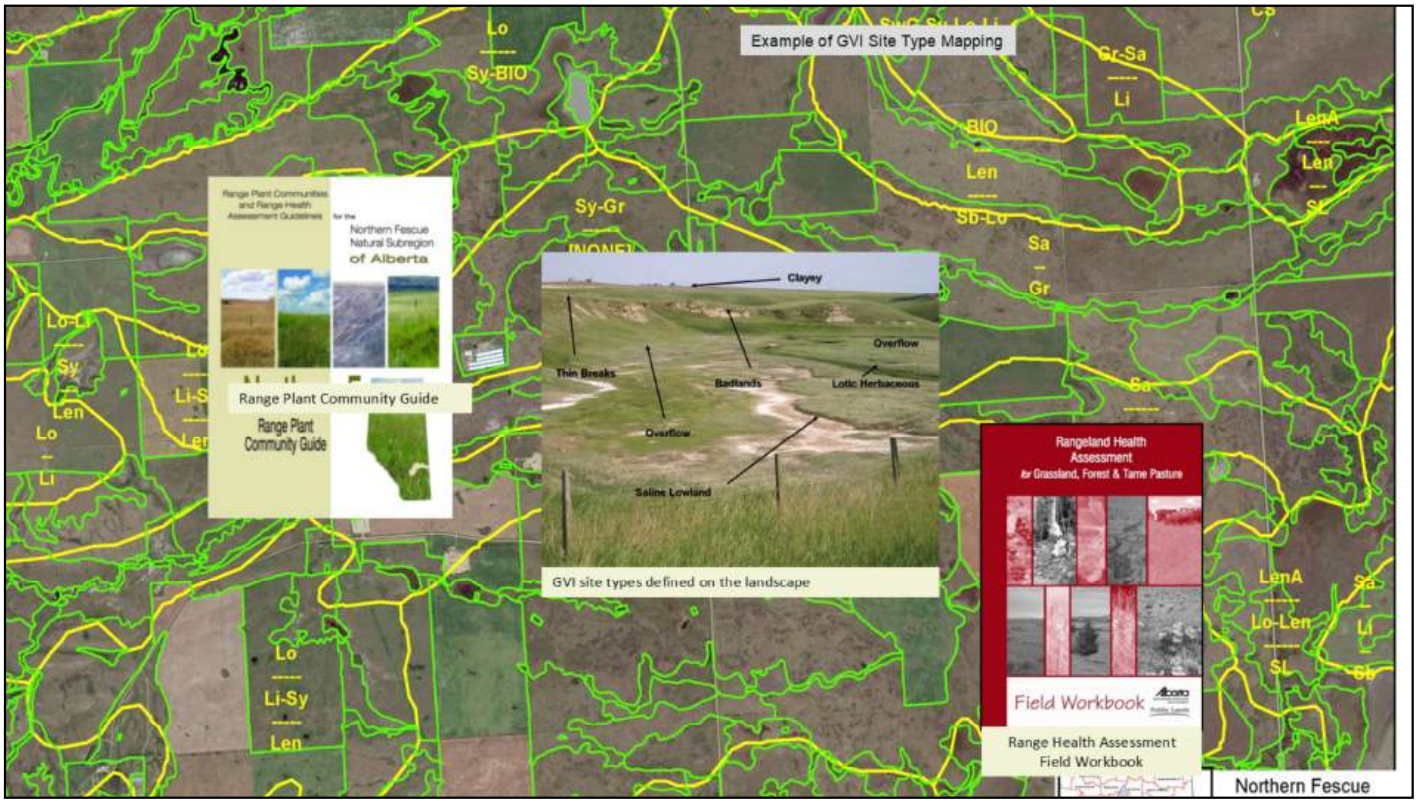
Given it's highly competitive ability to use available moisture, it would outcompete native species in the mixed grass prairie reducing the abundance of native species

He also suggested impacts to soil quality and in particular a decline in soil organic matter.

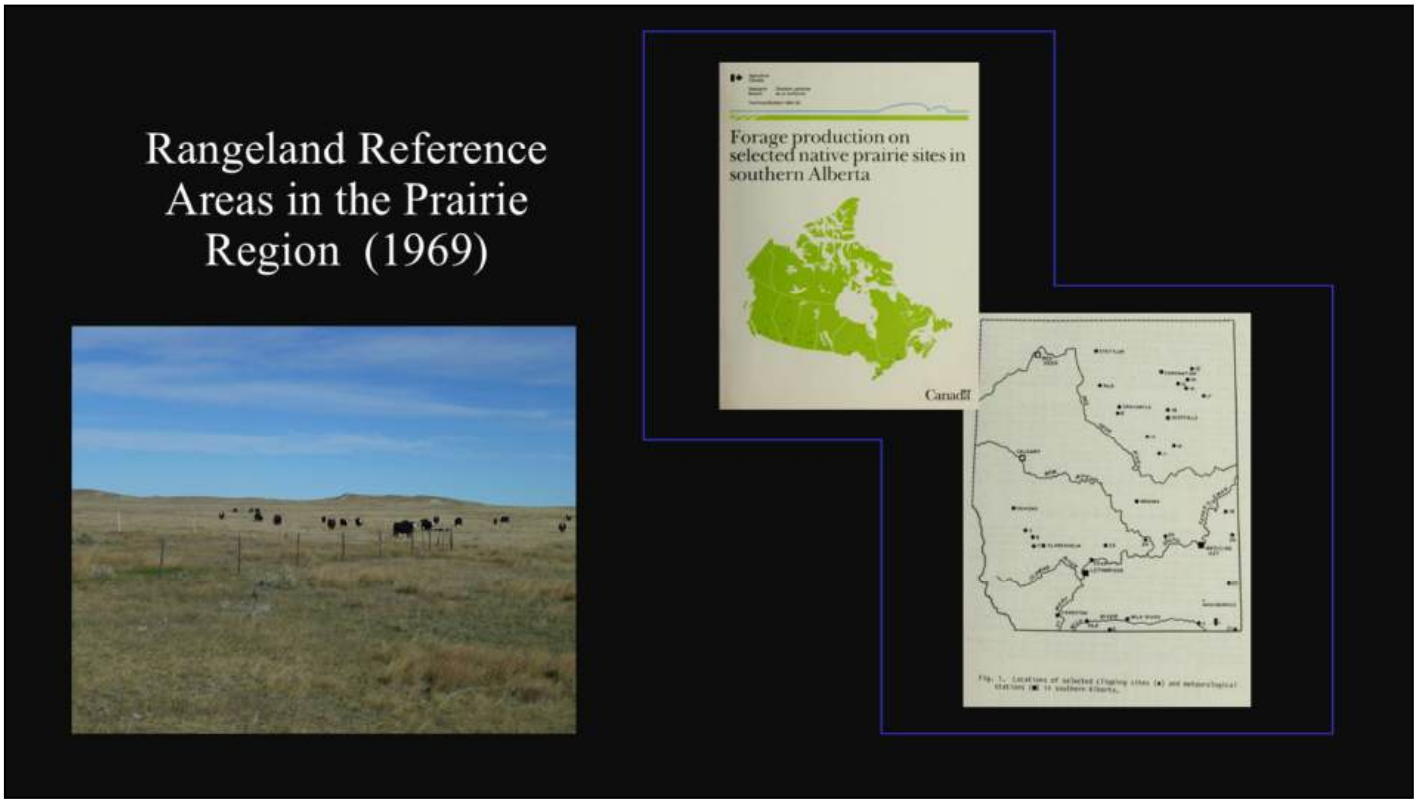
Dormaar's research found that native rangeland generally contained significantly more total root mass and organic carbon in the soil's surface layers (e.g., top 15 cm) compared to areas seeded with crested wheatgrass. There has been some debate as to whether CWG contributes less OM or the decline is simply due to the erosion of topsoil from the exposed spaces between plants, which would be made worse by wide row spacings.

Like ranching, range science and range management tools are a multigenerational project, and **CLICK** if you can't measure it you can't manage it.

The first stocking guide, created in 1966, was a collaboration between Ag Canada Scientists and Provincial Crown Land Managers. The USDA model of correlation climate, soils and plant communities with 14 range site types. **CLICK** Eventually the little brown book.



In the early 2000s, the grassland stocking guide was replaced by the Range Health tool kit including a range health scoring system based on 5 range health indicators with accompanying range plant community guides developed specific to the broad soil regions, now called natural subregions.

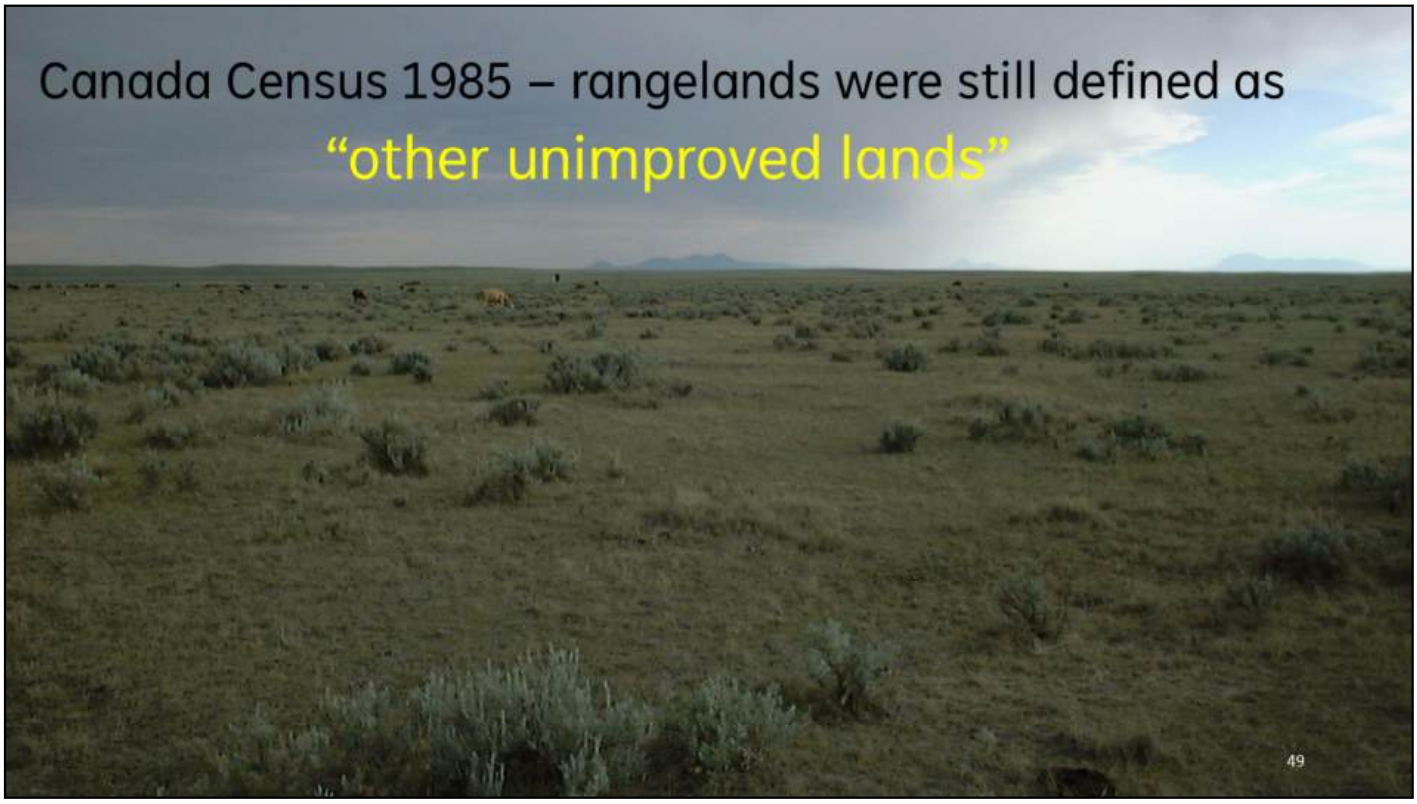


Another key monitoring tool that Ag Canada researchers supported were rangeland reference areas. These are sites selected to represent broad major plant communities and range site types on the landscape.

The Alberta Forest Service began establishing reference areas in the Rocky Mtn Forest reserve around 1950

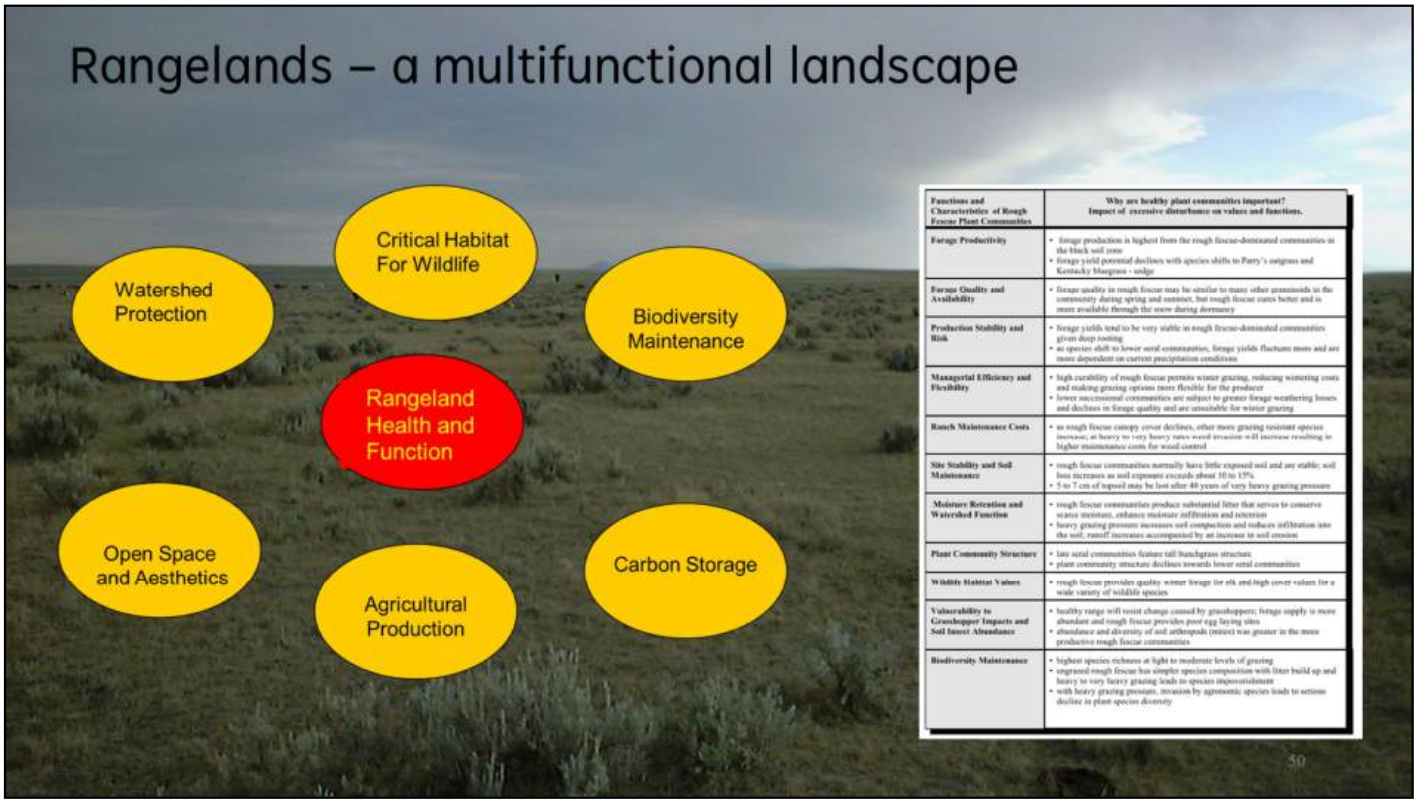
In the late 1960's, with Ag Canada partnering with the Public Land managers in establishing rangeland reference area in the Prairie region,

Thirteen of these initial 26 sites remain active with additional sites were created through the late 80s and early 90s to capture soils and site types not captured by the original network.



In my early years with the department, one of my first conferences required that I describe Alberta rangelands and to me it was shocking to see that census data tag our rangelands as other unimproved land.

Indeed, well into the 1980’s this notion persisted that rangelands needed to be improved through reseeded to tame forage species.



In the late 1990s, advancements in the biological sciences challenged us to better recognize, explore and communicate the ecological and environmental services that these lands provide.

CONCLUSIONS????????

The science A decade ago we had very high hopes that the Alberta's Land Use Framework was going to give us a leg up on rangeland conservation but that seems to have stalled.

Indeed we have much to celebrate with respect to the contributions of both ranchers and researchers, but major hurdles remain to have society truly value and protect these lands.

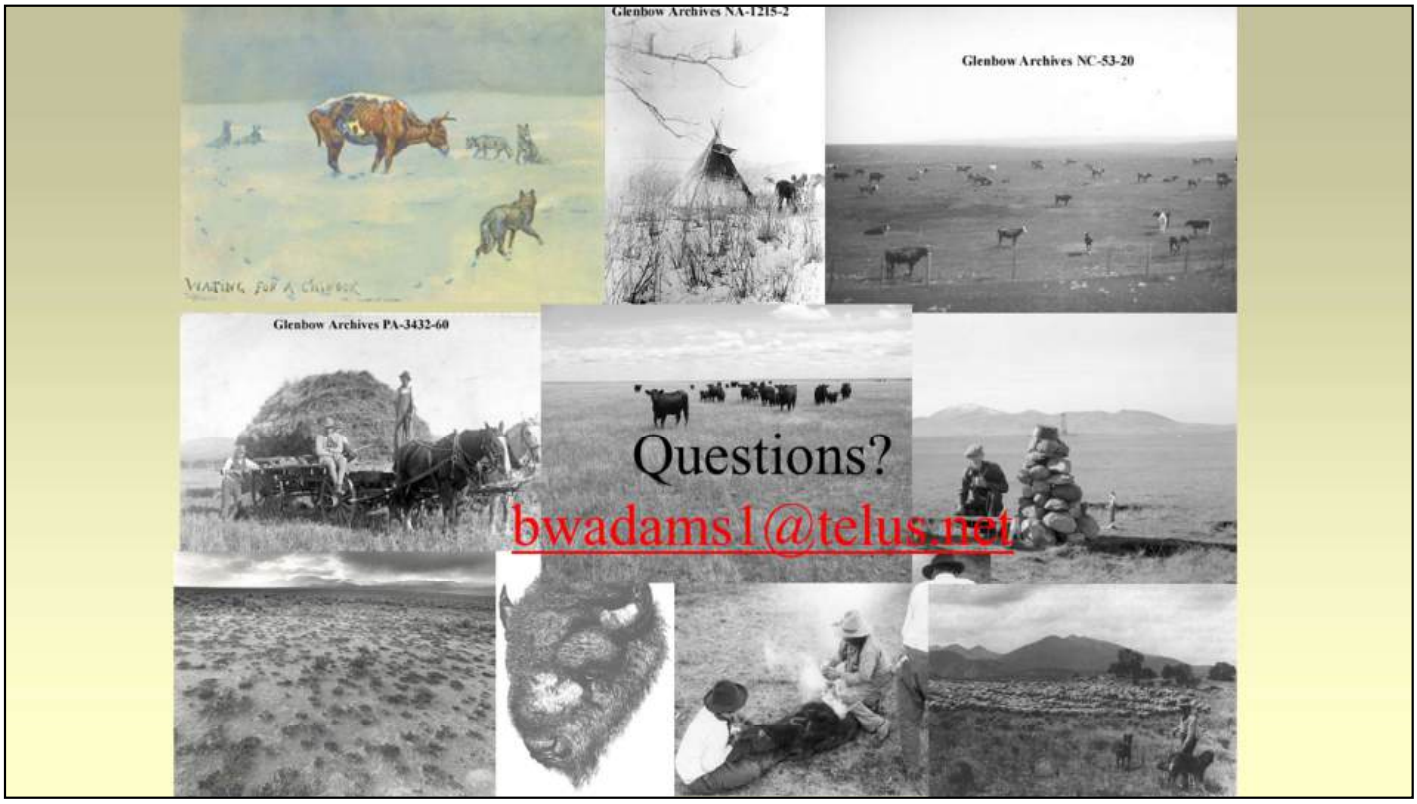
Isaac Newton inspired the phrase – "the shoulders we stand on" – that present progress builds on past knowledge.

I first developed this slide talk at the request of the Alberta Grazing Leased Holders Association and I posed the question, 100 year old learnings, are they relevant today?

I hope I have convinced you that they are and that we indeed need to celebrate the accomplishments of the men and women who have created legacy.

I will leave a challenge to you that if you would like to find a kind of readers digest summary of some of the early work ……

And so celebrating rangelands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Glenbow Archives NC-53-20
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Questions?
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