

Livestock 101: What Every Conservation Professional Needs to Know about Bison Production



February 9, 2026

FARM PRODUCTION AND CONSERVATION
FSA | NRCS | RMA | Business Center

Moderator for Today's Session

- Brenda Simpson
- National Grazing Specialist
- National Headquarters



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Livestock 101, Mark These Dates!

Tuesday, March 10, 2026 1:00–2:30 pm EST
Session 2. Livestock 101: Equines

Wednesday, April 15, 2026 1:00–2:30 pm EDT
Session 3. Livestock 101 Livestock Economics and Markets

Thursday, May 21, 2026 1:00–2:30 pm EDT
Session 4. Livestock 101: Aquaculture Monday, July 14, 2025

Friday, June 26, 2026 1:00–2:30 pm EDT
Session 5. Livestock 101: Cervids (Elk and Deer) and Camelids (Llama and Alpaca)

Monday, July 27, 2026, 1:00–2:30 pm EDT
Session 6. Livestock 101: Organic Livestock Production

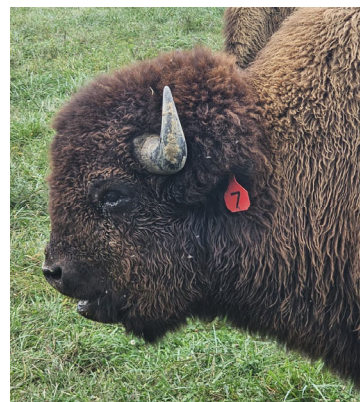
Tuesday, August 25, 2026 1:00–2:30 pm EDT
Session 7. Livestock 101: Urban Livestock Production

Wednesday, Sept 30, 2026 1:00–2:30 pm EDT
Session 8. Livestock 101: Insects



Purpose of the Series

- Respond to an expressed need for employee training in livestock production
- Share knowledge on livestock production to enable better support of conservation on the ground
- Leverage resources, by allowing NRCS employees to expand their network of experts in livestock production



Logistics

- Questions should be posted in the chat, live responses
- Session will be recorded and posted on:
- **The Conservation Webinar Portal**
<https://conservationwebinars.net>

The screenshot shows the USDA NRCS website interface for a webinar. At the top, there are navigation links: LIVE WEBINARS, ON-DEMAND WEBINARS, ABOUT, HELP, and CALENDAR. The main content area features a banner for 'Livestock 101: Dairy Cattle' sponsored by USDA NRCS. Below this is a 'Science & Technology Training Library' banner. A sidebar on the right contains 'Webinar Details' including the date (Jun 10, 2023 1:00 pm CDT), length (30 mins), and presenter (Margaret Quisenberry). A 'HOW TO REGISTER / JOIN' button is also visible.

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Livestock 101: Bison Production

Our Speakers Today are:
Lydia Whitman
Program Manager, National Bison Association

Dr. Jeff Martin
Assistant Professor/Extension Specialist—Bison,
South Dakota State University



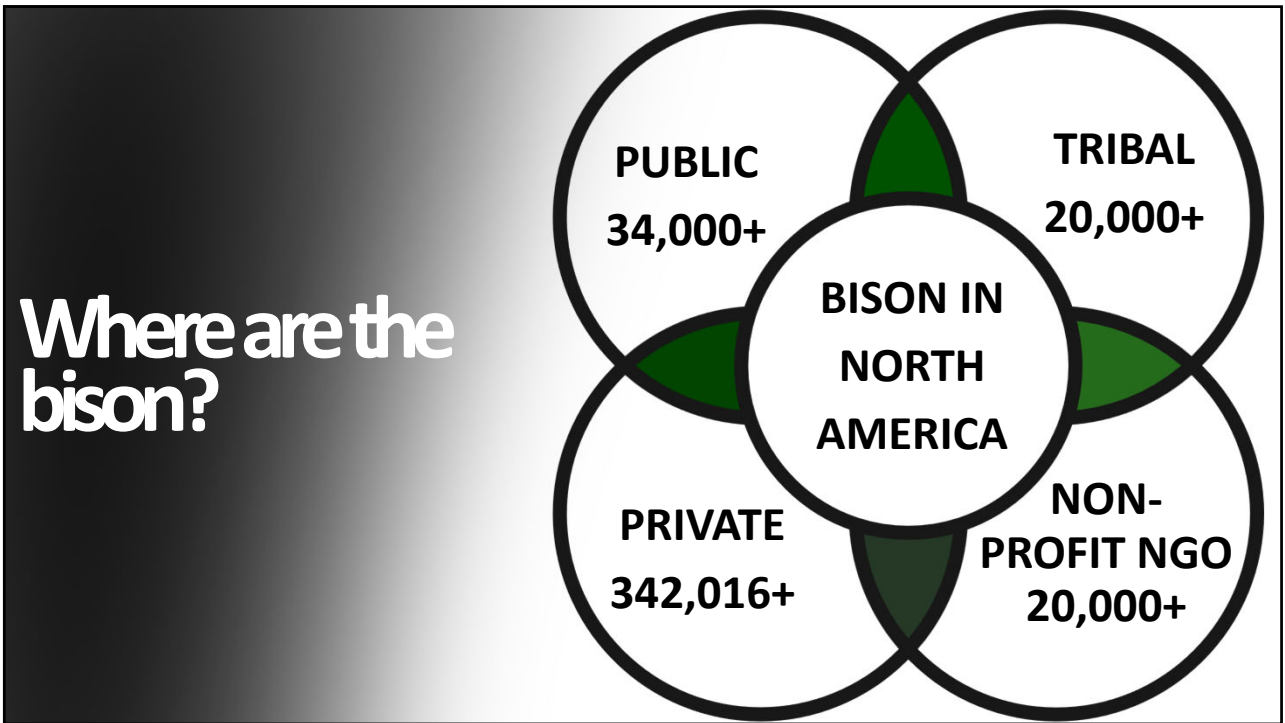
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PRESENTATION BY
LYDIA WHITMAN

@NATIONALBISON
WWW.NATIONALBISON.ORG







We are a community bound by the heritage of the American bison.

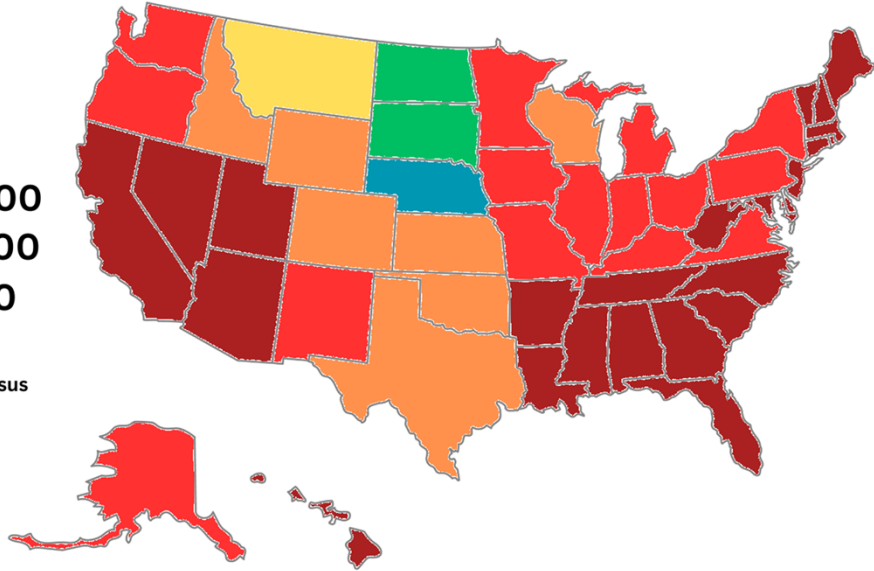


Just a little more than 100 years ago, the American bison was teetering on the verge of extinction. By the beginning of the 20th century, the species' numbers fell from herds of roughly 40 million to less than 1,000 individuals. The impact was devastating. Caring people unified around conservation and ecological health, cultural heritage and community identity, sustainable land stewardship, and commitment to bison on the landscape.

Ranched Bison

- 30,000+
- 20,000 - 30,000
- 10,000 - 20,000
- 5,000 - 10,000
- 0 - 5,000

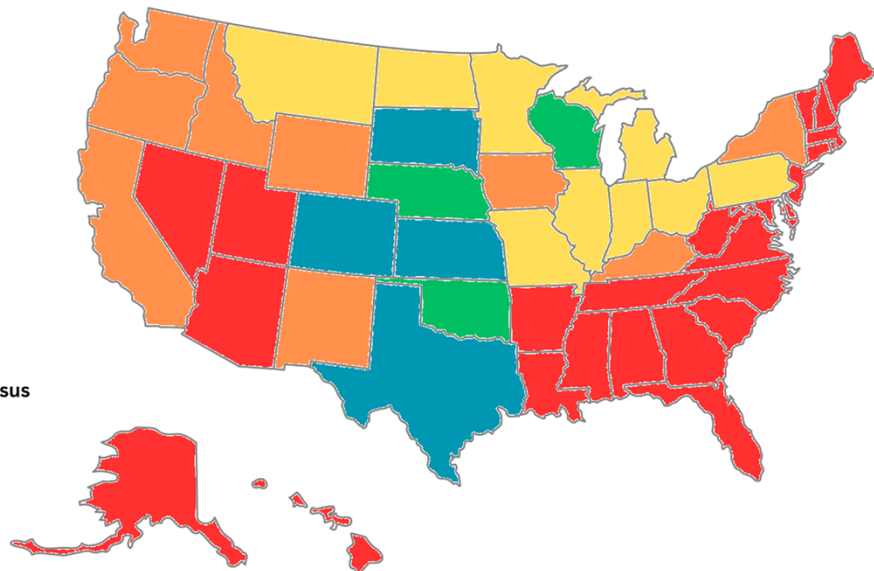
Source: 2022 USDA Ag Census

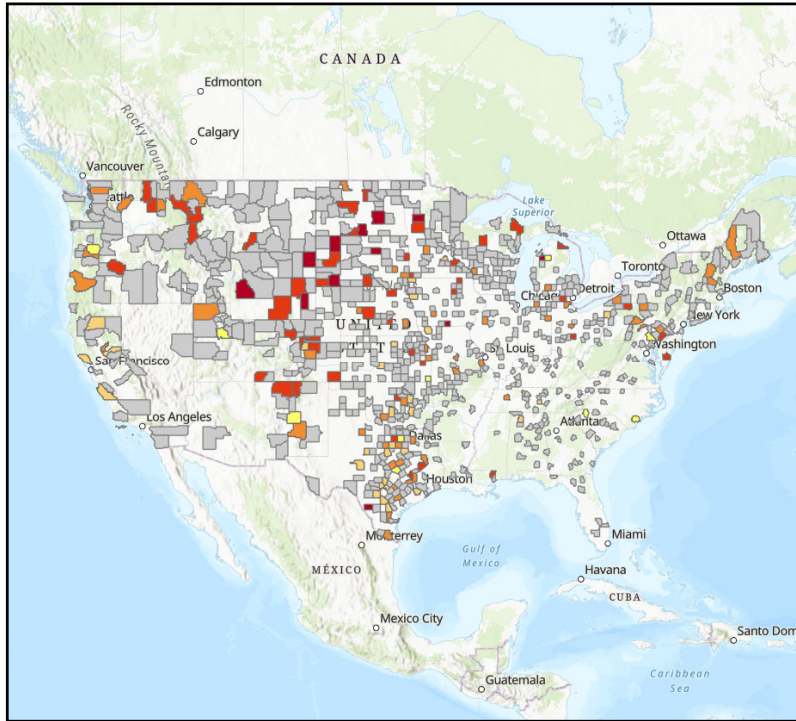


Bison Ranches

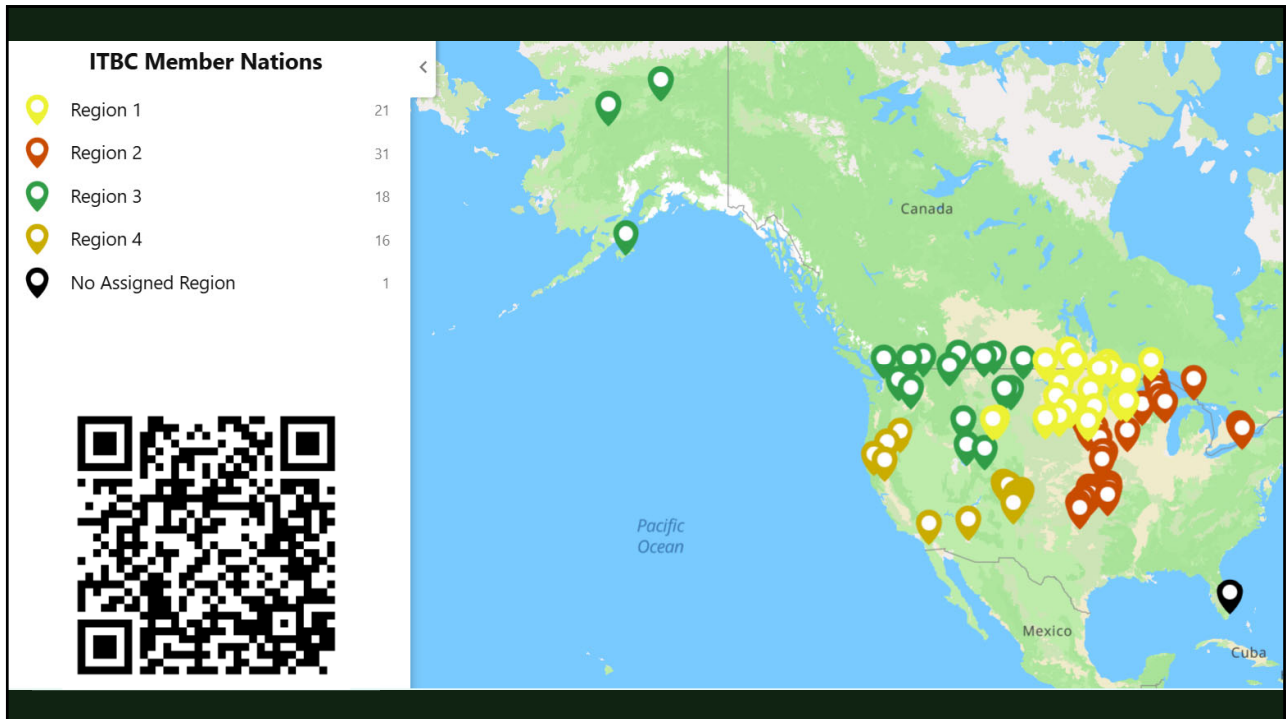
- 100+
- 75-100
- 50-75
- 25-50
- 0 - 25

Source: 2022 USDA Ag Census





- FARMERS AS A PERCENTAGE OF THE U.S. POPULATION: LESS THAN 2%.
- BISON RANCHERS AS A PERCENTAGE OF THE U.S. POPULATION: LESS THAN 0.0001%
- 12% GROWTH IN BISON RANCHES
- AVERAGE HERD HAS 30 BISON
- 5% GROWTH IN BISON POPULATION





- [Lower in Fat & Calories](#)
- [Rich in Protein](#)
- [High in Essential Vitamins & Minerals](#)
- [Beneficial Fats](#)
- [Supports Energy & Immunity](#)
- [Sustainable Choice](#)

Bison Protein

Conservation through commerce in bison is a restoration model where consumer demand for meat and products incentivizes ranchers to raise more bison, driving population growth from near extinction to over 400,000 today. This market-based approach supports private, commercial herds, which now make up roughly 90% of all bison, restoring them to the landscape.

BISON IS THE PERFECT PROTEIN

	BISON	Beef	Chicken
Fat (g)	2.42	18.54	7.41
Protein (g)	28.44	27.21	28.93
Calories (kcal)	143	283	190
Cholesterol (mg)	82	87	89
Iron (mg)	3.42	2.72	1.21
Vitamin B-12 (mcg)	2.86	2.5	.033

BISON has **26%** more iron than beef

BISON has **87%** less fat than beef

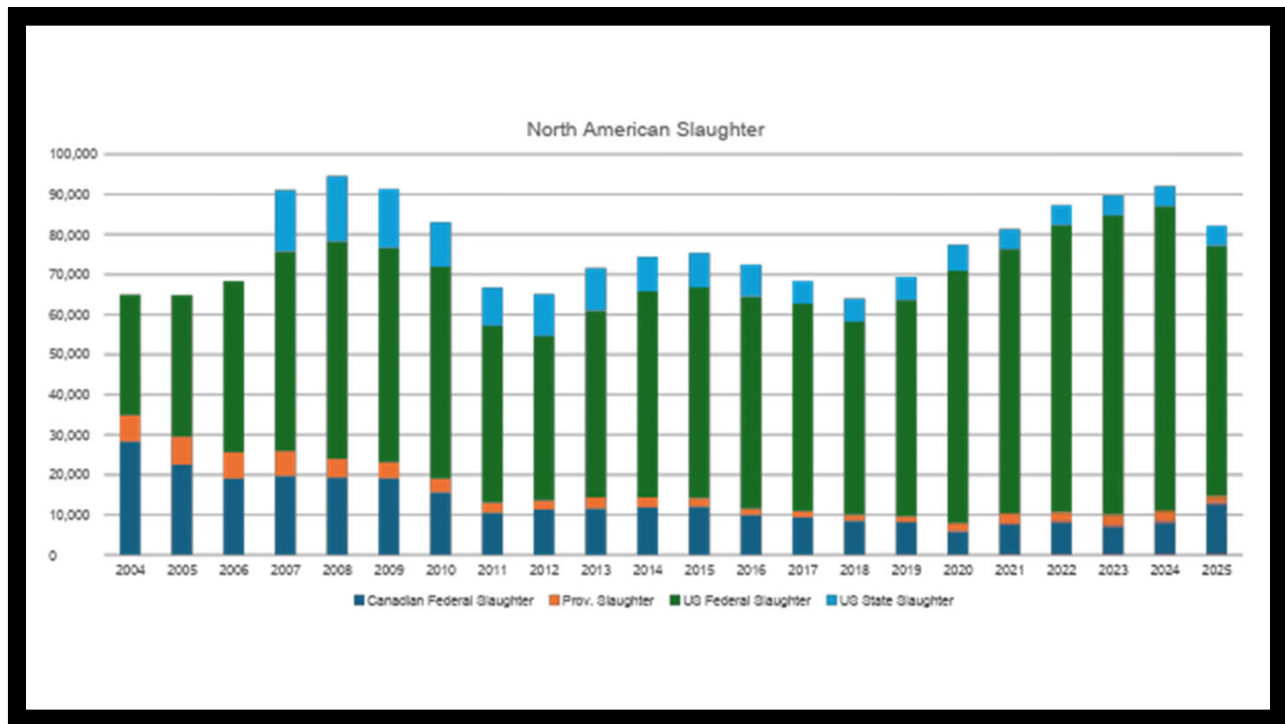
BISON has **8%** less cholesterol than chicken

BISON has **766%** more vitamin B-12 than chicken

BISON has **32%** less fat than chicken

beef has **98%** more calories than BISON

Source: USDA National Nutrient Database for Standard Reference.



TOUGH WINTER? THE BISON ARE FINE.



EAT BISON TO RESTORE BISON.

Photo © Jeff Vanuga/naturepl.com

MORE BISON = MORE BIRDS



EAT BISON TO RESTORE BISON.



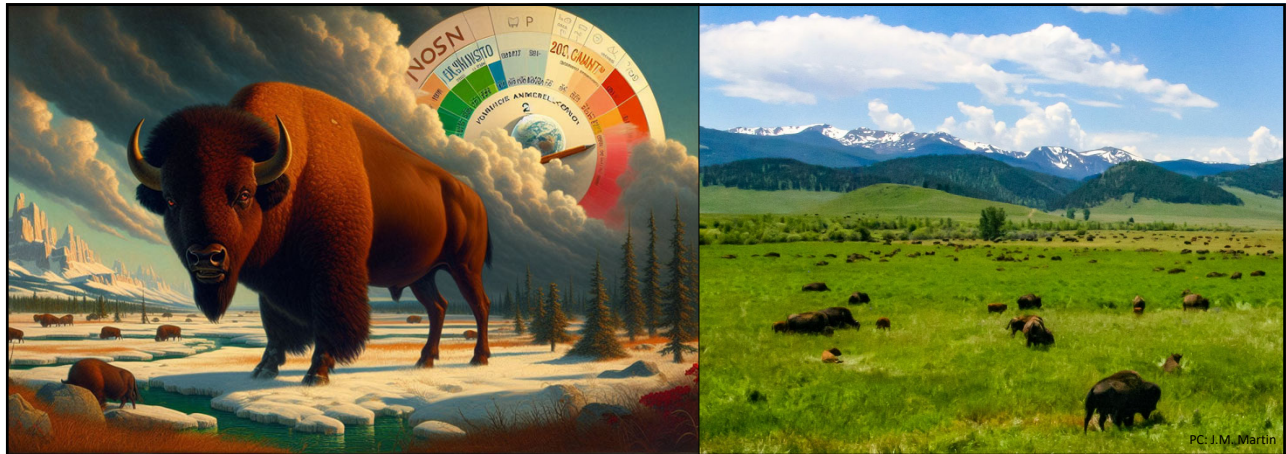




Bison thrive when we work together.
Their recovery is a testament to the power of diverse partners sharing the
responsibility of stewardship.



Lydia Whitman
National Bison Association
lydia@nationalbison.org
303-292-2833
www.nationalbison.org
@nationalbison



LIVESTOCK 101: BISON | OR BISON AS ECOSYSTEM ENGINEERS

JEFF M. MARTIN, PH.D.

**DEPARTMENT OF NATURAL RESOURCE MANAGEMENT &
 CENTER OF EXCELLENCE FOR BISON STUDIES &
 SOUTH DAKOTA STATE UNIVERSITY EXTENSION**



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North American bison (*Bison bison*)



- U.S. National Mammal
- National Bison Month is July
- National Bison Day is first Saturday in November
- As wildlife, they are “Near Threatened” (IUCN Red List)
- Buffalo vs. Buffalo vs. Bison:



Cape Buffalo (*Syncerus caffer*)



Water Buffalo (*Bubalus bubalus*)



North American Bison (*Bison bison*)



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Terminology: Age & sex classes



- **Bull:** intact male
 - (castration is not common practice for bison, very few bison steers exist)



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Terminology: Age & sex classes



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33
Wikimedia commons

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- **Cow:** female that has produced at least one calf
- **Calf:** young, birth to weaning
 - **Wean:** no longer reliant on maternal milk for nutrient intake



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Wikimedia commons

Terminology: Age & sex classes

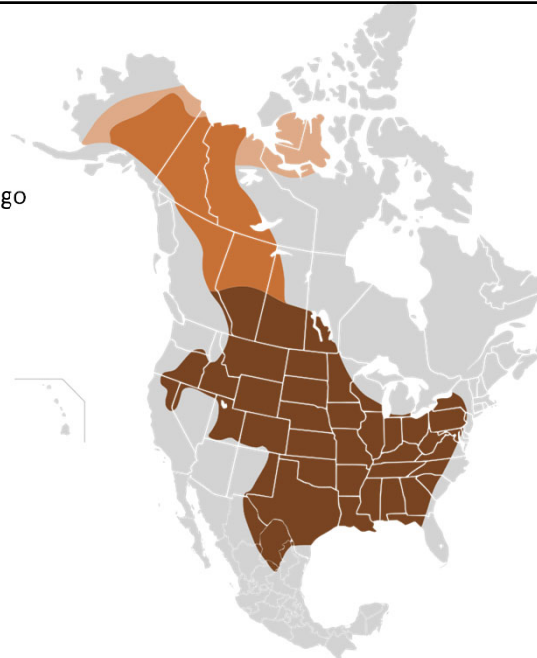


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- **Cow:** female that has produced at least one calf
- **Calf:** young, birth to weaning
 - **Wean:** no longer reliant on maternal milk for nutrient intake
- **Heifer:** young female that has not yet produced a calf



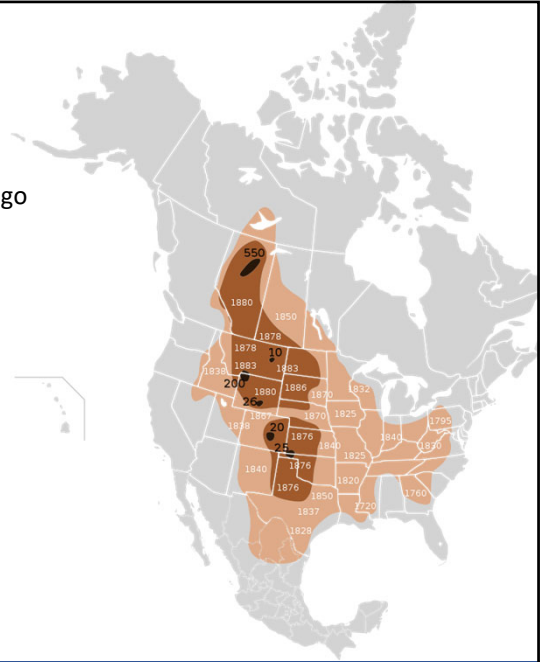
Prehistorical Distribution

- Came across Bering Land Bridge from Eurasia 160,000 years ago
- Between 30-60 million roamed North America



Historical Distribution

- Came across Bering Land Bridge from Eurasia 160,000 years ago
- Between 30-60 million roamed North America
 - Less than 1,000 head by 1882



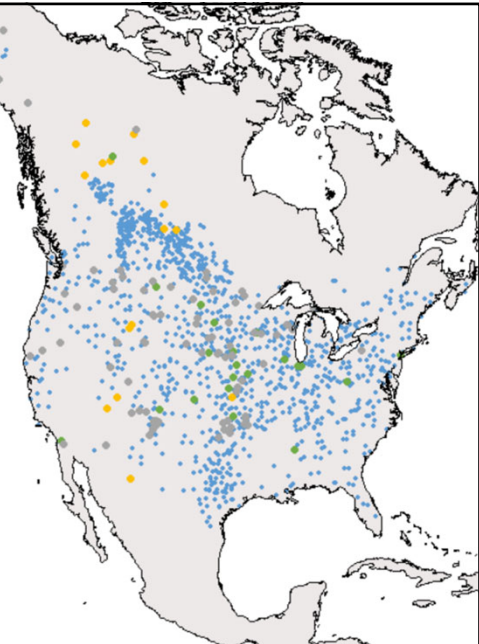
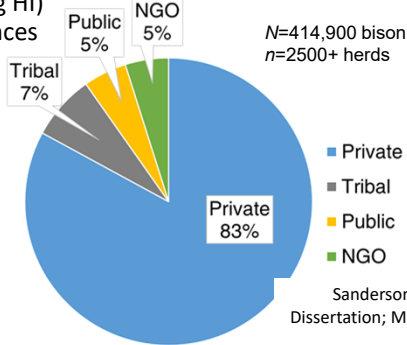
Modern Re-Distribution

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- Restoration of conservation herds continues

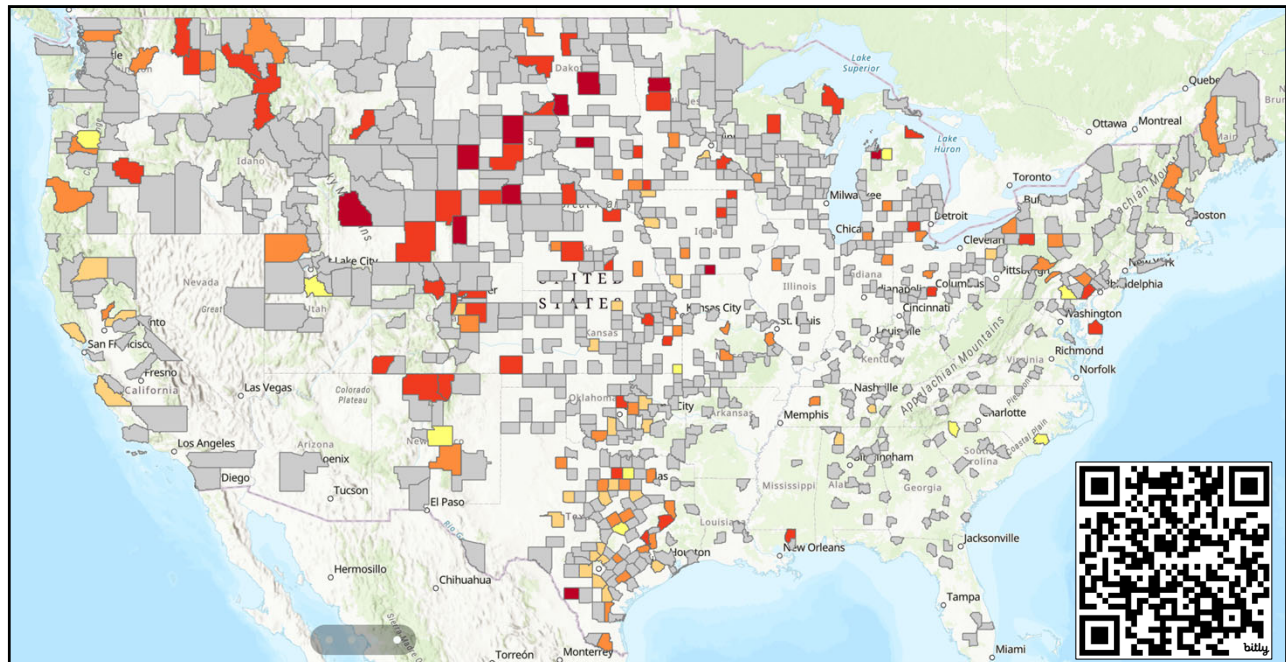


Modern *Re-Distribution*

- Came across Bering Land Bridge from Eurasia 160,000 years ago
- Between 30-60 million roamed North America
 - Less than 1,000 head by 1882
- Restoration of conservation herds continues
- ~415k bison today within >2500 herds across North America
 - 238k in US; 175k in CA; 500 in MX
 - Most States (including HI)
 - Most Canadian Provinces
 - Northern Mexico



Sanderson et al. 2008. *Conservation Biology* 22(2):252-266; Martin 2020 Dissertation; Martin et al. 2021. *People and Nature* 3(3):711-722; Shupinski et al. *in prep.*

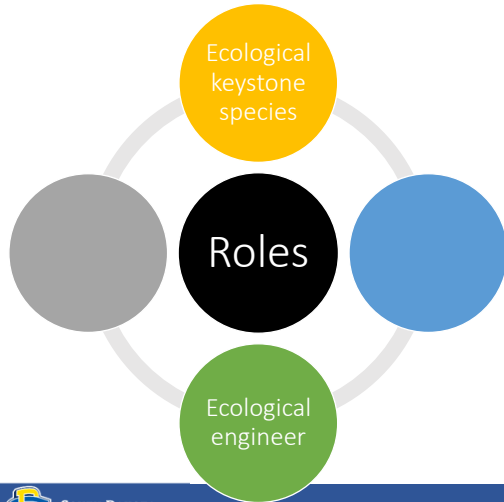


~750 Counties with Bison

Martin and Tow. 2021. <https://bit.ly/4brOj0t>

Roles of Bison

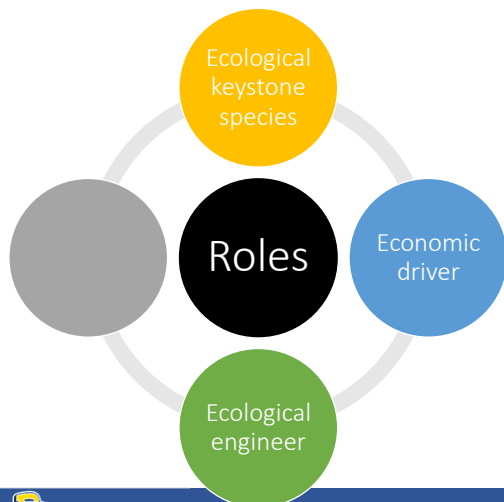
- Ecological keystone species & Ecological engineer



Martin et al. 2021. *People and Nature* 3(3):711-722 & Shamon...Martin... et al. 2022. *Frontiers in Ecology and Evolution* 10(826282)

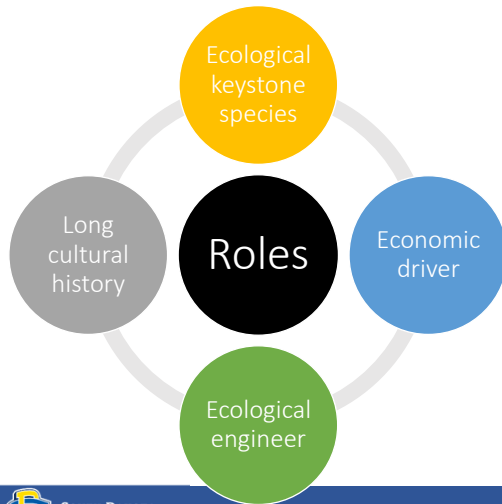
Roles of Bison

- Ecological keystone species & Ecological engineer
- Economic driver for rural populations
 - Bison industry: \$350M annually, meat



Martin et al. 2021. *People and Nature* 3(3):711-722 & Shamon...Martin... et al. 2022. *Frontiers in Ecology and Evolution* 10(826282)

Roles of Bison

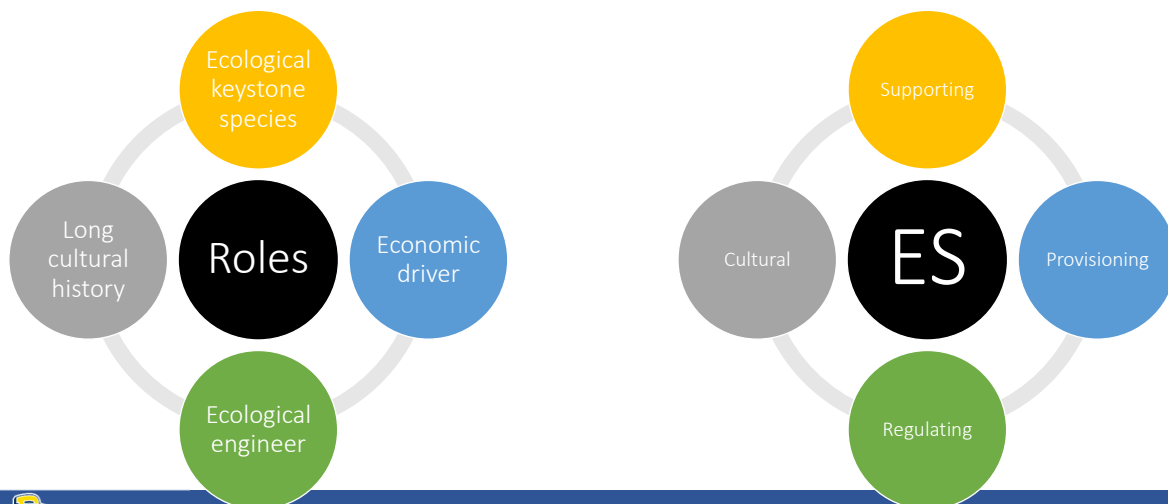


- Ecological keystone species & Ecological engineer
- Economic driver for rural populations
 - Bison industry: \$350M annually, meat
- Long cultural history
 - National Mammal
 - Tribal Nations
 - Western Frontier-ism



Martin et al. 2021. *People and Nature* 3(3):711-722 & Shamon...Martin... et al. 2022. *Frontiers in Ecology and Evolution* 10(826282)

Roles of Bison == Ecosystem Services



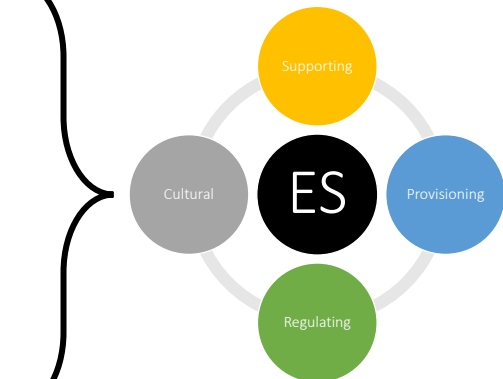
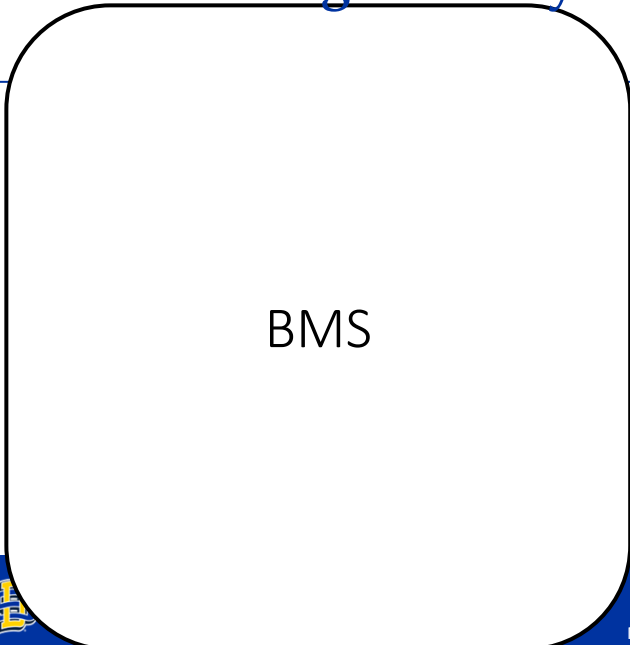
Martin et al. 2021. *People and Nature* 3(3):711-722 & Shamon...Martin... et al. 2022. *Frontiers in Ecology and Evolution* 10(826282)

Ecosystem Services (ES) of Bison

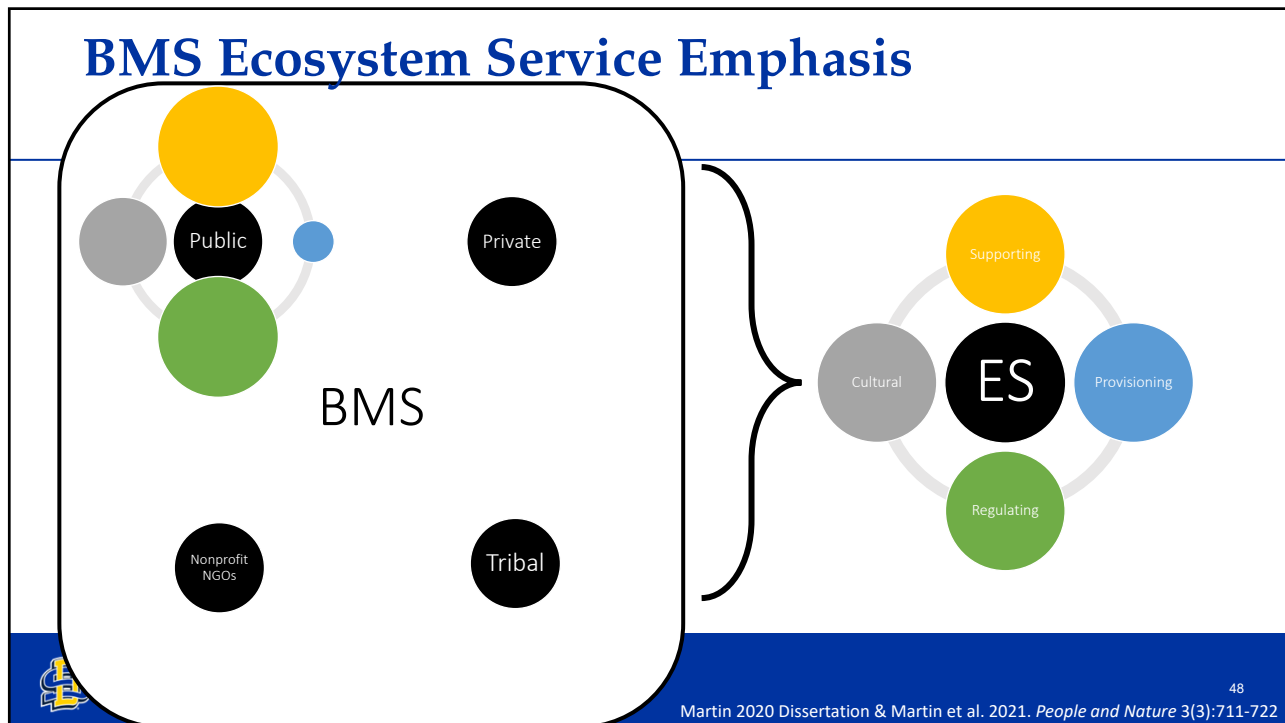
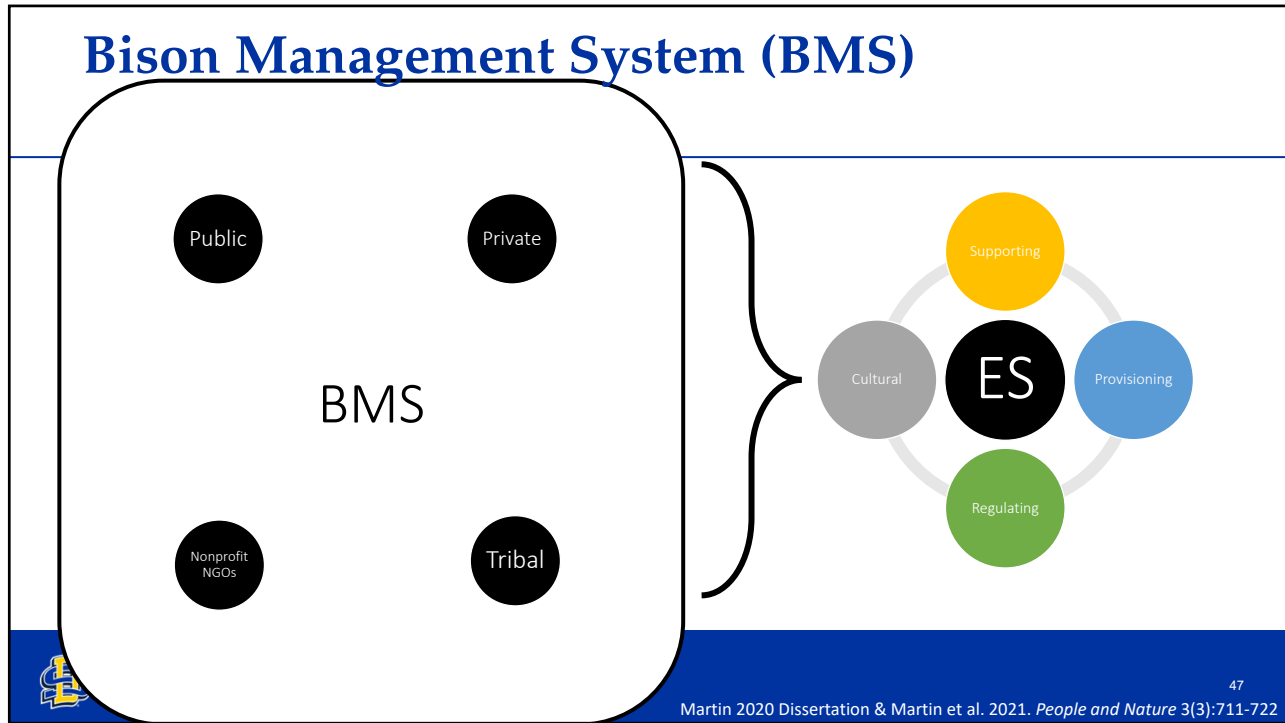


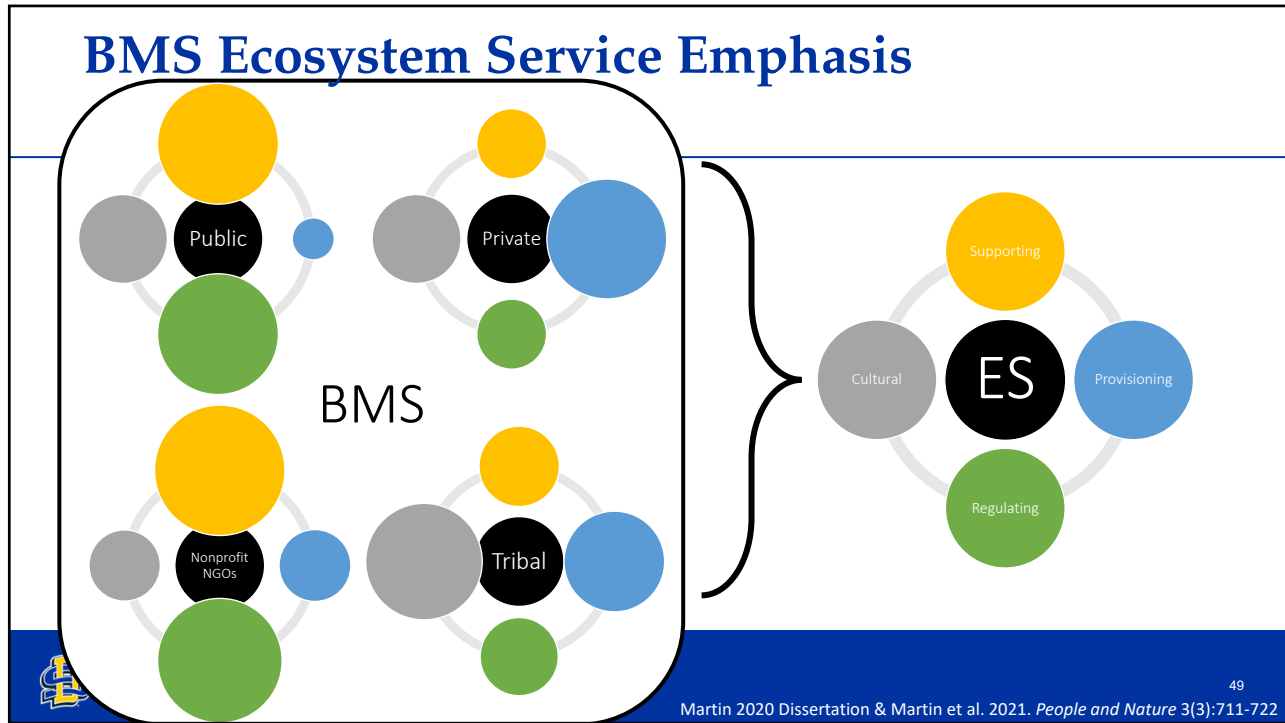
Martin 2020 Dissertation & Martin et al. 2021. *People and Nature* 3(3):711-722

Bison Management System (BMS)



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Martin 2020 Dissertation & Martin et al. 2021. *People and Nature* 3(3):711-722





Keystone Species Etymology

What is a keystone?

Is anyone from PA?
Keystone State

Is anyone a brick mason?
Familiar with building arc.

Wes Olson. 2022. *The Ecological Buffalo*.
Knapp et al. 1999. *BioScience* 49(1):39-50

Ecological Keystone Species Concept

Behaviors & Mgmt.
 Diet selection
 Grazing movement
 Grazing allocation
 Water use
 Wallowing
 Etc.

Prescribed grazing (528)
 Range planting (550)

Grass **Forbs**
Upland Birds **Woody**
Dung Beetles **Pollinators**
Nutrient Cycling **Ecosystem Structure**
Great Plains **Prairies**

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 Wes Olson. 2022. *The Ecological Buffalo.*

Behavior **Physique**
Diet **Excrement**
Nutrient Cycling

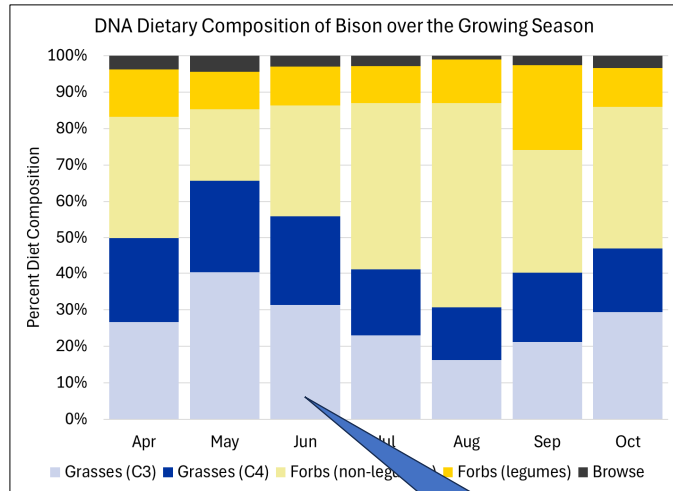
ES
 Supporting
 Provisioning
 Regulating
 Cultural

PC: J.M. Martin



Diet

- Compared to deer, bison are non-selective by having broad dietary selection
- However, compared to cattle, bison are more selective, in that bison do not eat as many forbs
- Seasonally, bison diets reflect changes in *biodiversity* through the year



DNA barcoding = diversity (# spp.) ≠ abundance

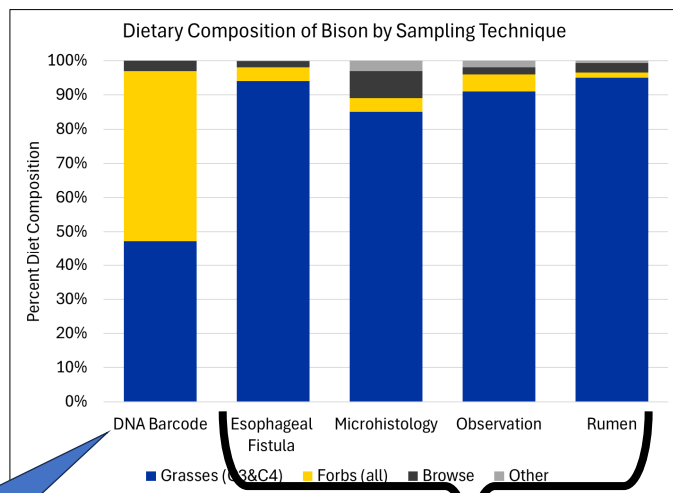


Data adapted from: Craine 2021. *Scientific Reports* 11(1):6829
 Martin. 2025a. SDSU Extension: <https://bit.ly/3MgXOFw>



Diet (2)

- Bison predominantly consume **grasses**, comprising >85% of diet by *abundance* (/volume)
- Bison pass seeds through their GI tract for dispersal

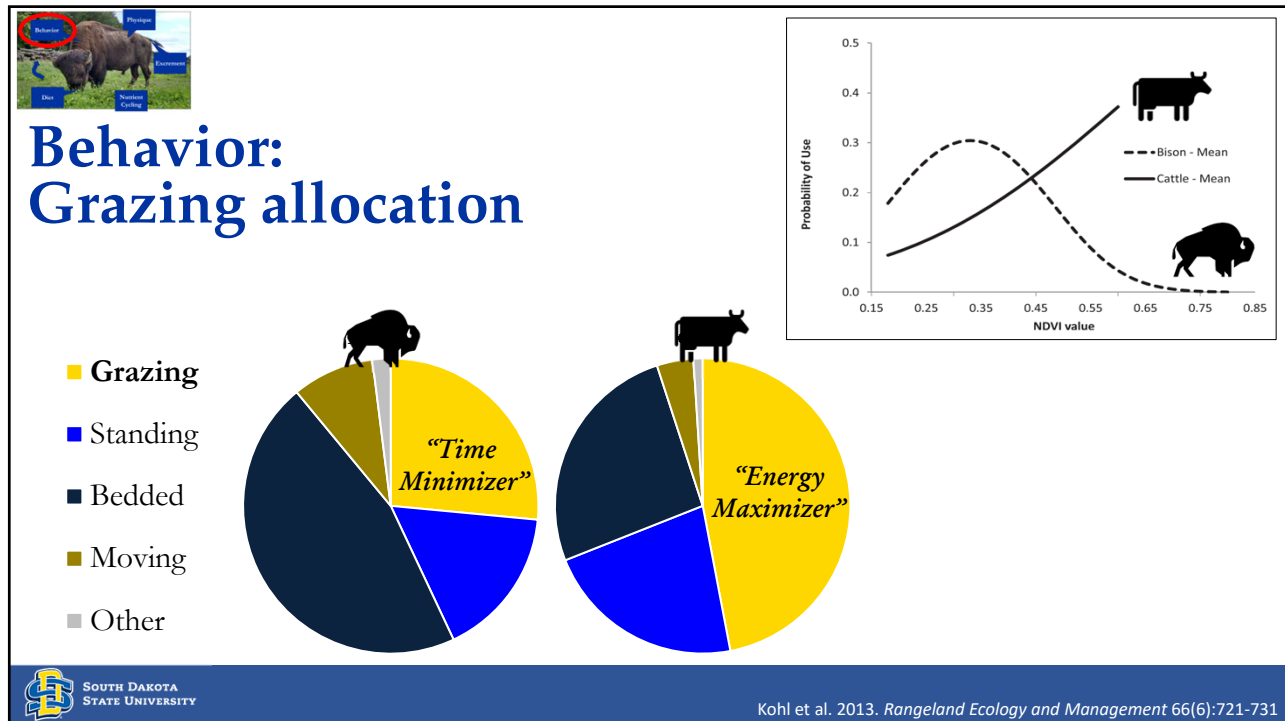
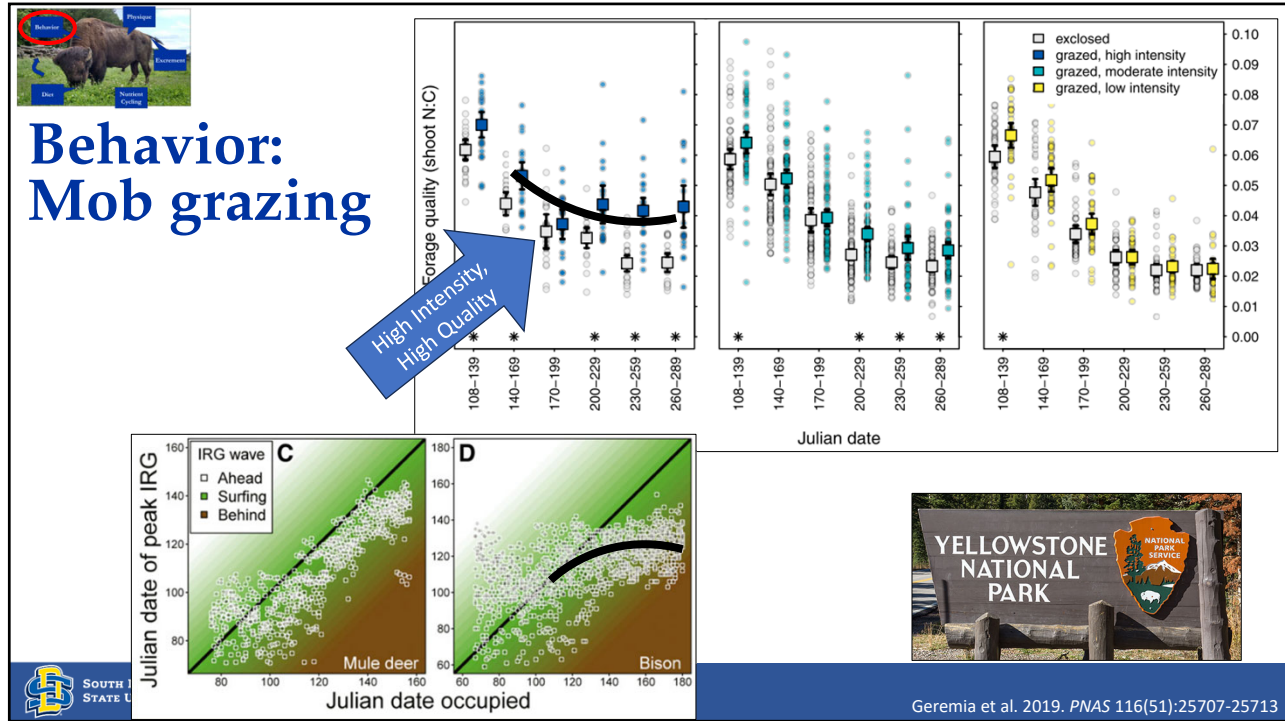


DNA barcoding = *biodiversity* (# spp.); ≠ *abundance* (/volume)

These methods ≠ *biodiversity* (# spp.); = *abundance* (/volume)

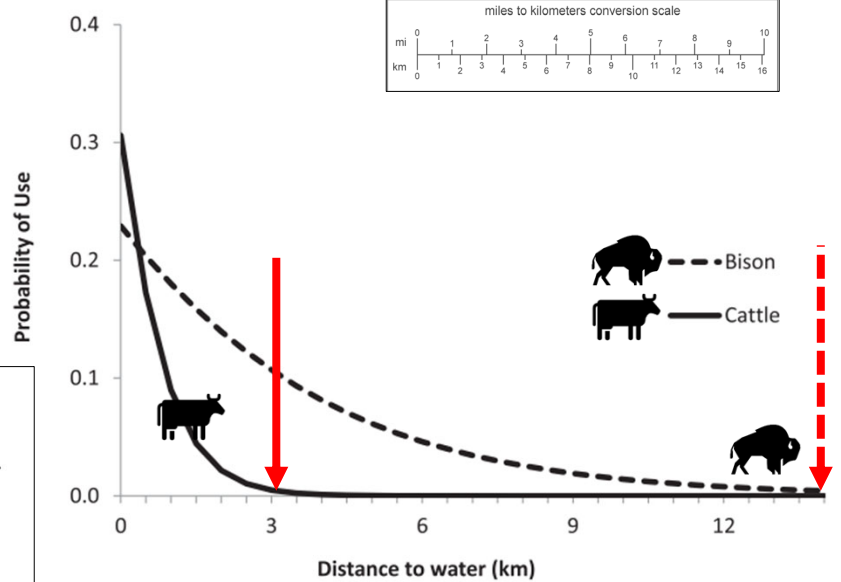
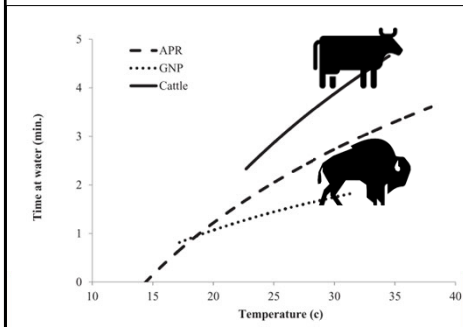


Data adapted from: Hecker et al. 2021. *Mammal Review* 51(2):193-206
 Martin. 2025a. SDSU Extension: <https://bit.ly/3MgXOFw>





Behavior: Water use

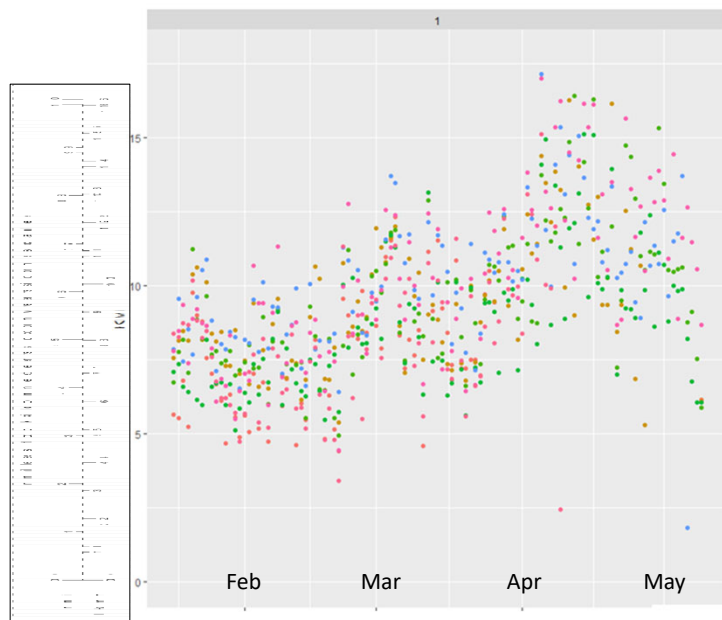


Kohl et al. 2013. *Rangeland Ecology and Management* 66(6):721-731

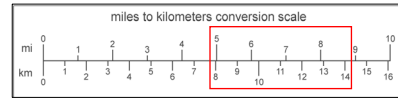


Behavior: Walking

- Ongoing research suggests bison walk 8 km/d (5 mi/d) in dormant season
- Up to 9-10 km/d (9-6 mi/d) in growing season
- Cattle: up to 2 km/d (1 mi/d)

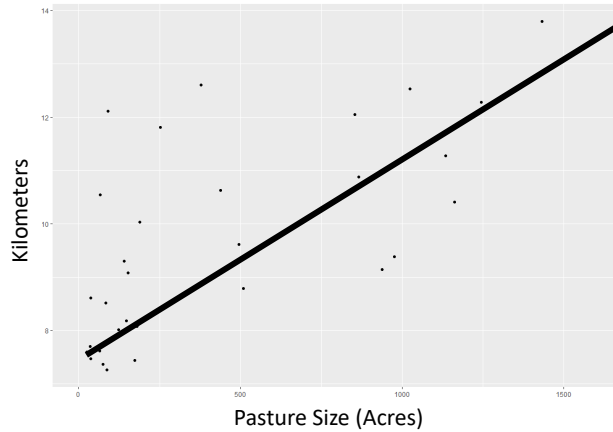


Ongoing SDSU bison GPS tracking research: Brennan and Martin.



Behavior: Walking (2)

- Daily traveled distance increases with pasture size
- The more space you provide, the more they walk



Ongoing SDSU bison GPS tracking research: Brennan and Martin.

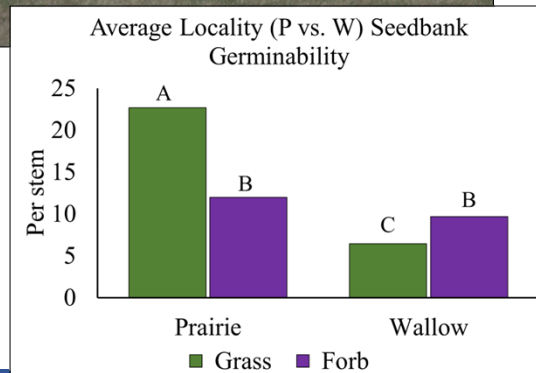


Behavior: Wallows

- Increase landscape biodiversity by opening seed bank around edges of bare soil depression
- Deposit seeds and nutrients from molted hair
- Vernal breeding pool for amphibian when compacted soil retains rainwater



PC: J.M. Martin



Eastman et al. 2026. *Natural Areas Journal* 46(1):13-20



Behavior: Horning

- Horning small trees and rubbing on large trees reduces woody encroachment, maintaining grasslands



@Custer State Park, SD; 2024



PC: J.M. Martin



Physique: Woolly hair

- See the
- Bird mo




Loggerhead Shrike



Western Kingbird

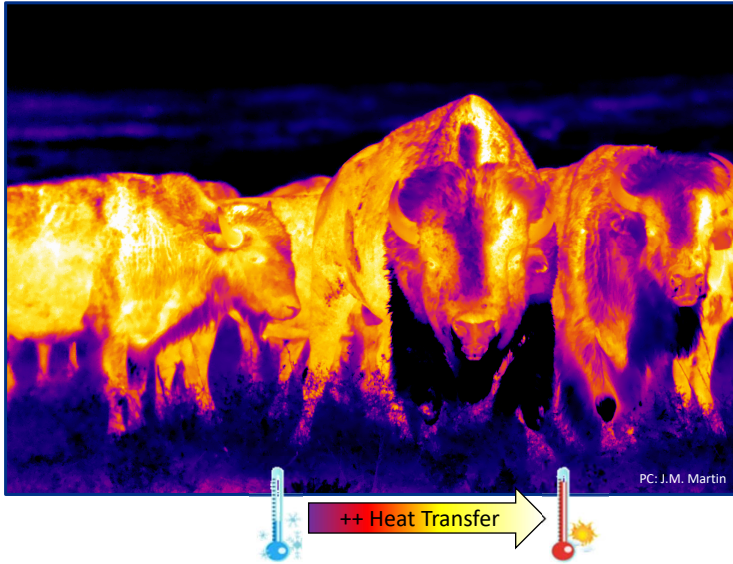


PC: B. Wehus-Tow 2021




Physique: Woolly hair (2)

- Warm woolly coat in winter
 - 3x denser than cattle (well insulated in winter)
 - Bison: 18,000 hairs/inch²
 - Hereford: 5,000 hairs/inch²
- Slick summer hide (molted coat reveals hide)




PC: J.M. Martin

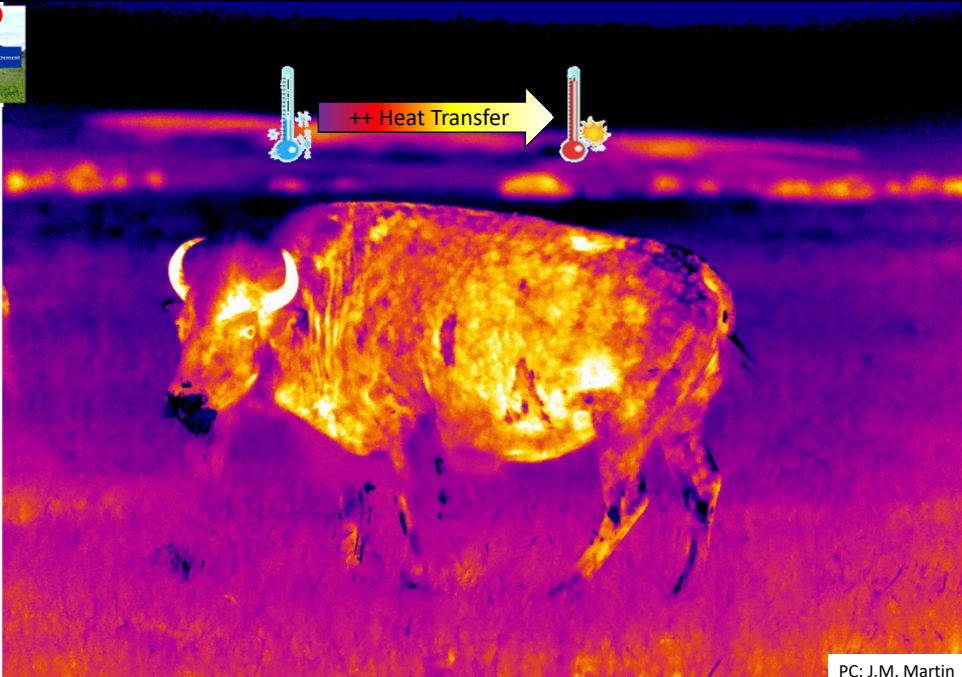


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Martin & Barboza. 2020b. *Ecosphere* 11(7):e03176
Peters & Slen. 1964. *Can. J. Ani. Sci.* 44:48-57



Physique: Thermal Window



PC: J.M. Martin



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Martin & Barboza. 2020b. *Ecosphere* 11(7):e03176



Physique: Limbs

- Long limbs
 - Less energy to walk



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PC: B. Wehus-Tow 2021
PC: N. Iyengar 2022




Physique: Limbs

- Long limbs
 - Less energy to walk
- Shoulder position extends above spinal column




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PC: B. Wehus-Tow 2021
PC: N. Iyengar 2022




Physique:
Body Condition
Score (BCS)


- Animal health at a glance




SDSU Extension Guide
bit.ly/Bison_BCS_guide



1. 2. 3. 4. 5.




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NRCS E528Q - Bison BCS Worksheet
<https://bit.ly/42JHKky>

Rohrer and Martin. 2021. USDA-NRCS Bison BCS Worksheets for E528Q
Martin and Lemminger. 2025. *SDSU Extension*



Excrement == Nutrient Cycling

Urine




- High in Nitrogen, provides much needed influx in areas devoid of nitrogen-fixating legumes

Dung

- High in both Nitrogen and Carbon, providing the building blocks of protein and energy **for new plant growth**
- Patties are home and food for a plethora of invertebrates (dung beetles)

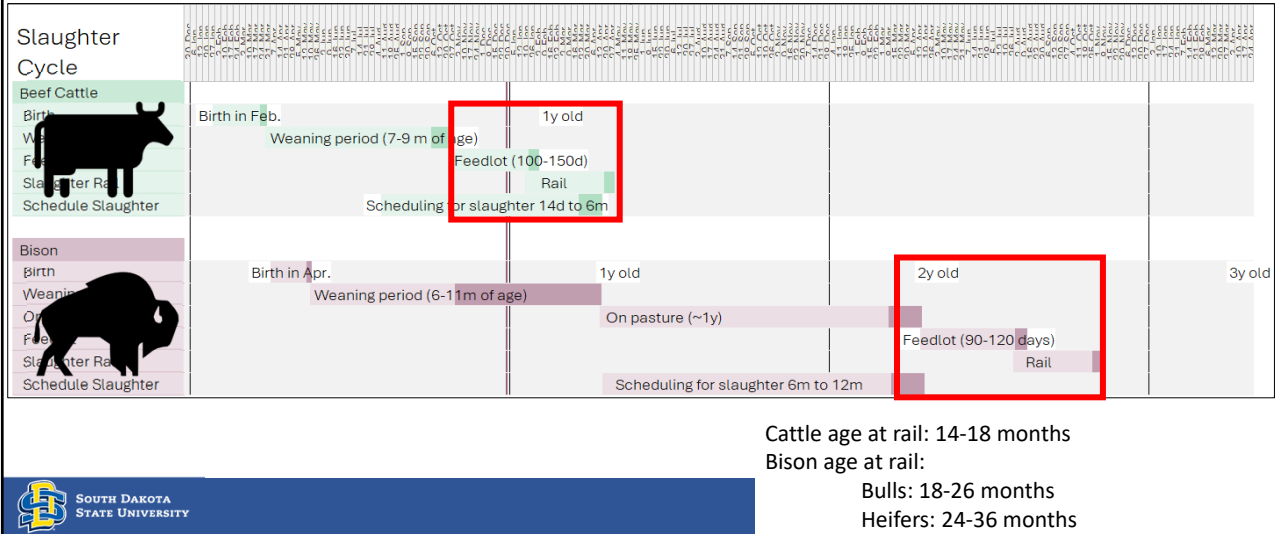
Carcasses

- Ecological:** Carcasses of old individuals left in field returns nutrients to soil, plants, and total food webs. Supports scavengers, decomposers, and microbes
- Managed:** Harvested carcasses of young individuals, extracts nutrients for human consumption and economic returns for people and rural communities

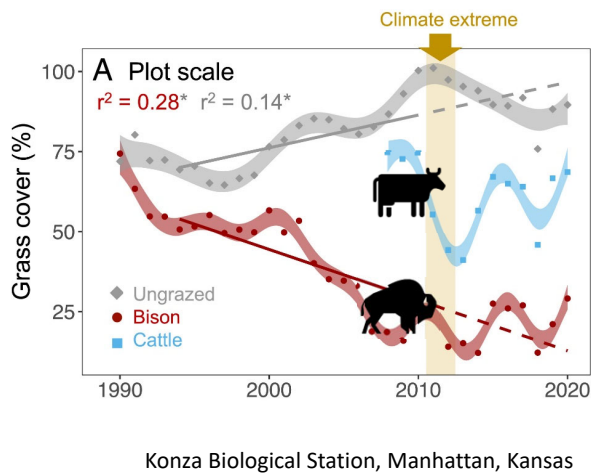




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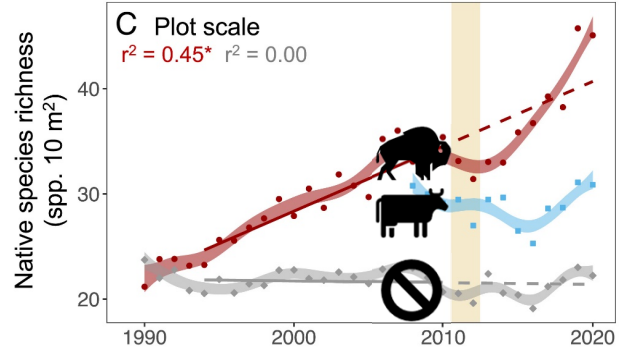
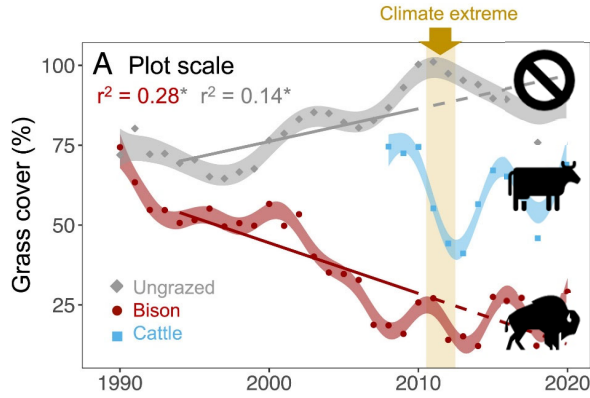
Slaughter Cycle: Bison nearly twice as long to the rail



Ecological Resiliency



Ecological Resiliency

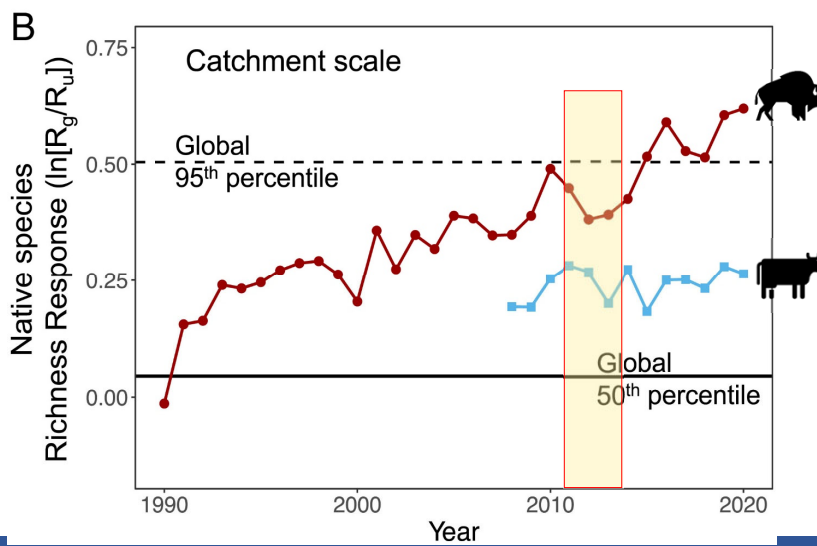


Konza Biological Station, Manhattan, Kansas

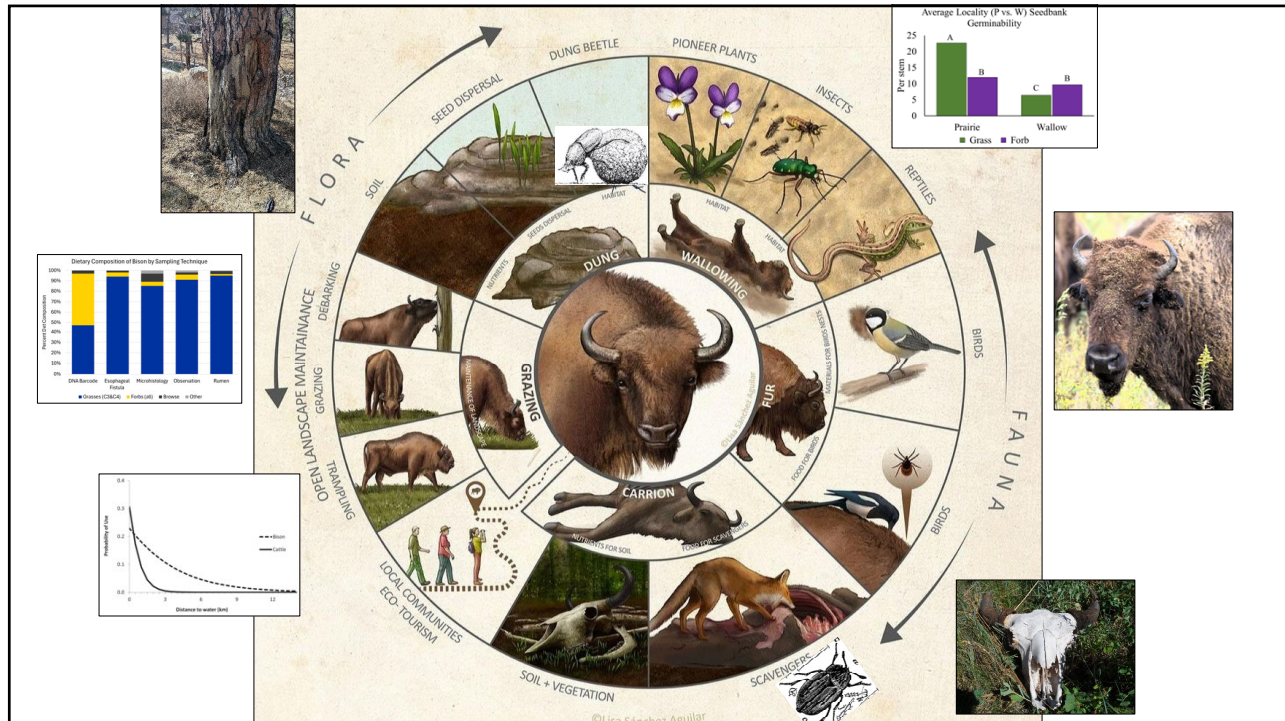


Ratajczak et al. 2022. *PNAS* 119(36):e2210433119

Ecological Resiliency



Ratajczak et al. 2022. *PNAS* 119(36):e2210433119



Extension resources lack for bison...

Search conducted	Search terms	Results
Google, 6/25/2025	"Extension + bison"	8 results in first 2 pages from land-grant institutions with resources from 6 institutions
Google, 6/25/2025	"Extension + beef cattle"	18 results in first 2 pages, with resources from 13 land-grant institutions
Web of Science, 8/13/2025	"Bison" + "outreach*" in both topic and title fields	0 results
Web of Science, 8/13/2025	"Beef cattle" + "outreach*" in both topic and title fields	16 results total in topic fields; 0 results in title fields

*"Outreach" was used instead of "Extension" for the Web of Science search because "Extension" unintentionally queried results about bison or beef cattle herd "expansion" as a synonym with "extension", etc.

But, we're improving

The collage displays four overlapping screenshots of the South Dakota State University Extension website. The top navigation bar is yellow with 'About', 'News', 'Events', 'Search', and 'Print' links. The main content area features several articles:

- Getting Started:** Updated July 30, 2021. Written collaboratively by Jeff M. Martin (SDSU Extension) and the SDSU Center of Excellence for Texas A&M AgrLife Extension.
- Are bison am... definition of b... of meat and c...:** Updated September 16, 2022. Written collaboratively by Jeff M. Martin (Bison Studies, and Amanda Blair, PhD Science Specialist).
- Bison Econo...:** Updated June 25, 2021. Written collaboratively by Jeff M. Martin (Bison Studies, and Amanda Blair, PhD Science Specialist).
- Climate Tool... Future Clima...:** Updated March 03, 2023. Written by Jeff Martin (Assistant Professor and SDSU Extension).
- Decoding Bison: Refining the Bison Body Condition Score:** Updated December 01, 2023. Written with contributions by Angie Lemminger, SDSU Graduate Research Assistant.

At the bottom of the collage, the South Dakota State University Extension logo is visible, along with the URL <https://extension.sdstate.edu/tags/bison> and the page number 75.

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Questions?

