United States Department of Agriculture
Natural Resources Conservation Service

Seed Mixes & Native Plant Materials

Use the “Right Stuff” on the “Right Site”

Susan R. Winslow
NRCS Bridger Plant Materials Center

So…It is all about planning and knowing where to look and, better yet, who to ask!

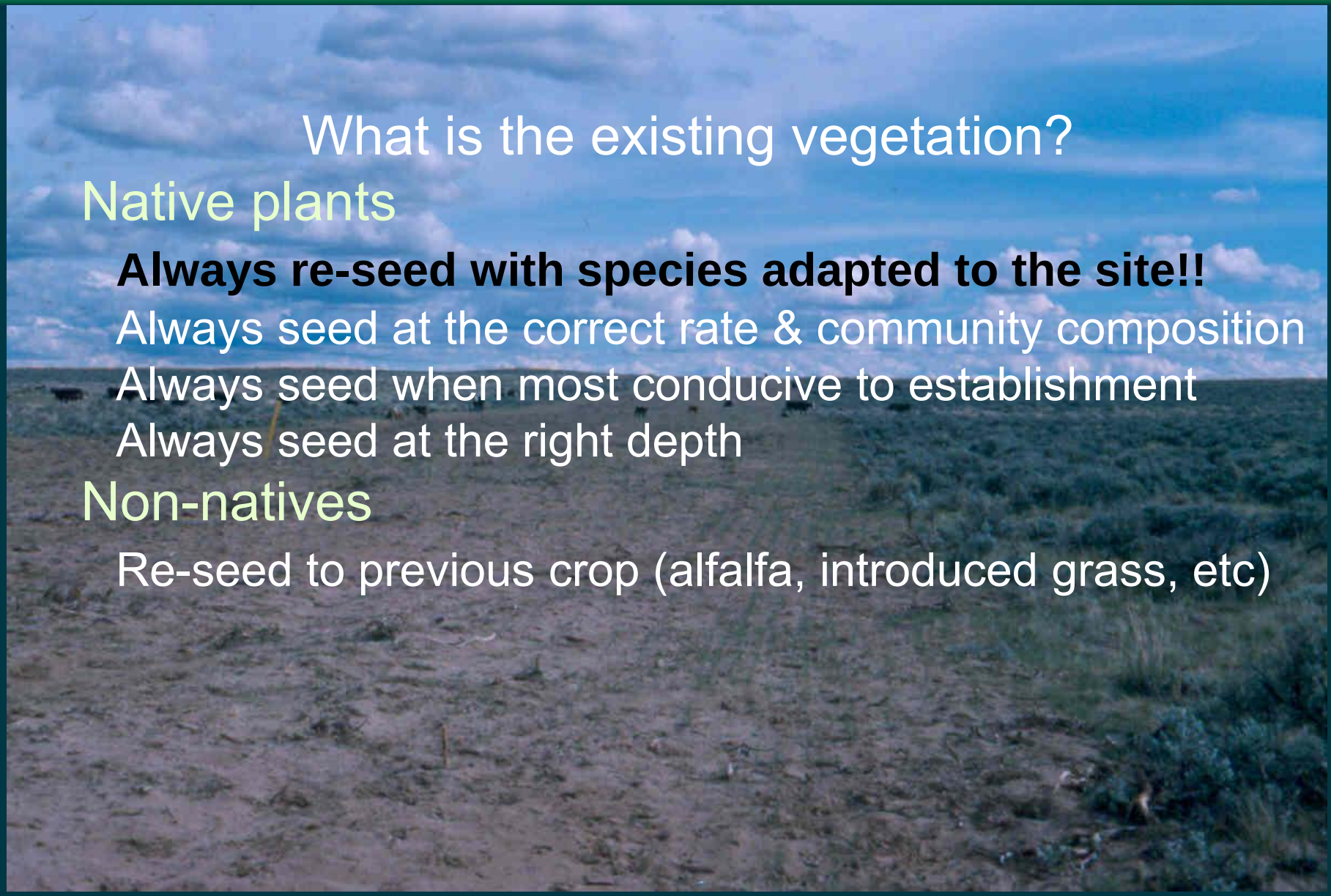
Drill-planted seed

can establish like this!

Inventory Site before disturbance

- ✓ Must have legal description &/or latitude-longitude
- ✓ How is the land used?
- ✓ What is the predominant soil type/texture?
- ✓ How much annual precip. & when does it come?
- ✓ What is the existing vegetation?

--Native plants
--Non natives



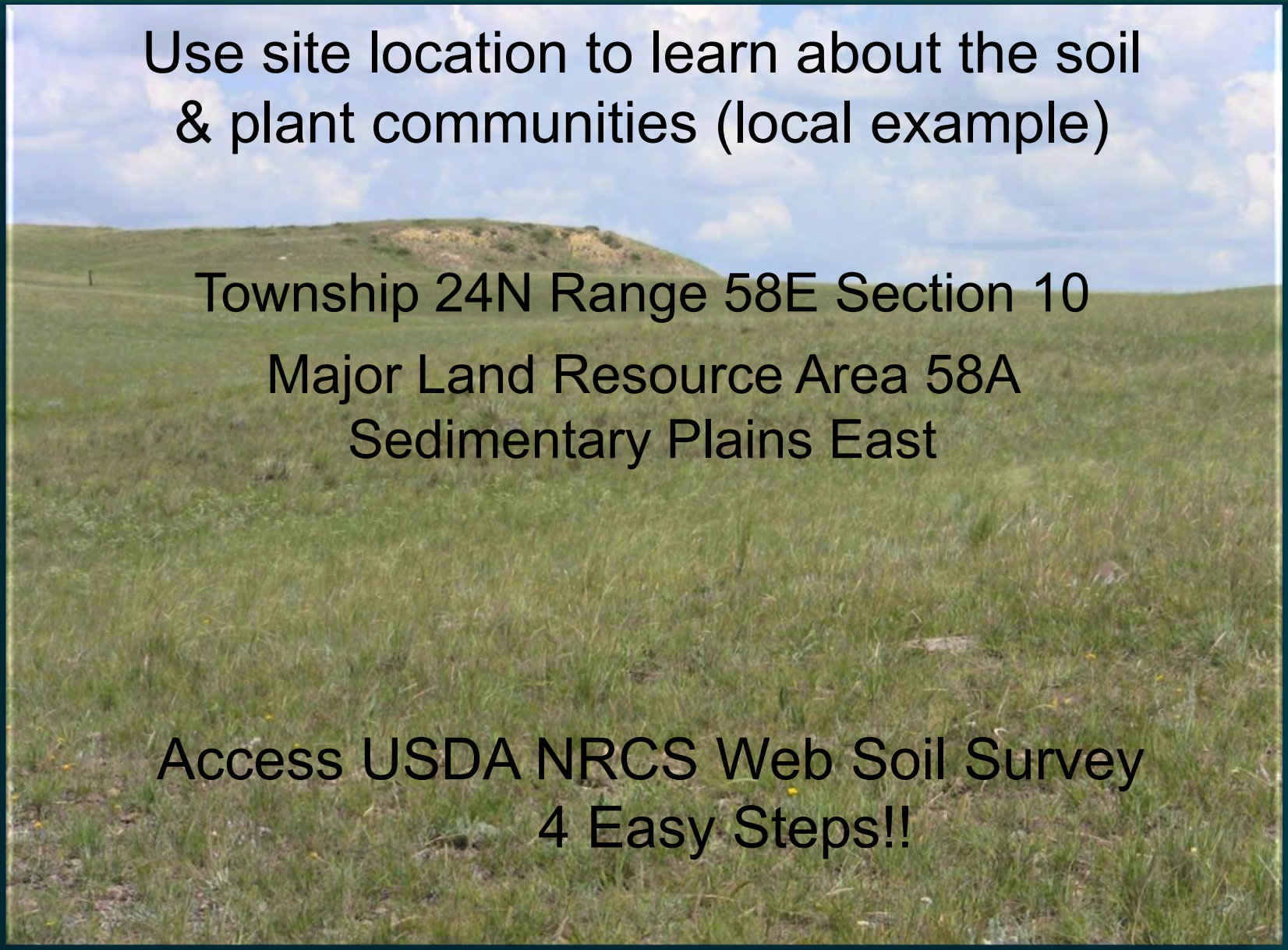
What is the existing vegetation?

Native plants

- **Always re-seed with species adapted to the site!!**
- Always seed at the correct rate & community composition
- Always seed when most conducive to establishment
- Always seed at the right depth

Non-natives

- Re-seed to previous crop (alfalfa, introduced grass, etc)

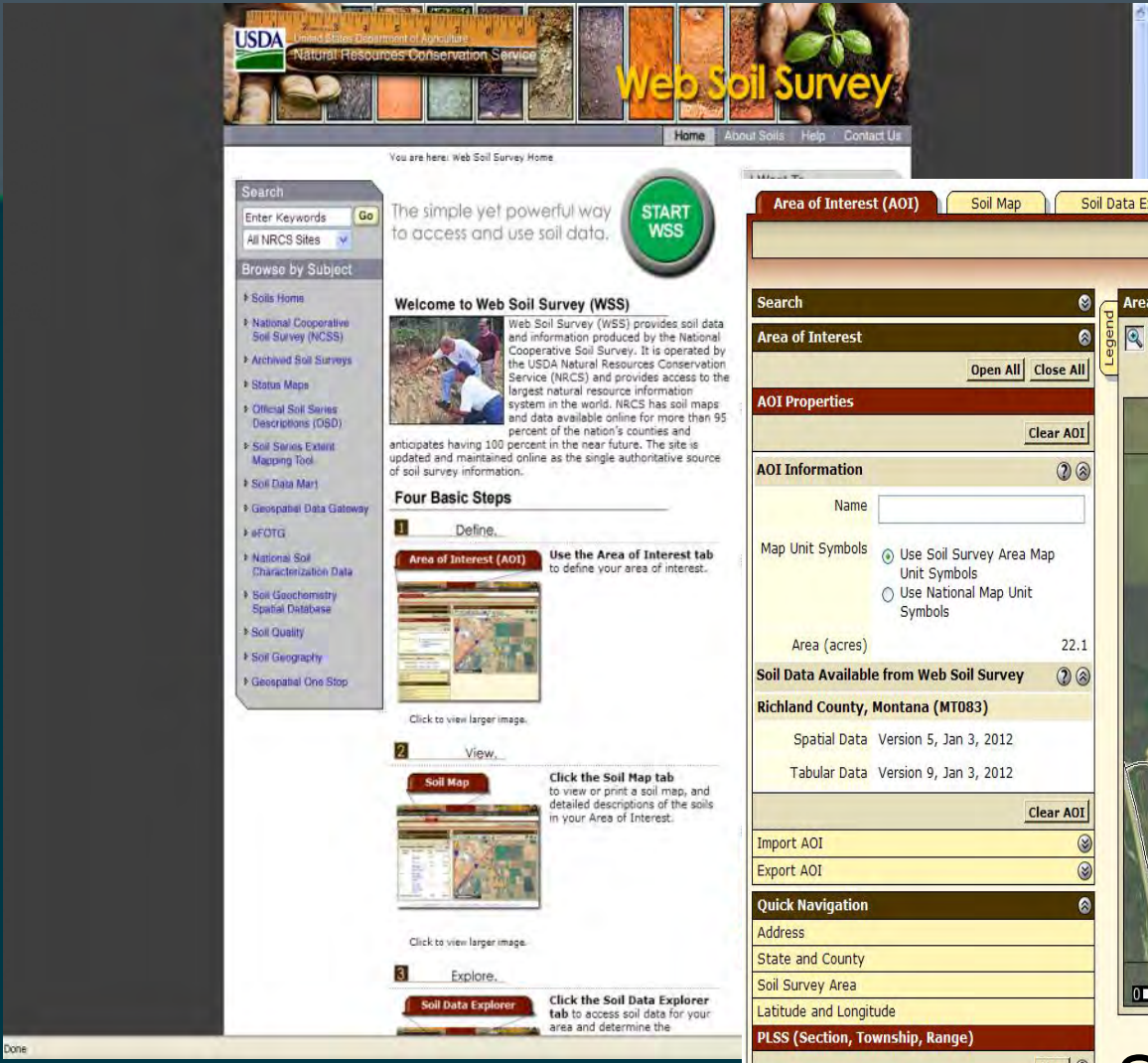


Use site location to learn about the soil & plant communities (local example)

Township 24N Range 58E Section 10

Major Land Resource Area 58A
Sedimentary Plains East

Access USDA NRCS Web Soil Survey
4 Easy Steps!!



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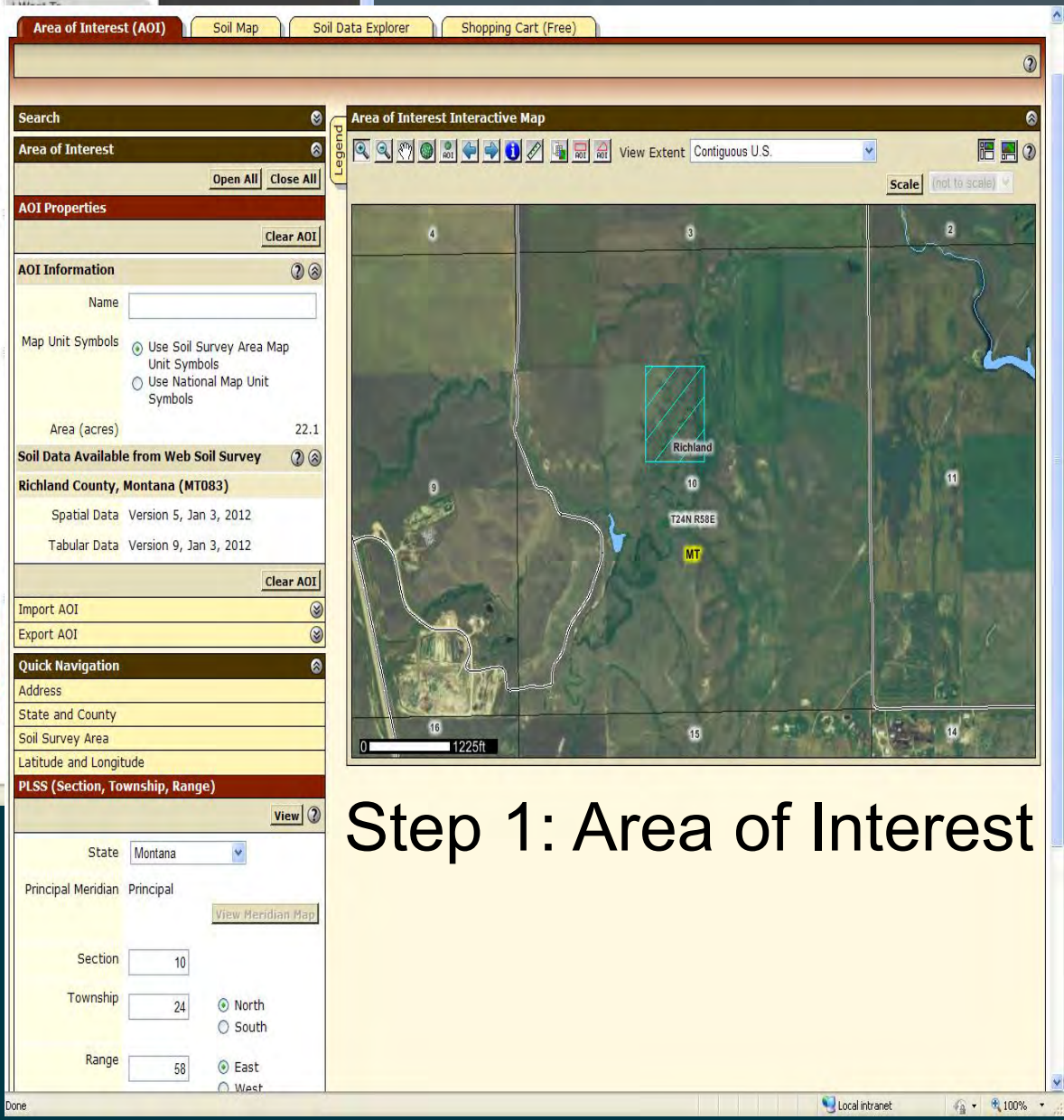
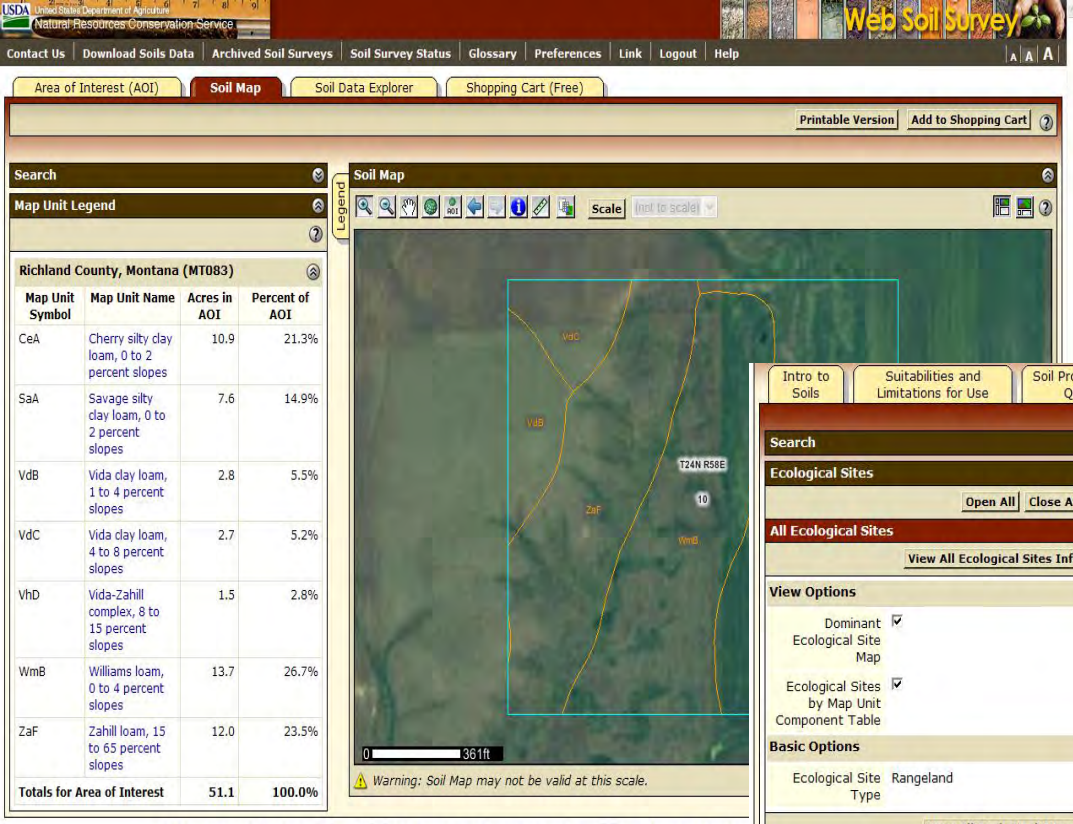
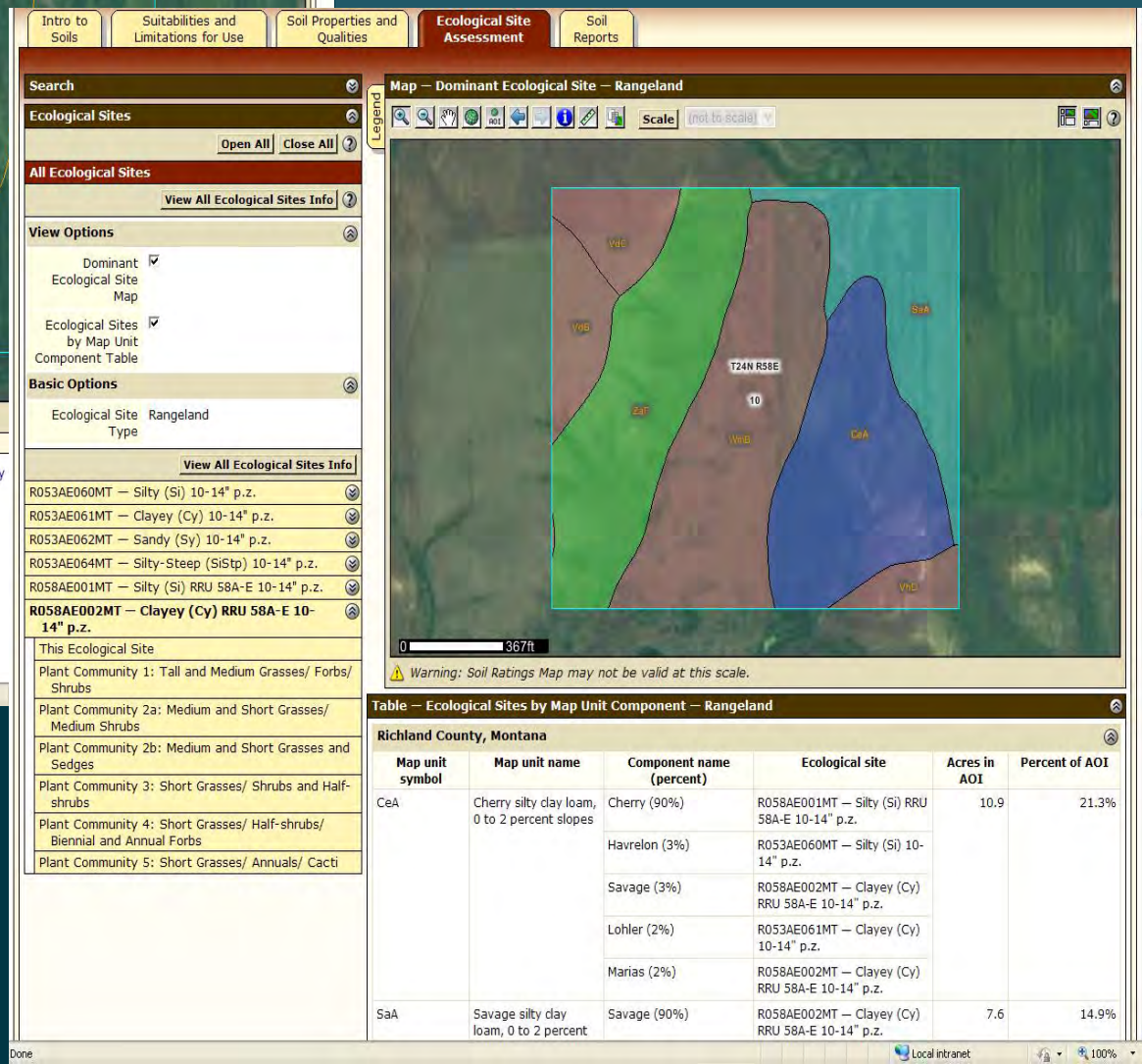


Step 1: Area of Interest

Step 3: Soil Data Explorer's Ecological Site Description



Step 2: Soil Map



Search

Ecological Sites

Open All | Close All

All Ecological Sites

R053AE060MT — Silty (Si) 10-14" p.z.

R053AE061MT — Clayey (Cy) 10-14" p.z.

R053AE062MT — Sandy (Sy) 10-14" p.z.

R053AE064MT — Silty-Steep (SiStp) 10-14" p.z.

R058AE001MT — Silty (Si) RRU 58A-E 10-14" p.z.

R058AE002MT — Clayey (Cy) RRU 58A-E 10-14" p.z.

This Ecological Site

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

View Plant Community Info

View Options

- Plant Community Photos
- Plant Community Description
- Vegetation Tables
  - Annual Production
  - Plant Species Composition
  - Plant Growth Curve
- Cover Tables
  - Soil Surface Cover
  - Ground Cover
  - Canopy Cover

View Plant Community Info

Plant Community 2a: Medium and Short Grasses/ Medium Shrubs

Plant Community 2b: Medium and Short Grasses and Sedges

Plant Community 3: Short Grasses/ Shrubs and Half-shrubs

Description — Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community is dominated by tall and medium cool season grasses (green needlegrass, bluebunch wheatgrass, and western wheatgrass) and a diverse group of short grasses and sedges (Sandberg bluegrass, prairie junegrass, blue grama, and buffalograss). An abundance of forbs, shrubs, and half-shrubs in small percentages, including dotted gayfeather, winterfat, Nuttall's saltbush, and silver or Wyoming big sagebrush.

This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and the presence of tall, deep rooted perennial grasses allows for high drought tolerance. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable precipitation. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for high soil stability and a functioning hydrologic cycle.

Tables — Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

Annual Production (Lbs/Acre)

Plant Type	Low	Representative Value	High
Grass/Grasslike	560	1,040	1,600
Forb	70	130	200
Shrub/Vine	70	130	200
Totals	**700**	**1,300**	**2,000**

Plant Species Composition (Lbs/Acre)

Grass/Grasslike

Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre Low	High
1: Native grasses			**550**	**1400**
	Montana wheatgrass	Elymus albicans	0	100
	tufted wheatgrass	Elymus macrourus	35	200
	plains muhly	Muhlenbergia cuspidata	0	100
	green needlegrass	Nassella viridula	140	600
	western wheatgrass	Pascopyrum smithii	105	500
	bluebunch wheatgrass	Pseudoroegneria spicata	35	800
2: Native grasses and sedges			**7**	**200**
	blue grama	Bouteloua gracilis	7	100
	buffalograss	Bouteloua dactyloides	7	100
	needleleaf sedge	Carex duriuscula	7	100

Step 4: Plant Community Description

Clayey Ecological Site 10-14” p.z.

>45 species: 17 grasses (38%), 18 forbs (40%), 10 shrubs (22%)

Common Name	lbs Full Stand	% Mix	lbs Mix	lbs Critical Area
Green needlegrass	5	25	1.25	2.5
Bluebunch w.g.	6	25	1.50	3.0
Western w.g.	8	20	1.60	3.2
Thickspike w.g.	6	15	0.9	1.8
Sandberg b.g.	2	5	0.1	0.2
Blue grama	2	5	0.1	0.2
Needleandthread	6	5	0.3	0.6
			Total lbs/acre	11.5

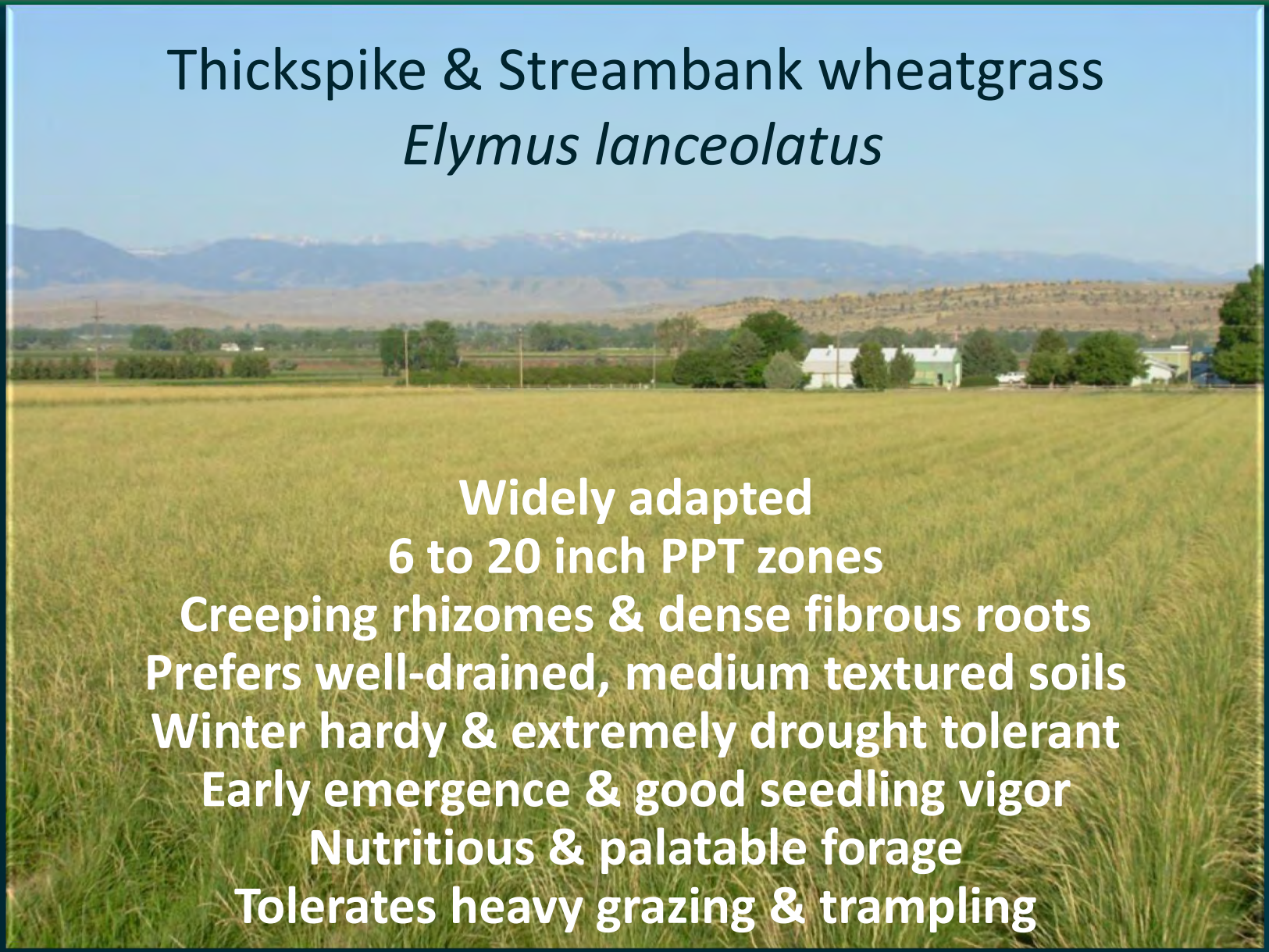
Add diversity by seeding echinacea, purple & white prairie clover, prairie coneflower, & locally adapted shrubs

Green Needlegrass
Nassella viridula

Widely adapted
Prefers clayey soils
12 to 18 inch PPT zone
High seed dormancy
Early spring green-up
Good forage value
Does not withstand intensive grazing

Thickspike & Streambank wheatgrass

Elymus lanceolatus

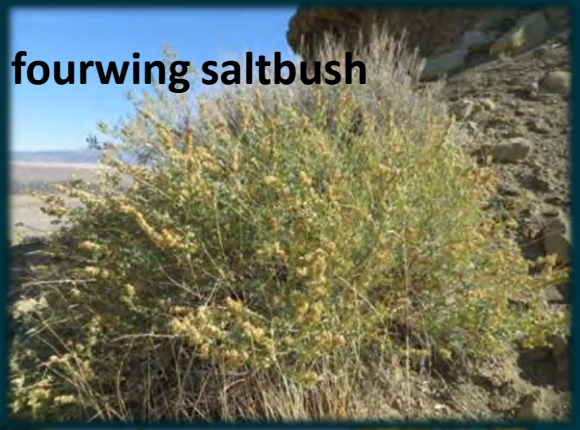


Widely adapted
6 to 20 inch PPT zones
Creeping rhizomes & dense fibrous roots
Prefers well-drained, medium textured soils
Winter hardy & extremely drought tolerant
Early emergence & good seedling vigor
Nutritious & palatable forage
Tolerates heavy grazing & trampling


purple prairie clover


white prairie clover


prairie coneflower


fourwing saltbush


western yarrow


Maximilian sunflower


echinacea


white sagebrush


stiff sunflower

Loamy Ecological Site 10-14” p.z.

>37 species: 14 grasses (38%), 17 forbs (46%), 6 shrubs (16%)

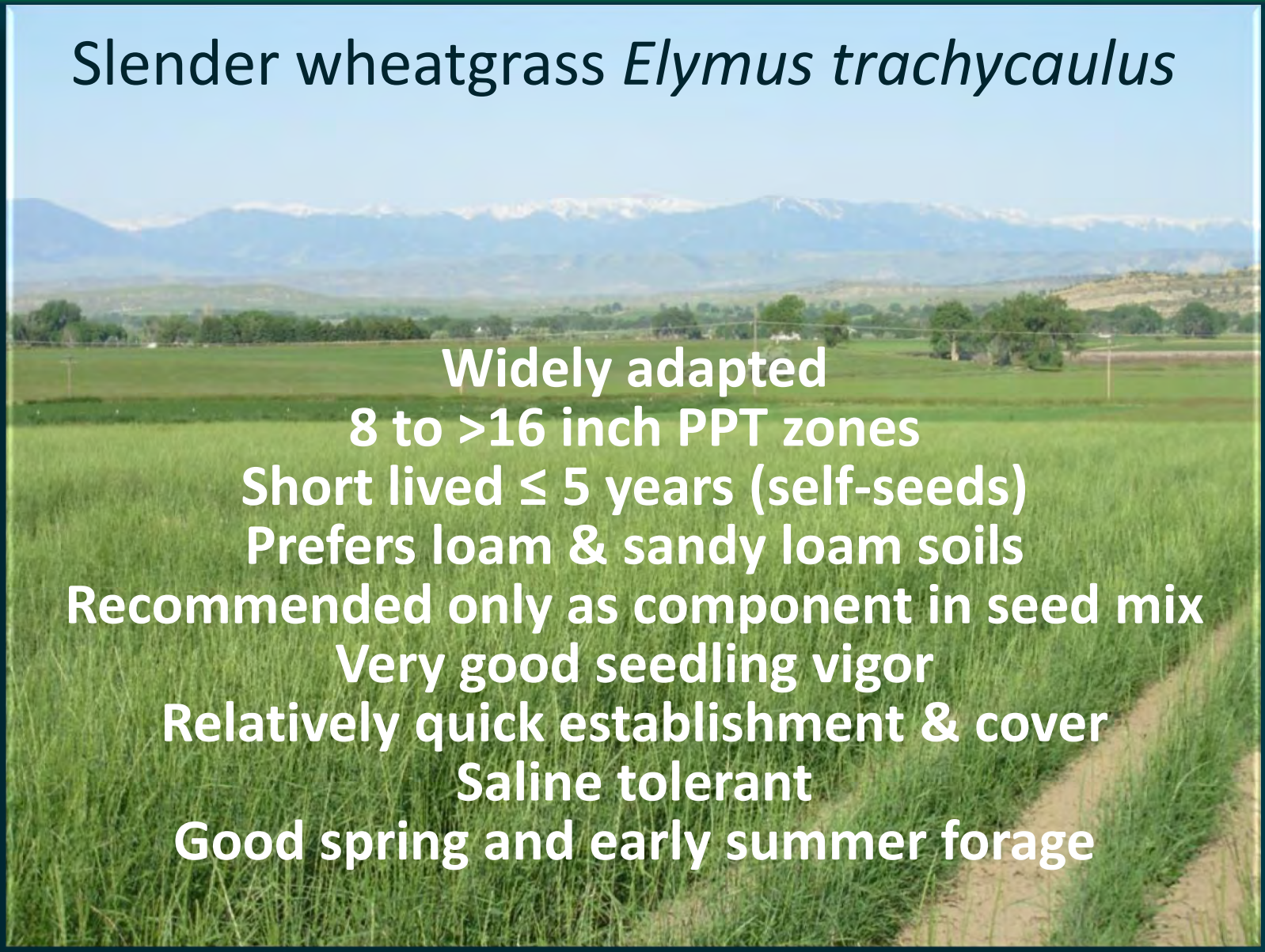
Common Name	lbs Full Stand	% Mix	lbs Mix	lbs Critical Area
Western w.g.	8	25	2.00	4.0
Green needlegrass	5	20	1.00	2.0
Needleandthread	6	20	1.20	2.4
Blue grama	2	15	0.30	0.6
Sideoats grama	4.5	10	0.45	0.9
Big bluestem	6	10	0.60	1.2
			Total lbs/acre	11.1

Add diversity by seeding echinacea, western yarrow, purple prairie clover, prairie coneflower, & white sagebrush

Western wheatgrass *Pascopyrum smithii*

Also know as bluejoint, widely adapted
10 to 20 inch PPT zones
Rhizomatous grass
Prefers heavy textured, slightly alkaline soils
Winter hardy & drought tolerant
1st year growth is slow but develop rapidly 2nd year
Highly nutritious & palatable forage
Does not tolerate heavy &/or continuous grazing

Slender wheatgrass *Elymus trachycaulus*



Widely adapted
8 to >16 inch PPT zones
Short lived ≤ 5 years (self-seeds)
Prefers loam & sandy loam soils
Recommended only as component in seed mix
Very good seedling vigor
Relatively quick establishment & cover
Saline tolerant
Good spring and early summer forage

Sandy Ecological Site 10-14" p.z.

>46 species: 18 grasses (39%), 18 forbs (39%), 10 shrubs (22%)

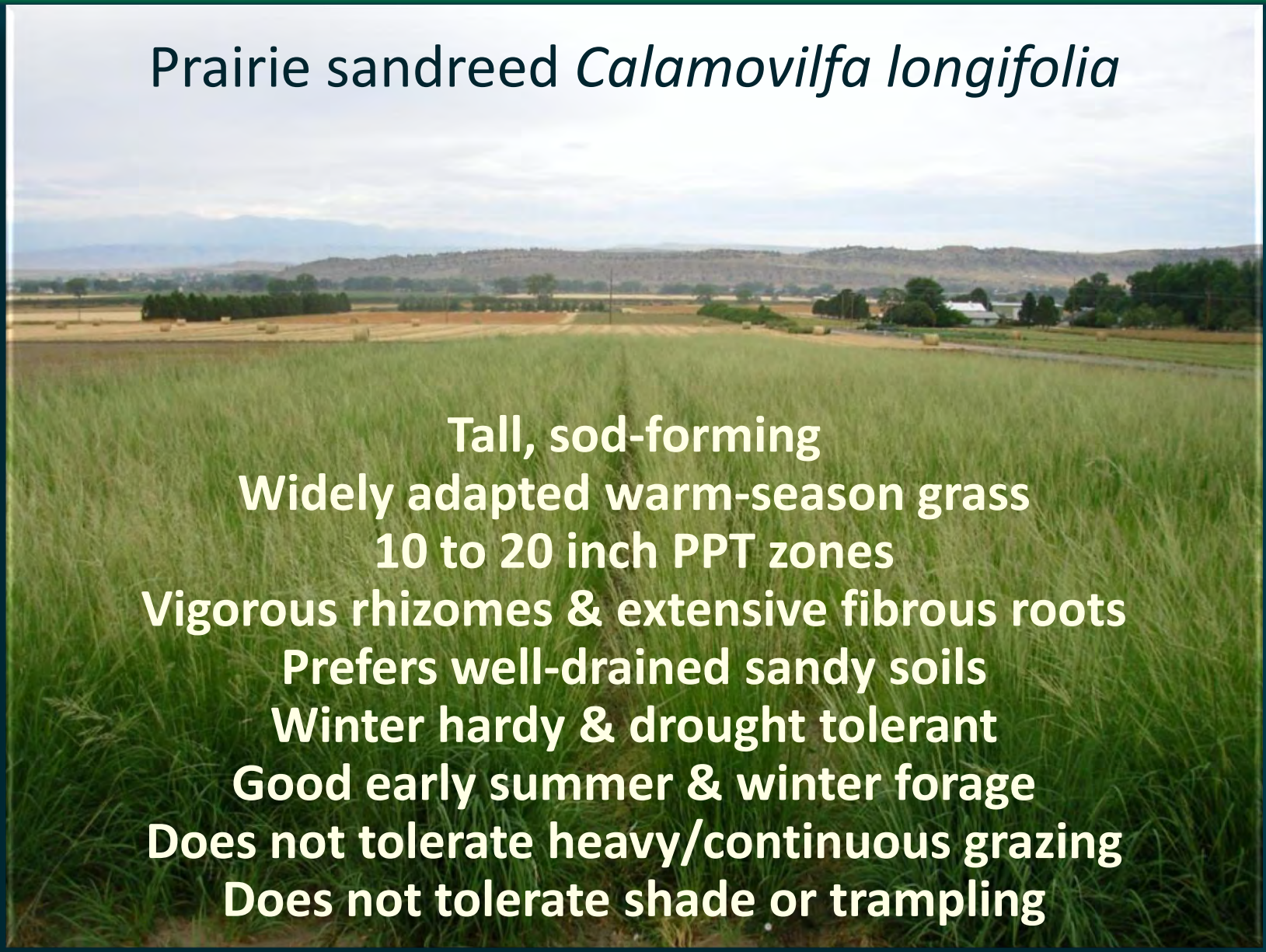
Common Name	lbs Full Stand	% Mix	lbs Mix	lbs Critical Area
Bluebunch w.g.	6	35	2.10	4.2
Prairie sandreed	4.5	15	0.68	1.4
Little bluestem	4	15	0.60	1.2
Big bluestem	6	10	0.60	1.2
Needleandthread	6	5	0.30	0.6
Indian ricegrass	6	5	0.30	0.6
Sandberg b.g.	2	5	0.10	0.2
Western w.g.	8	5	0.40	0.8
Blue grama	2	5	0.10	0.2
			Total lbs/acre	10.4

Add diversity by seeding echinacea, purple prairie clover, western yarrow, prairie coneflower, stiff sunflower, & white sagebrush

Bluebunch wheatgrass *Pseudoroegneria spicata*

Widely adapted
10 to 20 inch PPT zones
Long-lived bunchgrass
Prefers coarse-textured &/or well-drained loamy soils
Low seedling vigor
Requires several years to reach full maturity
Highly nutritious & palatable forage
Does not tolerate heavy &/or continuous grazing

Prairie sandreed *Calamovilfa longifolia*



Tall, sod-forming
Widely adapted warm-season grass
10 to 20 inch PPT zones
Vigorous rhizomes & extensive fibrous roots
Prefers well-drained sandy soils
Winter hardy & drought tolerant
Good early summer & winter forage
Does not tolerate heavy/continuous grazing
Does not tolerate shade or trampling

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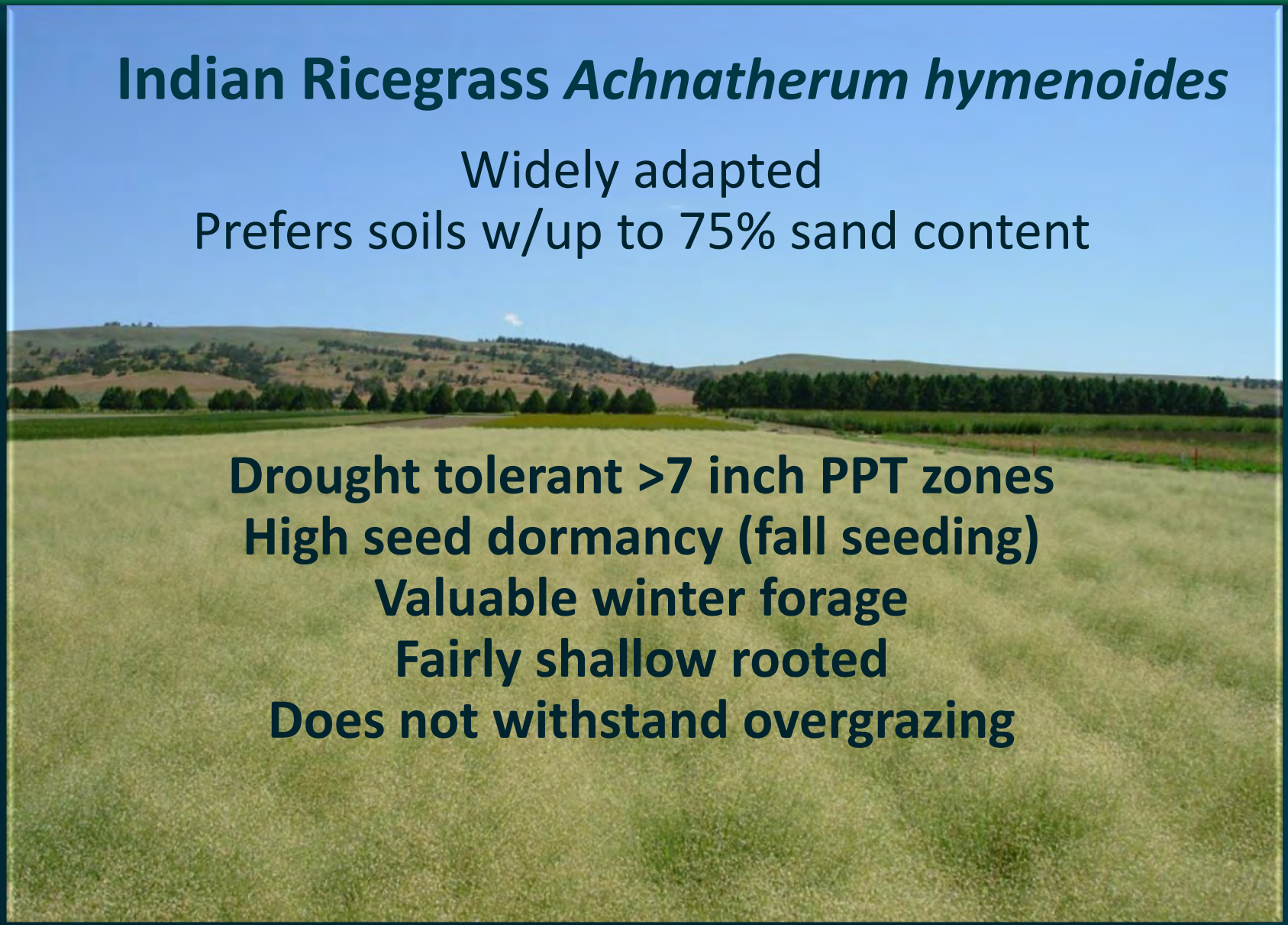
Blue grama *Bouteloua gracilis*

Sod-forming, short warm-season grass
Distributed from Canada to Mexico
12 to 14 inch PPT zone
Prefers well-drained, coarse soils

Palatable & nutritious forage
Tolerates extreme temperatures
Extremely drought tolerant
Increases with overgrazing

Indian Ricegrass *Achnatherum hymenoides*

Widely adapted
Prefers soils w/up to 75% sand content



Drought tolerant >7 inch PPT zones
High seed dormancy (fall seeding)
Valuable winter forage
Fairly shallow rooted
Does not withstand overgrazing

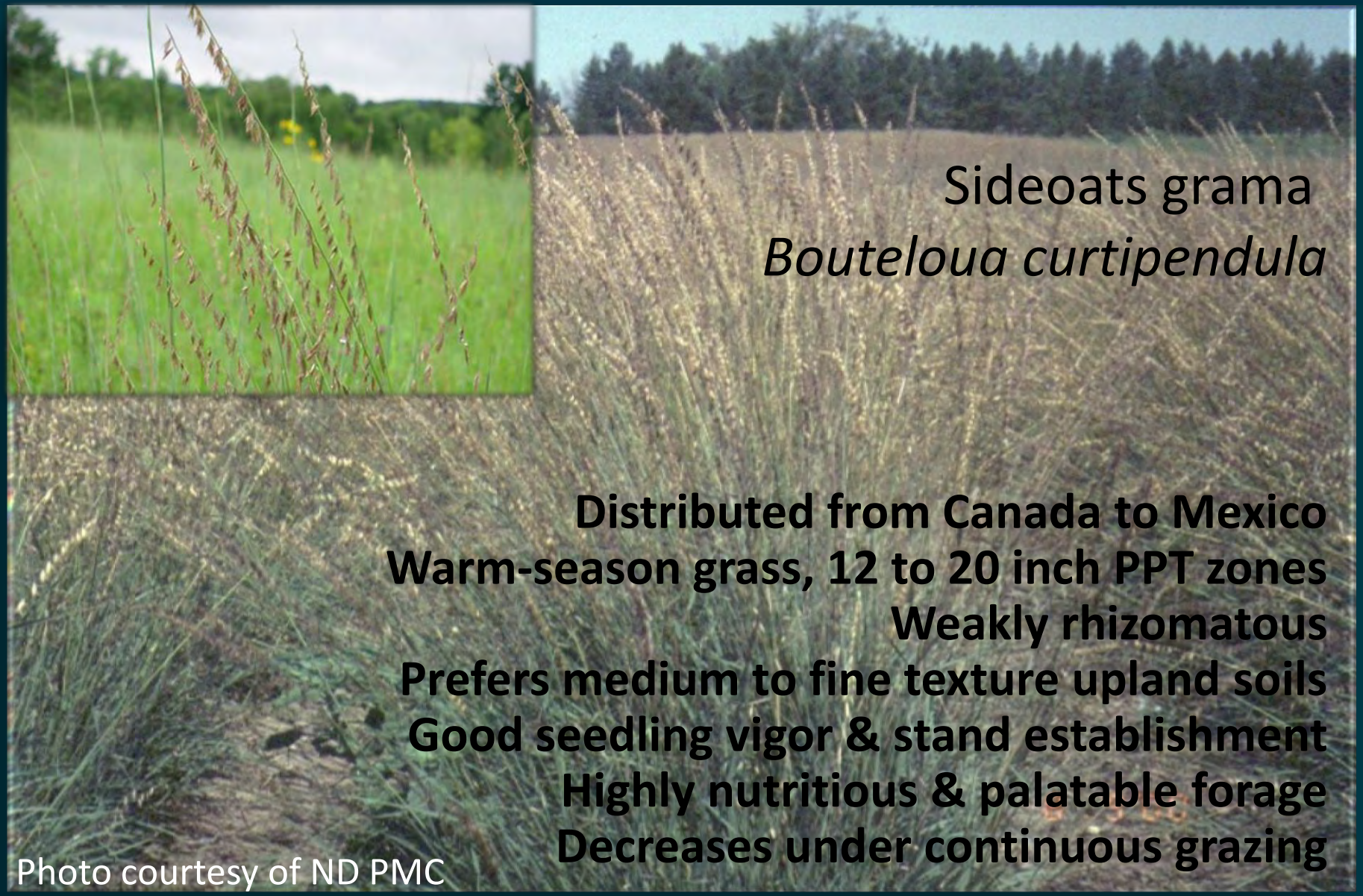
Silty-Steep Ecological Site 10-14” p.z.

>57 species: 19 grasses (33%), 21 forbs (37%), 17 shrubs (30%)

Common Name	lbs Full Stand	% Mix	lbs Mix	lbs Critical Area
Little bluestem	4	20	0.80	1.6
Western w.g.	8	10	0.80	1.6
Thickspike w.g.	6	10	0.60	1.2
Big bluestem	6	10	0.60	1.2
Bluebunch w.g.	6	10	0.60	1.2
Sideoats grama	4.5	10	0.45	0.9
Green needlegrass	5	10	0.50	1.0
Needleandthread	6	10	0.60	1.2
Prairie sandreed	4.5	5	0.23	0.5
Sandberg b.g.	2	5	0.10	0.2
			Total lbs/acre	10.6

Add diversity by seeding echinacea, western yarrow, purple prairie clover, prairie coneflower, & locally adapted shrubs


Little bluestem *Schizachryum scoparium*
Warm-season bunchgrass
Very prominent in Great Plains
10 to 15 inch PPT zone
Adapted to many soil types
Palatable & nutritious forage prior to seed set
Photo courtesy of ND PMC



Sideoats grama
Bouteloua curtipendula

Distributed from Canada to Mexico
Warm-season grass, 12 to 20 inch PPT zones
Weakly rhizomatous
Prefers medium to fine texture upland soils
Good seedling vigor & stand establishment
Highly nutritious & palatable forage
Decreases under continuous grazing

Photo courtesy of ND PMC

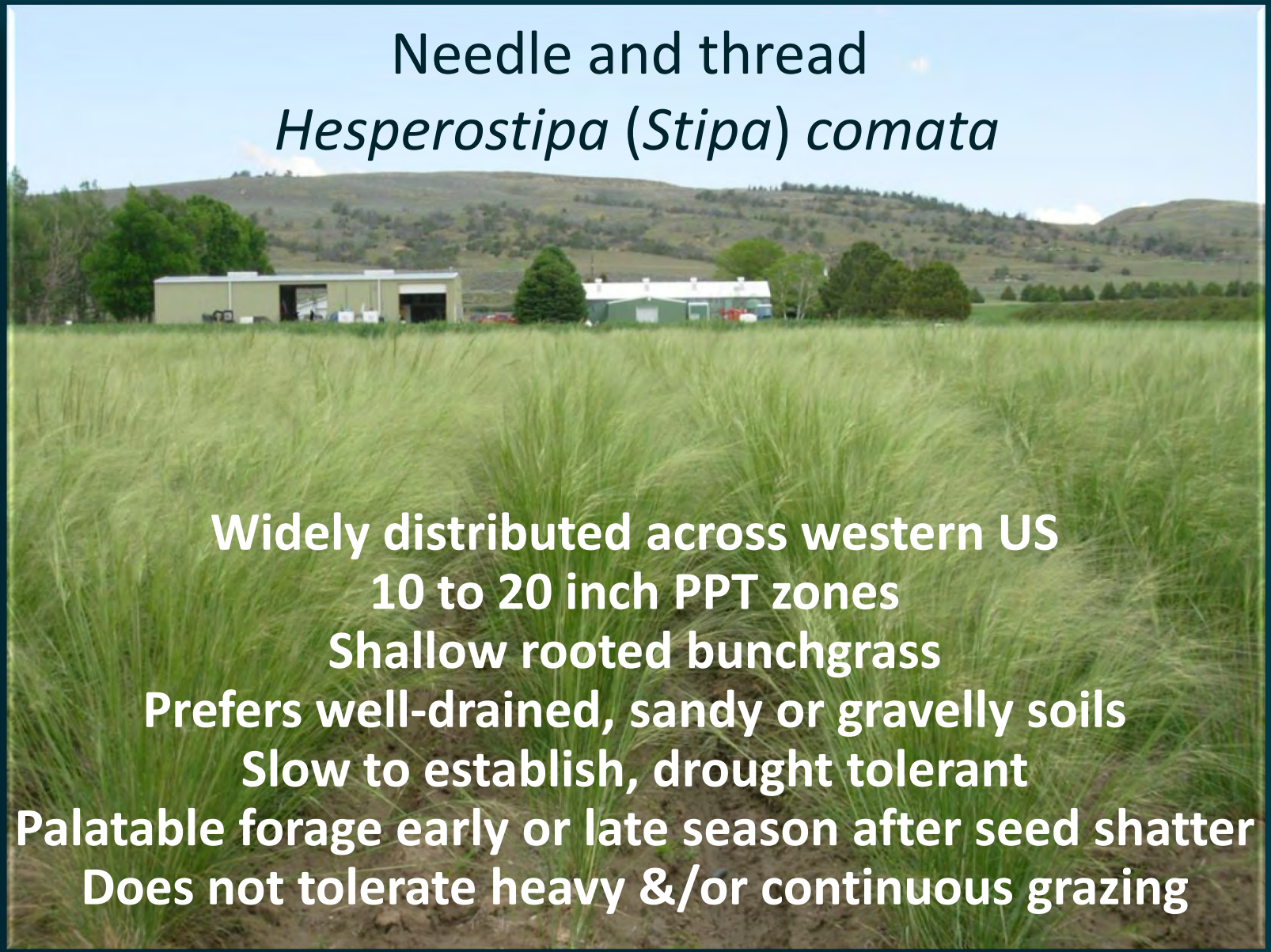
Very Shallow Ecological Site 10-14" p.z.

>35 species: 11 grasses (31%), 11 forbs (31%), 13 shrubs (38%)

Common Name	lbs Full Stand	% Mix	lbs Mix	lbs Critical Area
Bluebunch w.g.	6	45	2.70	5.4
Little bluestem	4	25	1.00	2.0
Sideoats grama	6	10	0.60	1.2
Needleandthread	6	10	0.60	1.2
Prairie sandreed	4.5	5	0.23	0.5
Sandberg b.g.	2	5	0.10	0.2
Western w.g.	8	5	0.40	0.8
Blue grama	2	5	0.10	0.2
			Total lbs/acre	11.5

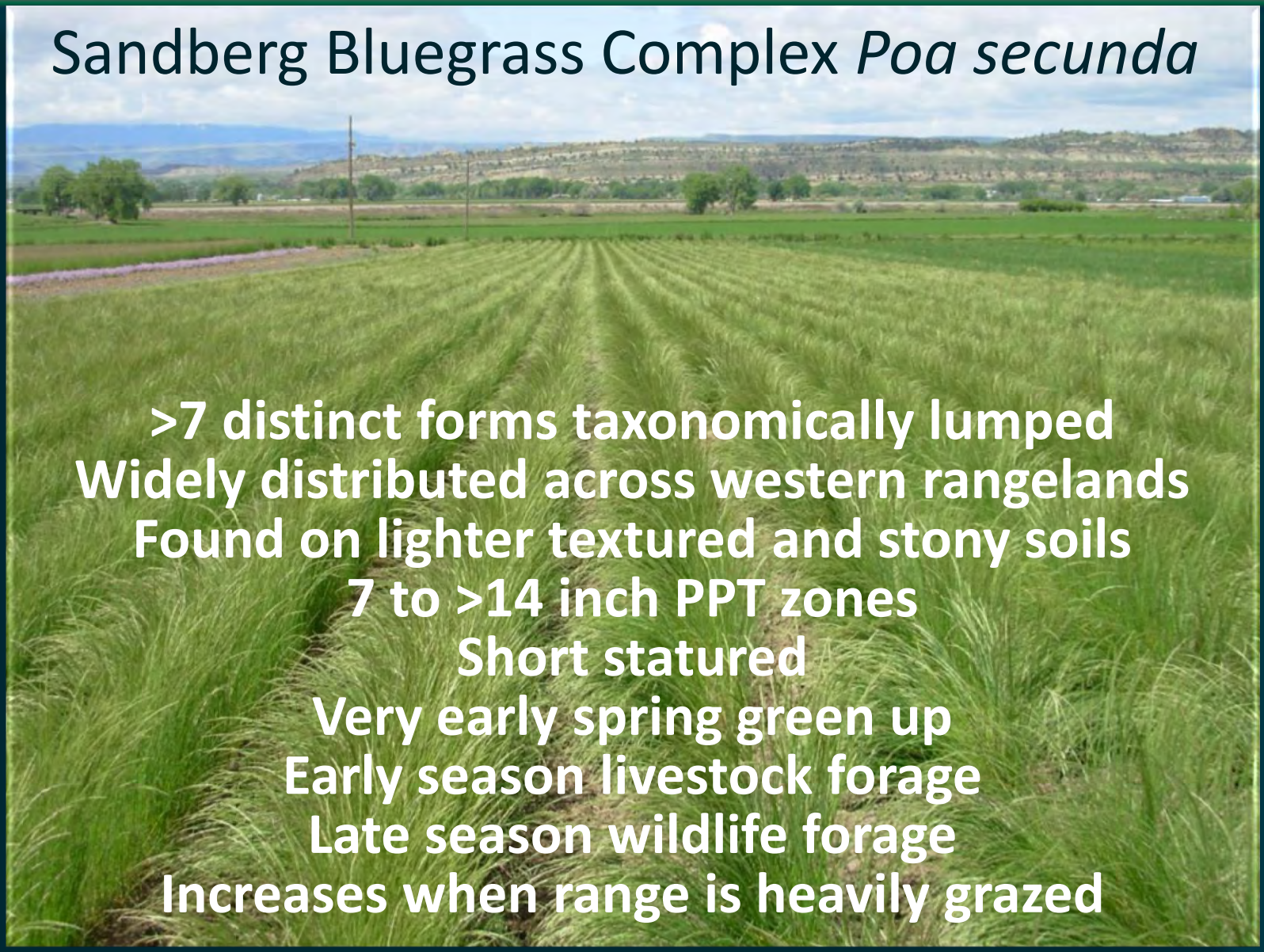
Add diversity by seeding echinacea, purple & white prairie clover, & locally adapted shrubs

Needle and thread
Hesperostipa (*Stipa*) *comata*



Widely distributed across western US
10 to 20 inch PPT zones
Shallow rooted bunchgrass
Prefers well-drained, sandy or gravelly soils
Slow to establish, drought tolerant
Palatable forage early or late season after seed shatter
Does not tolerate heavy &/or continuous grazing

Sandberg Bluegrass Complex *Poa secunda*



>7 distinct forms taxonomically lumped
Widely distributed across western rangelands
Found on lighter textured and stony soils
7 to >14 inch PPT zones
Short statured
Very early spring green up
Early season livestock forage
Late season wildlife forage
Increases when range is heavily grazed

Overflow Ecological Site 10-14” p.z.

>34 species: 19 grasses (56%), 9 forbs (26%), 6 shrubs (18%)

Common Name	lbs Full Stand	% Mix	lbs Mix	lbsCriticalArea
Big bluestem	6	25	1.50	3.0
Green needlegrass	5	15	0.75	1.5
Western w.g.	8	15	1.20	2.4
Prairie sandreed	4.5	15	0.68	1.4
Switchgrass	3	10	0.30	0.6
Little bluestem	4	10	0.40	0.8
Needleandthread	6	5	0.30	0.6
Prairie cordgrass	8	5	0.40	0.8
		Total lbs/acre		11.1

Add diversity by seeding prairie coneflower, stiff sunflower, Maximilian sunflower, & white sagebrush

Big bluestem
Andropogon gerardii

Also known as turkey foot
Warm-season grass (tallgrass prairie)
>12 inch PPT zone

Prefers silt/clay loam lowland soils
High quality summer feed
Do not graze below 6-8” height

Switchgrass *Panicum virgatum*

Tall, sod-forming
Widely adapted warm-season grass
>12 inch PPT zones
Vigorous rhizomes, deep root system
Prefers overflow & subirrigated sites
Extremely productive, good early summer forage
Decreases under grazing
Tolerates spring flooding

Next Step--How to decide exactly the best seed to buy?

A. Shoot from the hip?

B. Ask your neighbor?

C. Make the family do it?

D. Call the Seed Company?

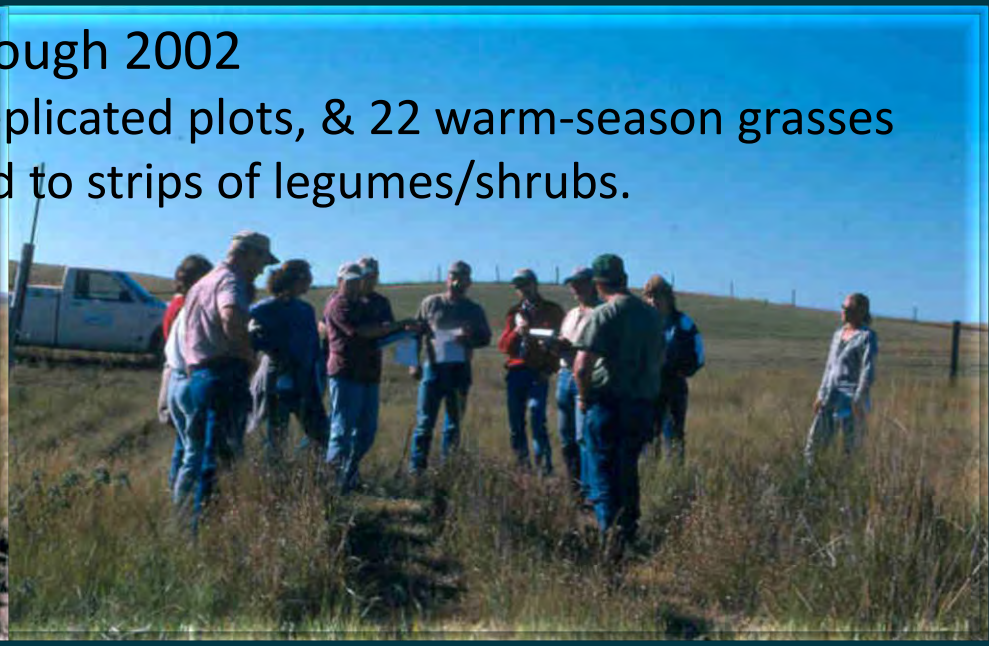
E. Compare results of local plant performance trials?

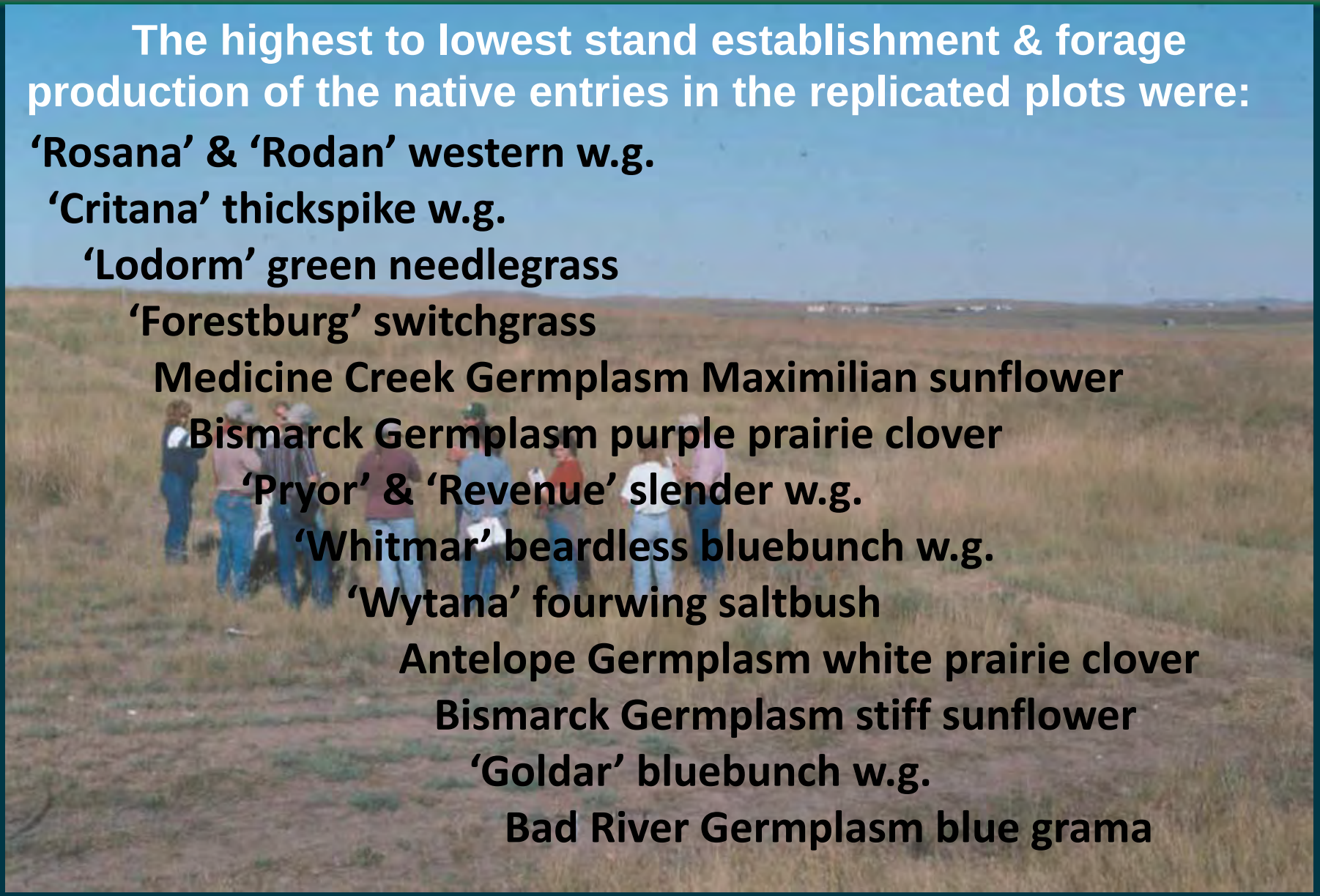
Today's answer, since we're the Government and we're here to help, is…..

E. Compare results of local plant performance trials!!

1994 through 2002

Comparative Evaluation Planting: 224 replicated plots, & 22 warm-season grasses in 2-acre plots, cross-seeded to strips of legumes/shrubs.





The highest to lowest stand establishment & forage production of the native entries in the replicated plots were:

'Rosana' & 'Rodan' western w.g.

'Critana' thickspike w.g.

'Lodorm' green needlegrass

'Forestburg' switchgrass

Medicine Creek Germplasm Maximilian sunflower

Bismarck Germplasm purple prairie clover

'Pryor' & 'Revenue' slender w.g.

'Whitmar' beardless bluebunch w.g.

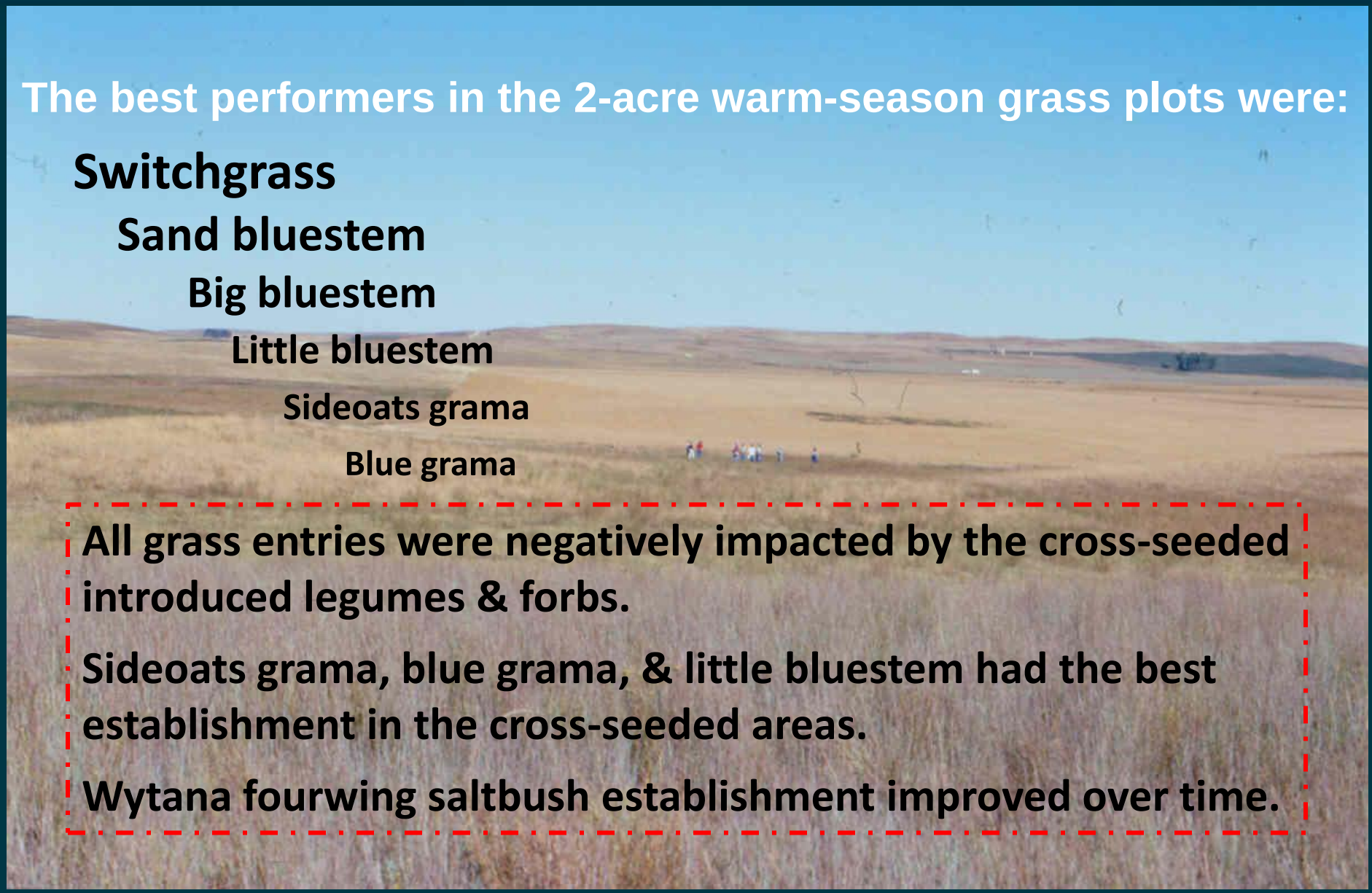
'Wytana' fourwing saltbush

Antelope Germplasm white prairie clover

Bismarck Germplasm stiff sunflower

'Goldar' bluebunch w.g.

Bad River Germplasm blue grama



The best performers in the 2-acre warm-season grass plots were:

Switchgrass

Sand bluestem

Big bluestem

Little bluestem

Sideoats grama

Blue grama

- **All grass entries were negatively impacted by the cross-seeded introduced legumes & forbs.**
- **Sideoats grama, blue grama, & little bluestem had the best establishment in the cross-seeded areas.**
- **Wytana fourwing saltbush establishment improved over time.**

In Summary:

Use the “Right” Topsoil: from stockpile

Use the “Right Stuff” on the “Right Site”: adapted plant material

Seed at the Right Time of Year: typically mid-May

Seed with the Right Equipment: double-disk drill with packer wheels

Seed in Alternate-Rows: reduces competition

Seed at the Right Depth: ≤½ inch

As a very wise person once said to me:
“It won’t grow if you don’t plant it!”


Questions/Comments?

References

Bridger Plant Materials Center
http://plant-materials.nrcs.usda.gov/mtpmc/index.html
Bismarck Plant Materials Center
http://plant-materials.nrcs.usda.gov/ndpmc/index.html
USDA Plants Database http://www.plants.usda.gov
Web Soil Survey http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
NRCS Electronic Field Office Technical Guide eFOTG
http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map=
NRCS MT PM Technical Note No. 46, No. 53 & No. 55
http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes/
Published NRCS (SCS) soil surveys (including plant community descriptions)

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