

Crested Wheatgrass Control and Native Plant Establishment in Utah

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Assisted Succession

1

Capture



2

Reduce



3

Reseed





The Hope



The Fear

Goal

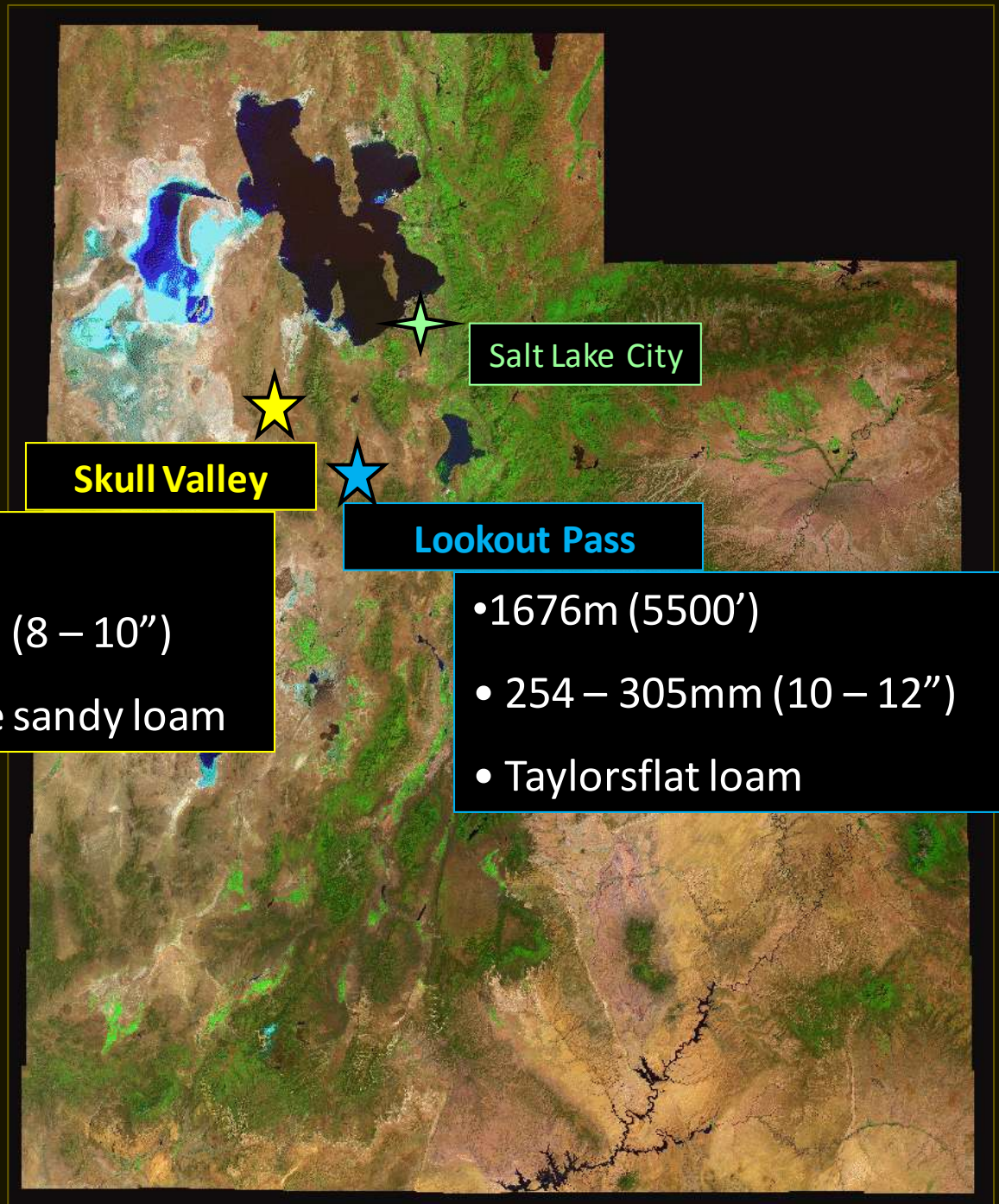
To test effective control strategies to reduce crested wheatgrass and establish native species while minimizing weed invasion.

Three questions:

1. Which treatment (chemical vs. mechanical) best controls crested wheatgrass?
2. Does crested wheatgrass control followed by seeding native species promote or inhibit weed invasion?
3. Do wheatgrass control methods affect native plant revegetation success?

1

Capture



Skull Valley

- 1525m (5000')
- 200 – 254mm (8 – 10")
- Medburn fine sandy loam

Lookout Pass

- 1676m (5500')
- 254 – 305mm (10 – 12")
- Taylorsflat loam

2

Reduce

		30											30
BLOCK 1	Year 2	140	FCM-S	FCM-US	PCH-S	PCH-US	FCH-S	FCH-US	UD-US	UD-S	PCM-US	PCM-S	140
	Year 1	140	PCM-US	PCM-S	FCM-S	FCM-US	UD-US	UD-S	FCH-S	FCH-US	FCH-S	FCH-US	140
		30											30
BLOCK 2	Year 1	140	FCM-S	FCM-US	PCM-US	PCM-S	FCH-S	FCH-US	PCH-S	PCH-US	UD-US	UD-S	140
	Year 2	140	PCH-US	PCH-S	FCH-S	FCH-US	PCM-US	PCM-S	UD-S	UD-US	FCM-S	FCM-US	140
		30											30
BLOCK 3	Year 1	140	PCM-US	PCM-S	FCM-S	FCM-US	UD-US	UD-S	FCH-S	FCH-US	PCH-US	PCH-S	140
	Year 2	140	FCM-S	FCM-US	PCH-S	PCH-US	FCH-S	FCH-US	UD-US	UD-S	PCM-US	PCM-S	140
		30											30
BLOCK 4	Year 2	140	FCM-S	FCM-US	PCH-S	PCH-US	FCH-S	FCH-US	UD-US	UD-S	PCM-US	PCM-S	140
	Year 1	140	FCM-S	FCM-US	PCM-US	PCM-S	FCH-S	FCH-US	PCH-S	PCH-US	UD-US	UD-S	140
		30											30
BLOCK 5	Year 1	140	UD-US	UD-S	PCM-S	PCM-US	FCH-US	FCH-S	PCH-US	PCH-S	FCM-S	FCM-US	140
	Year 2	140	PCH-US	PCH-S	FCH-S	FCH-US	PCM-US	PCM-S	UD-S	UD-US	FCM-S	FCM-US	140
		30											30
		30	155	155	155	155	155	155	155	155	155	155	30

Randomize Block Split Plot Design

Blocks = 5

Year 1 = 2005

Year 2 = 2006

Main Plot: 1 acre (0.4 ha)

PCM = 1-way disk

FCM = 2-way disk

PCH = 1.1 L/ha Roundup Original Max

FCH = 3.2 L/ha Roundup Original Max

UD = Undisturbed (no treatment)

Sub Plot: ½ acre (0.2 ha)

S = Seeded

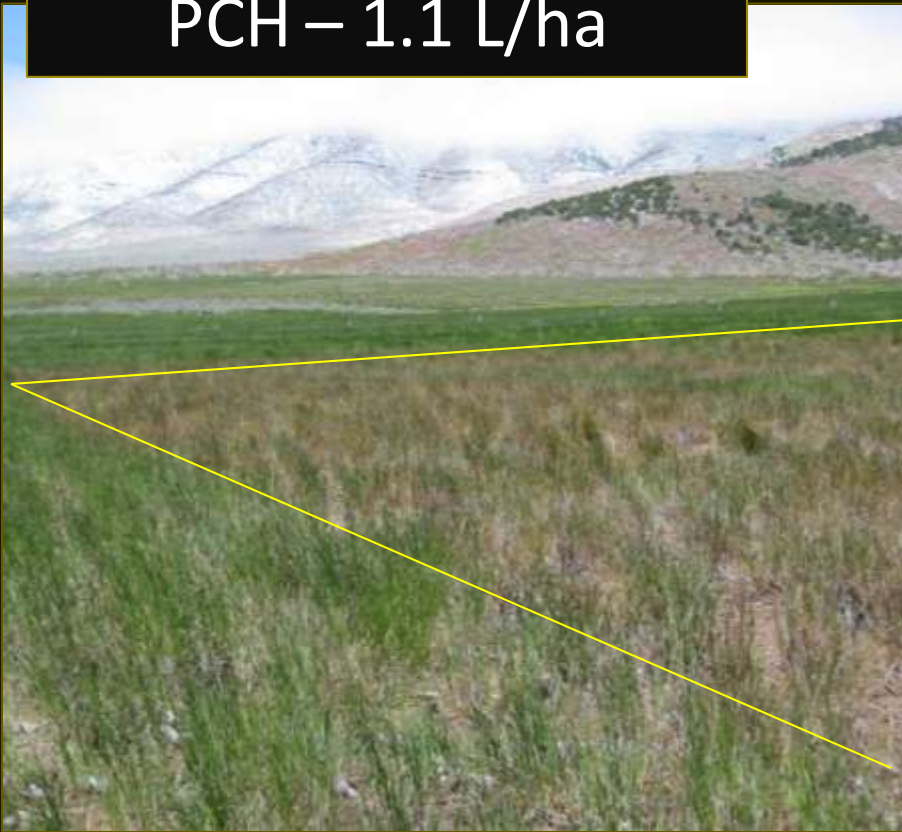
US = Unseeded

Herbicide Treatment

May 2005 & 2006

Roundup Original Max

PCH – 1.1 L/ha



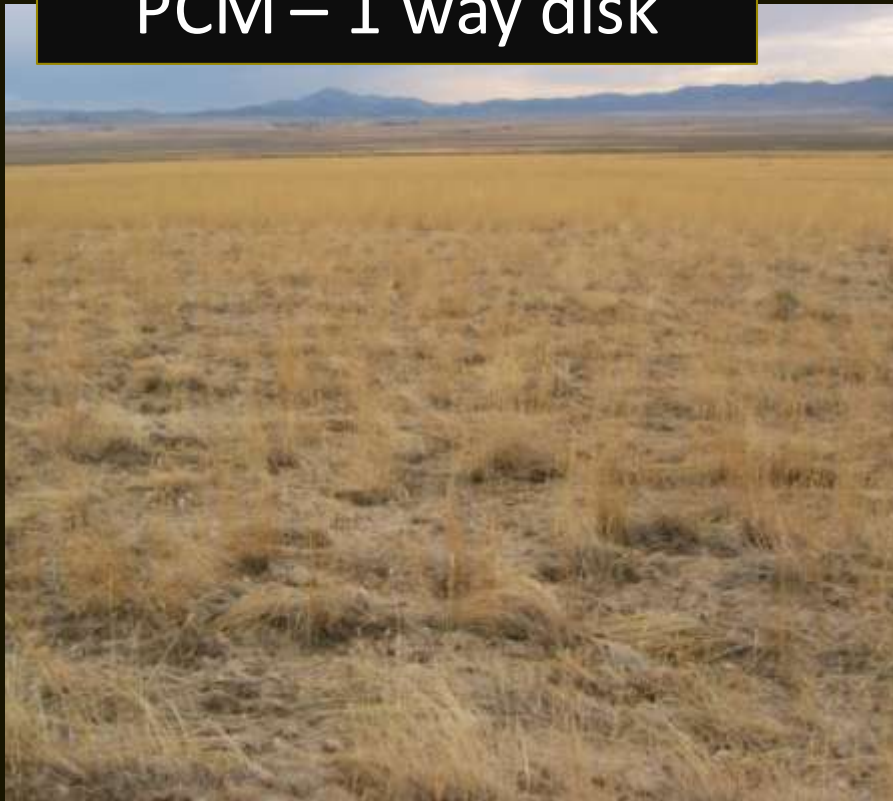
FCH – 3.2 L/ha



Mechanical Treatment

June 2005 & 2006

PCM – 1 way disk



FCM – 2 way disk



3

Reseed



October 2005 & 2006



Drill

Species	PLS kg/ha	Bulk kg/ha
Bluebunch wheatgrass - 'Anatone'	3.36	3.54
Squirreltail - 'Sanpete'	2.24	3.16
Indian ricegrass - 'Nezpar'	2.24	2.39
Fourwing saltbush	1.12	3.90
Lewis flax - 'Appar'	0.84	0.93
Munroe globemallow	0.56	0.94
Total	10.36	14.86

Broadcast

Sandberg bluegrass	0.84	1.06
White stemmed rabbitbrush	0.28	0.84
Wyoming big sagebrush	0.22	1.05
Yarrow - 'Eagle'	0.22	0.27
Total	1.56	3.22

Seed Mix

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Seed Mix

Vegetation Sampling



Stratified Random Sampling Design
30 samples per subplot



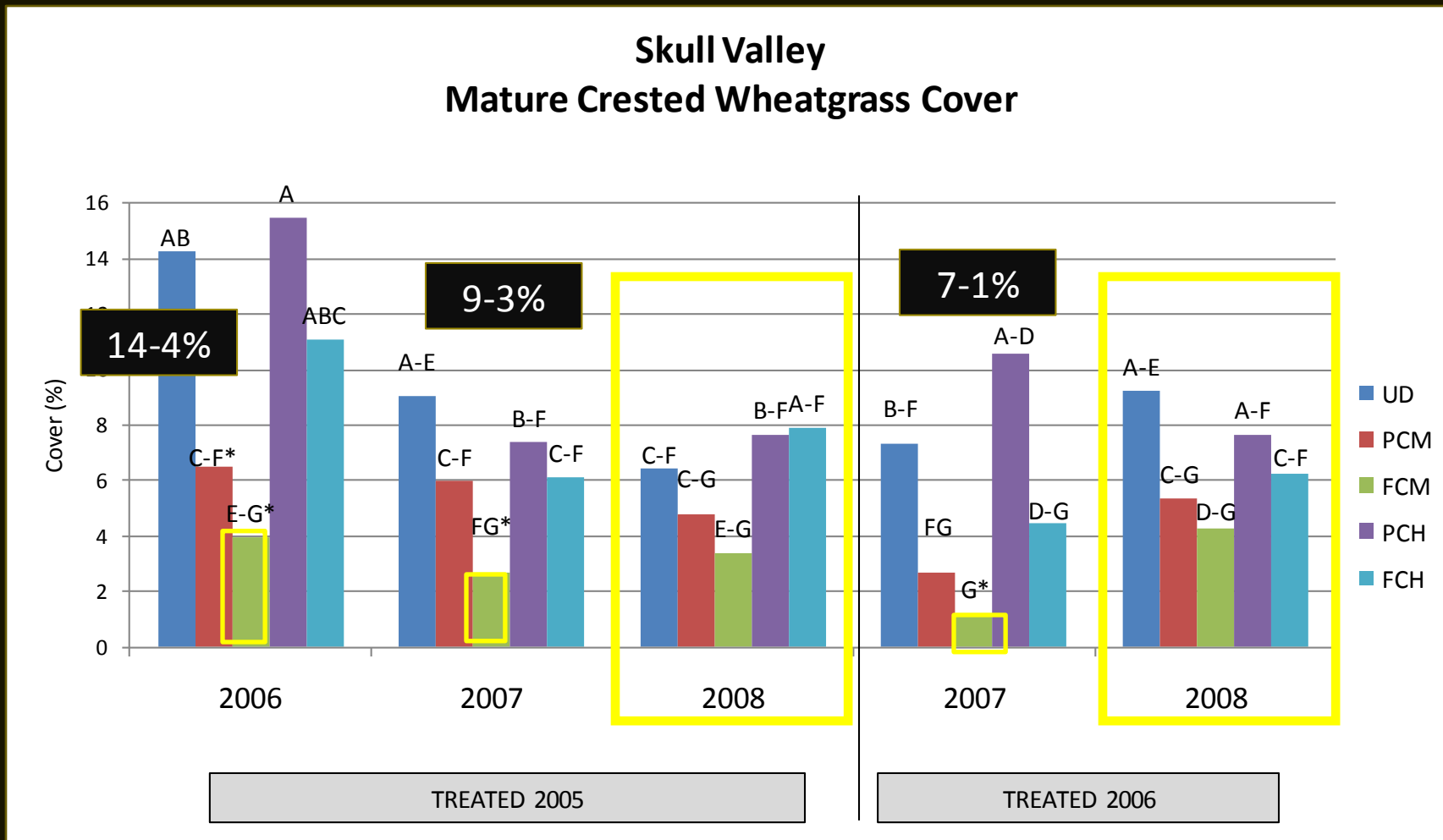
Density
Modified Duabemire Cover

Precipitation and Soil Moisture



Results

1. Which treatment (chemical vs. mechanical) best controls crested wheatgrass?



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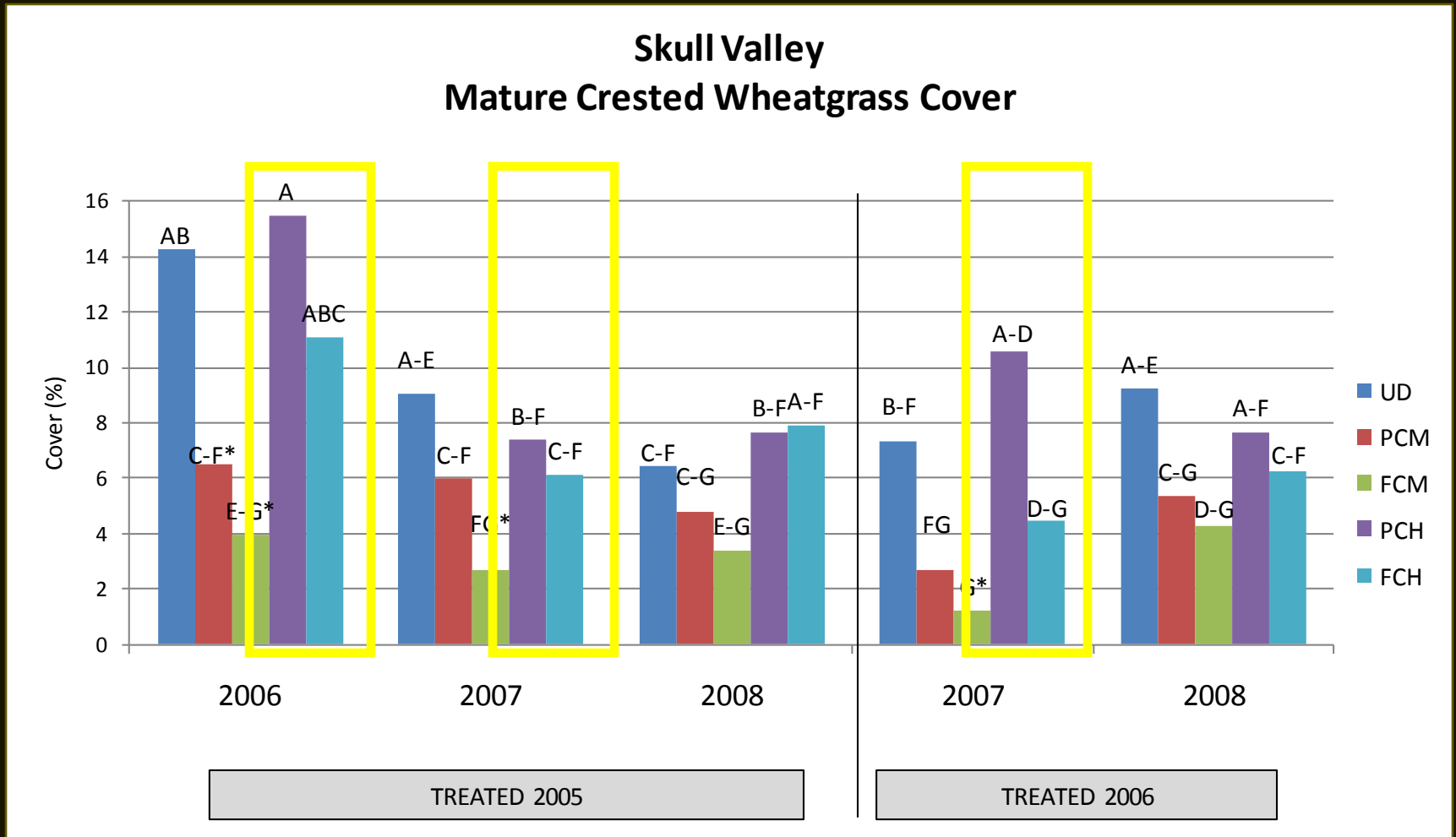
Crested Wheatgrass Density

- No treatment significantly reduced density of mature crested wheatgrass plants.



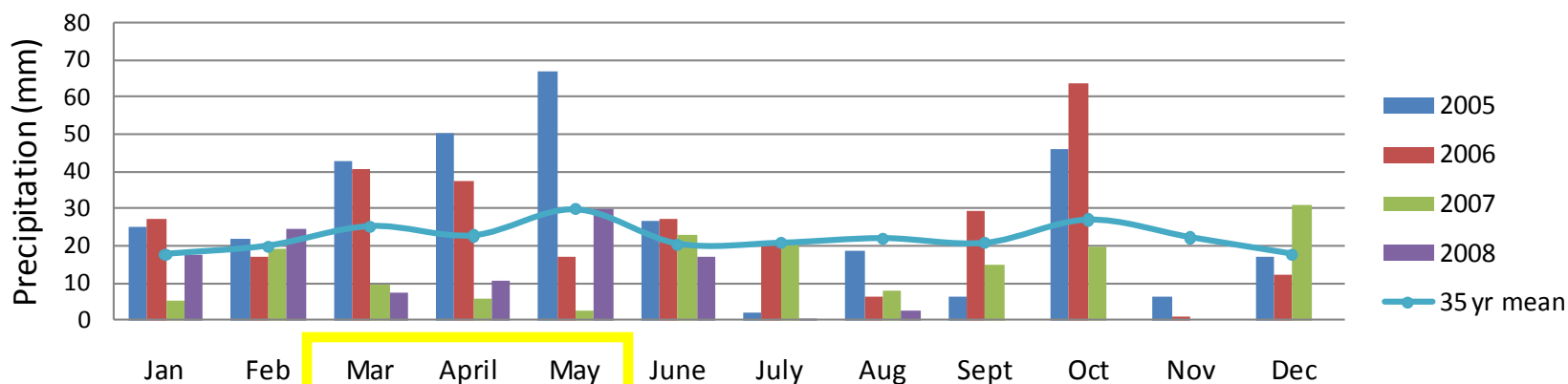
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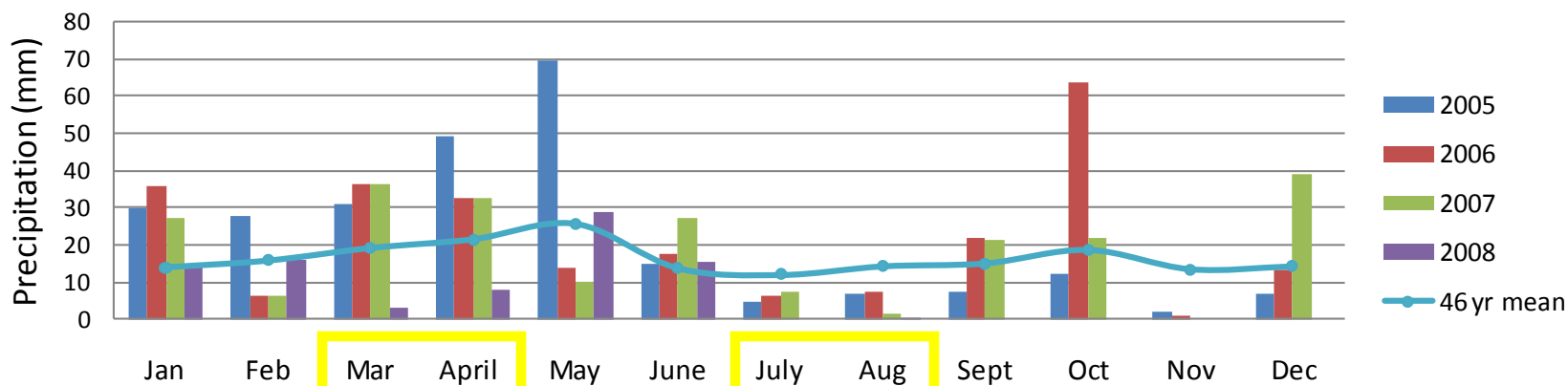


Precipitation

Lookout Pass



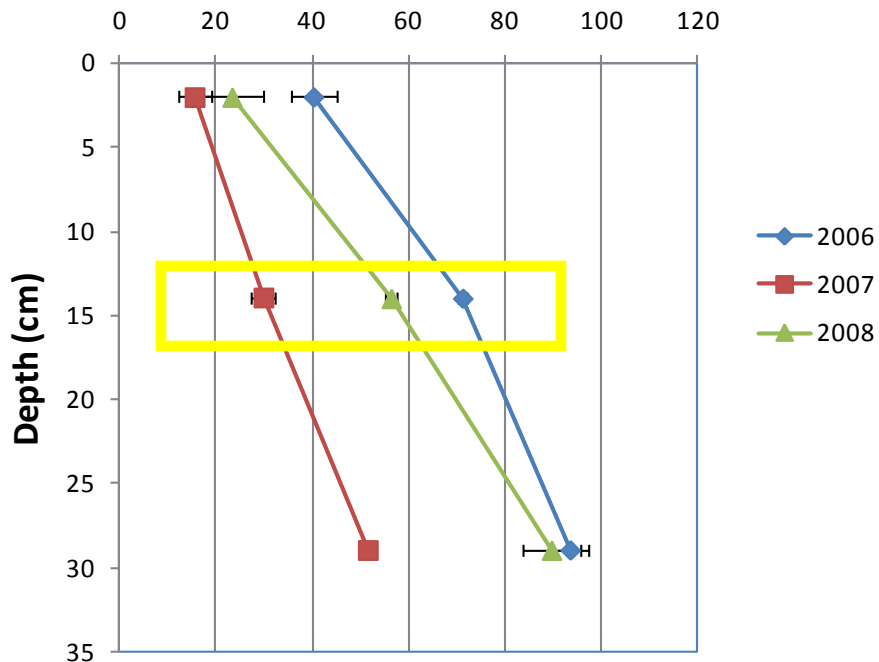
Skull Valley



Soil Moisture

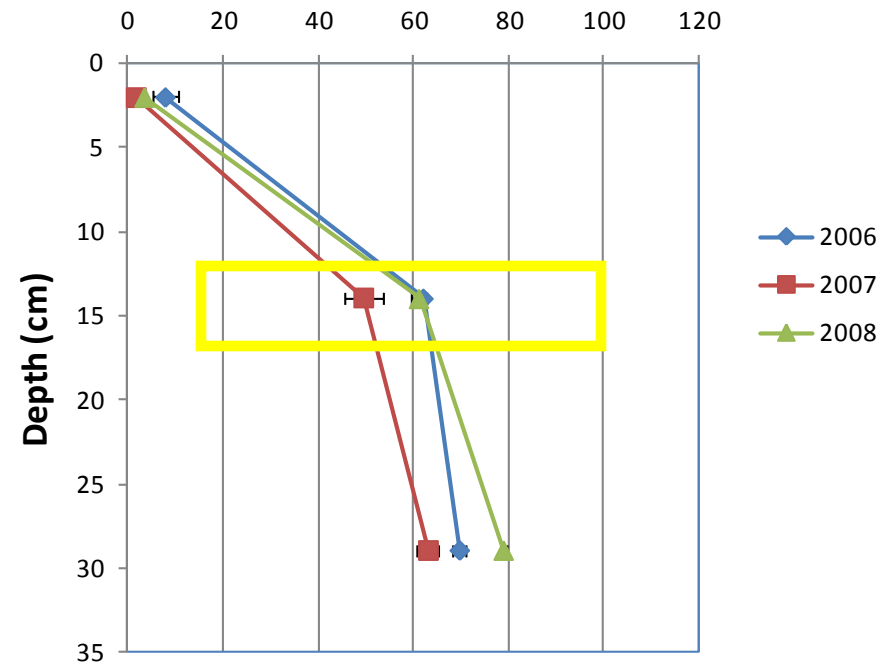
Lookout Pass

Days from 1 March until dry



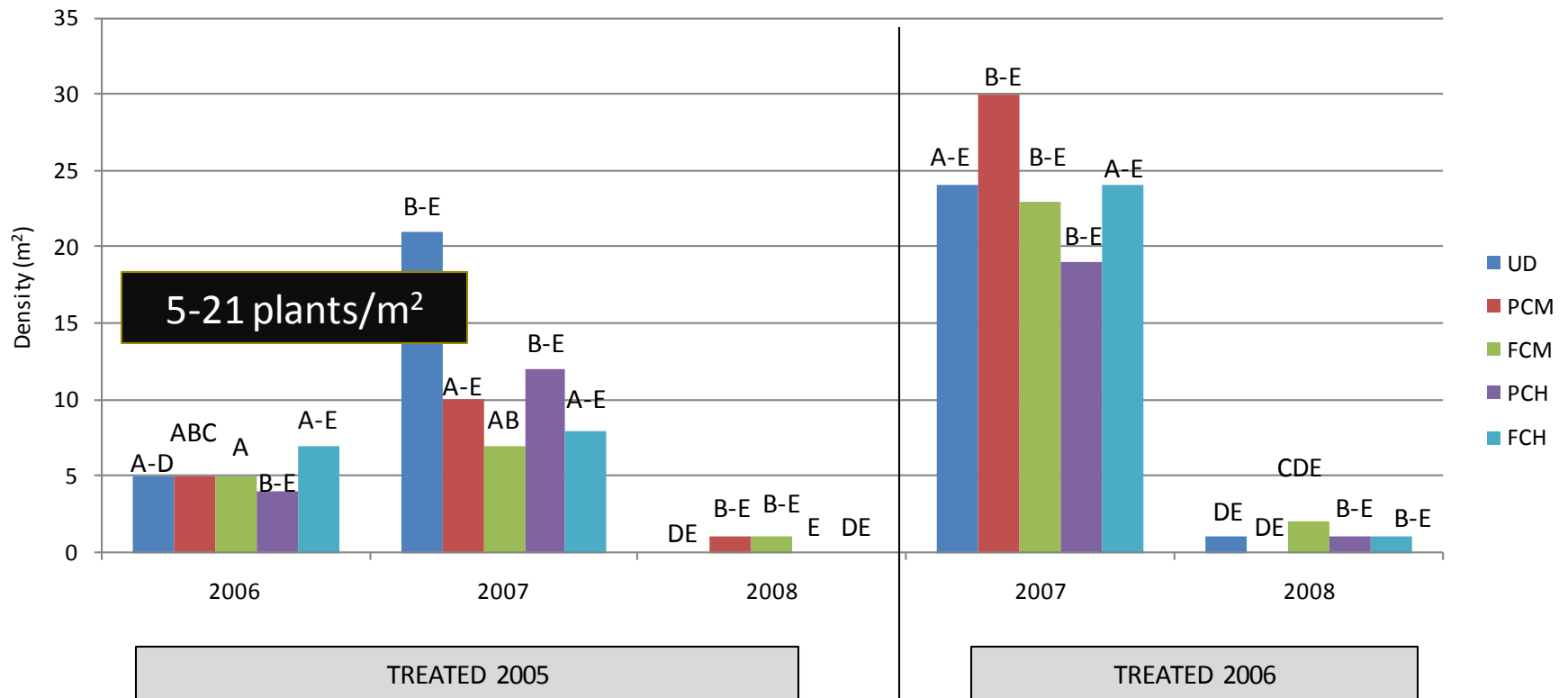
Skull Valley

Days from 1 March until dry



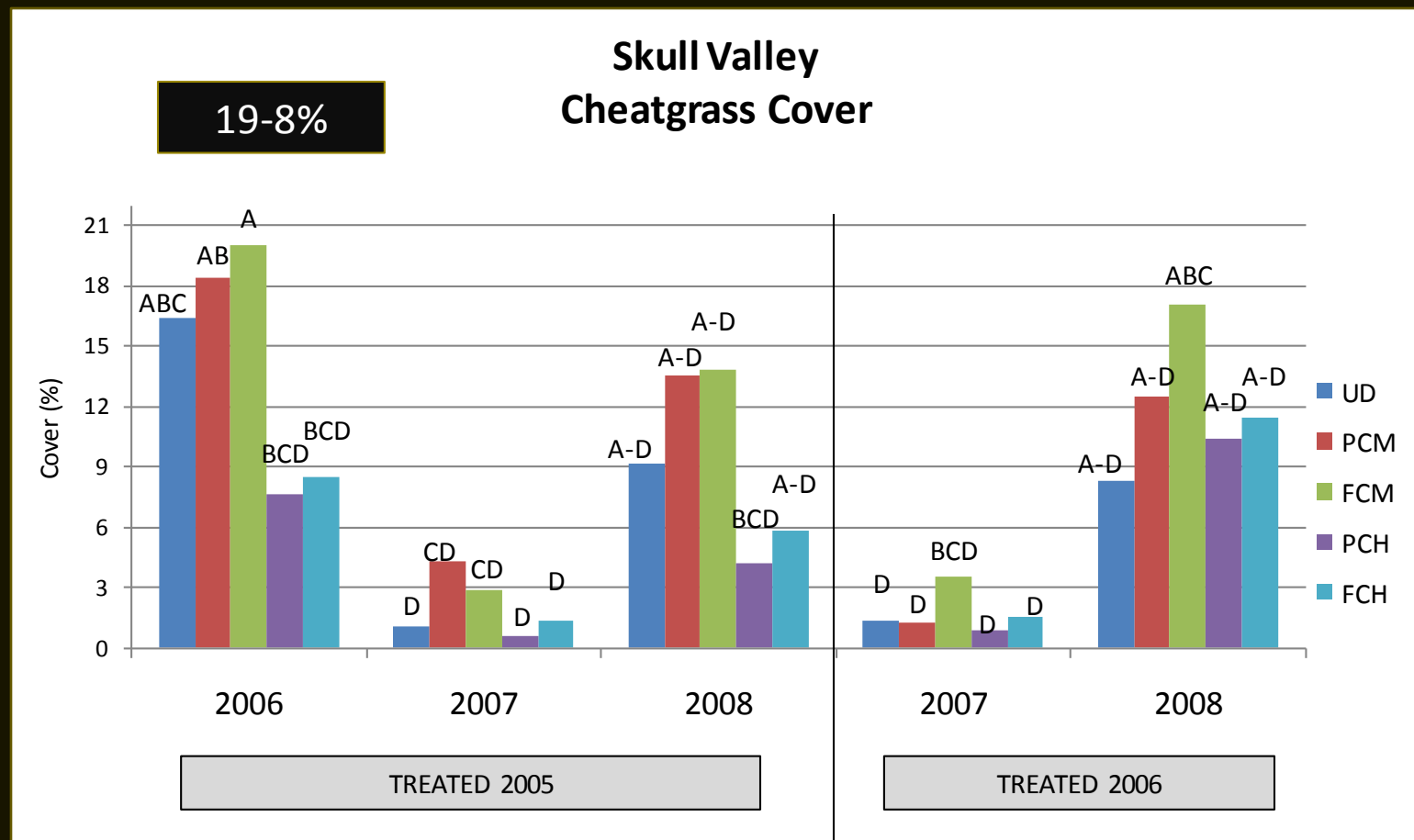
Results

Lookout Pass Crested Seedling Density

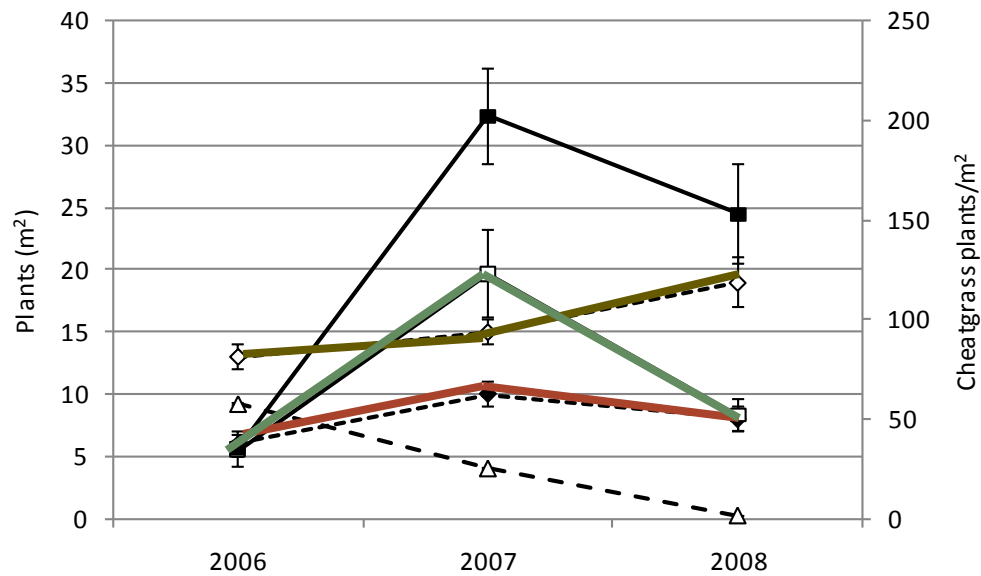
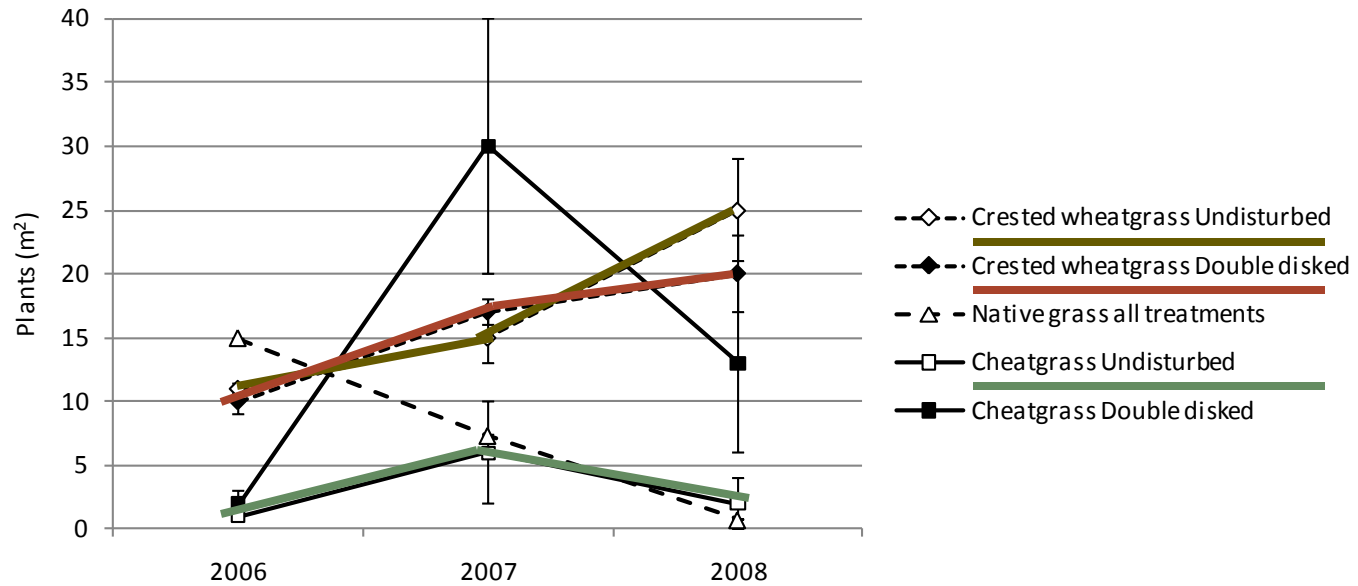


Results

2. Does crested wheatgrass control followed by seeding native species promote or inhibit weed invasions?



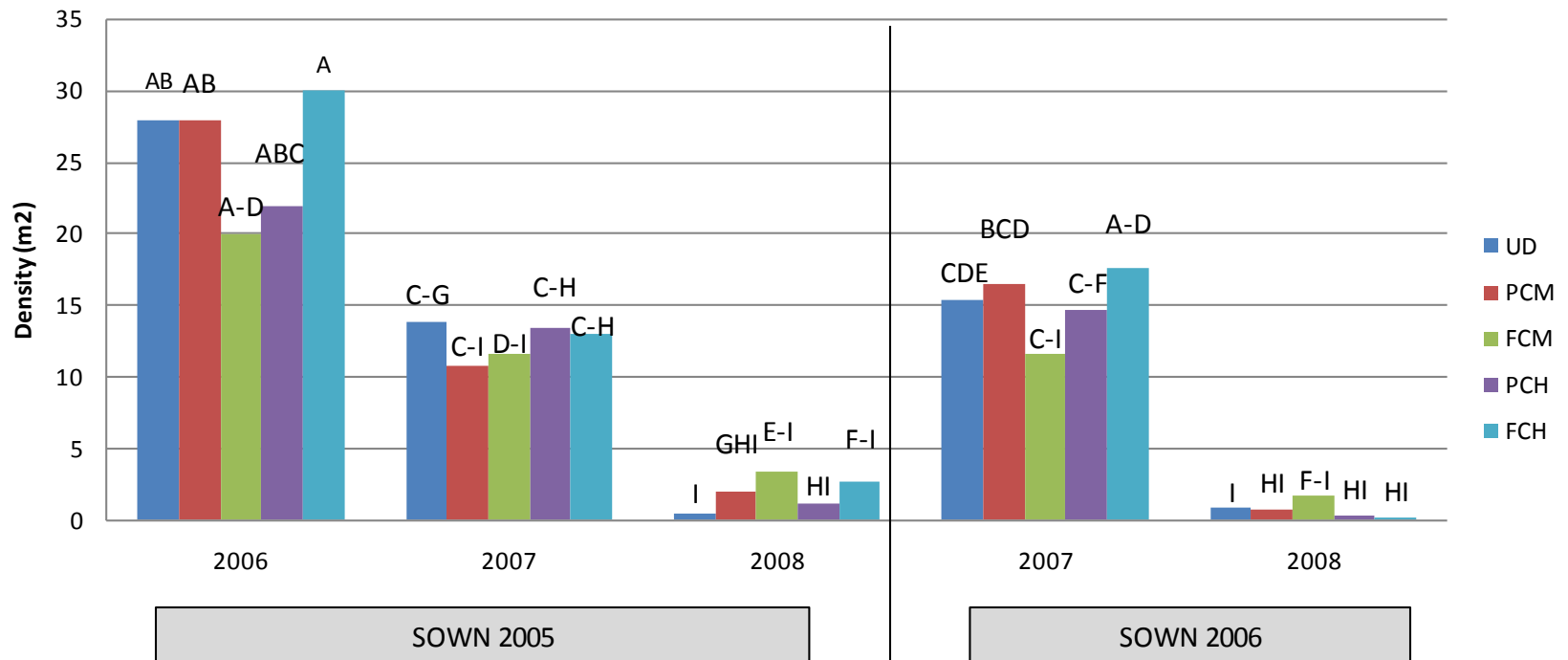
A



Results

3. Do wheatgrass control methods affect native plant revegetation success?

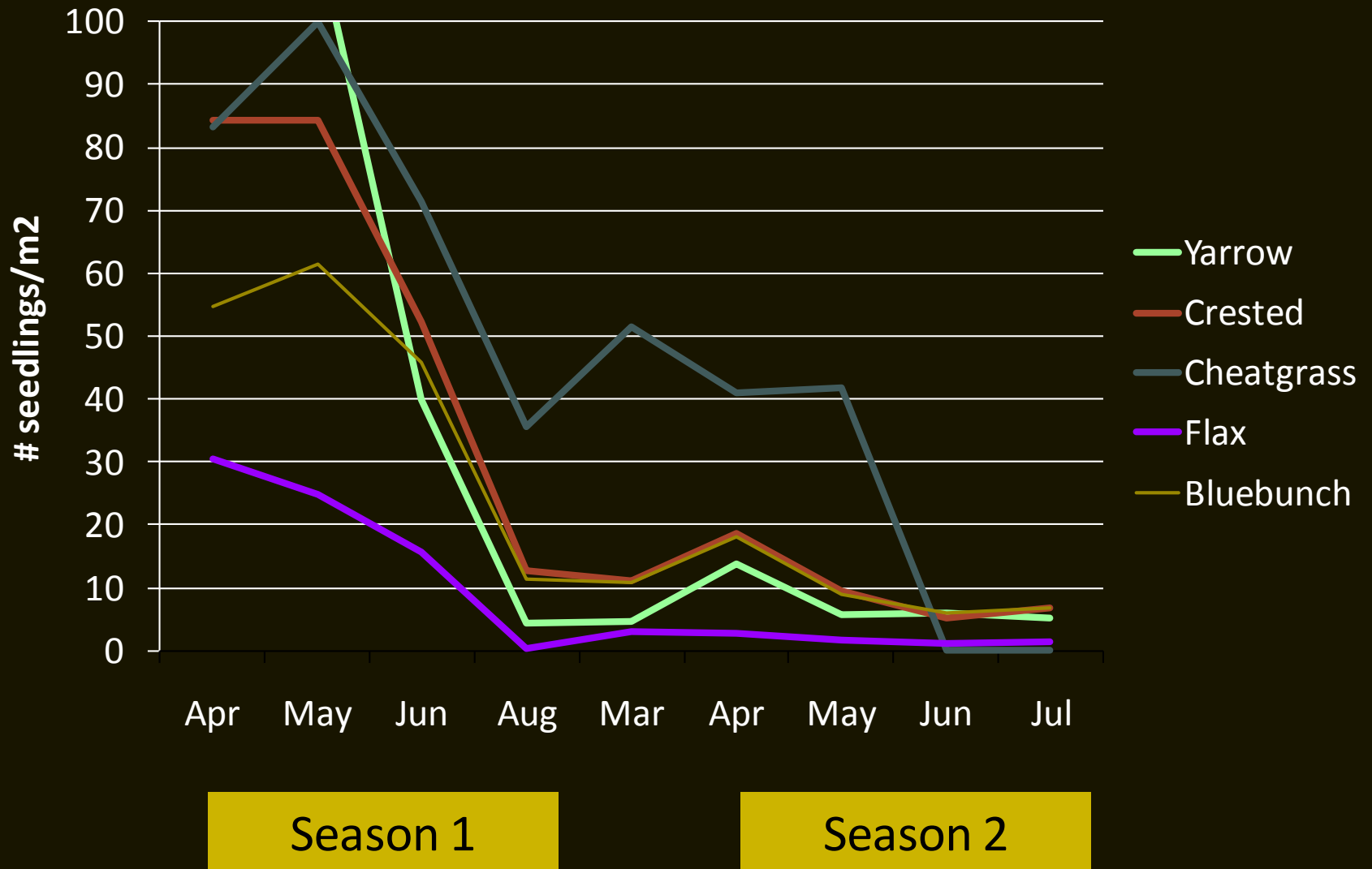
Lookout Pass
Total Seeded Species Density



Block	Year	
1	1	Small Plots
	2	Small Plots
2	1	Small Plots
	2	Small Plots
3	1	Small Plots
	2	Small Plots
4	1	Small Plots
	2	Small Plots



Results



Implications

The Bad News

- Crested wheatgrass is very difficult to kill

The Good News

- Crested wheatgrass is very difficult to kill

Implications

1. Control of crested wheatgrass to restore native species will require primary and secondary wheatgrass-reduction treatments to reduce both residuals and seedbank plants.
2. Native species establishment is highly dependent on seedling survival.
3. Crested wheatgrass has a valuable role in range seeding because of its ability to establish and survive when native plant seedlings survival is low.
4. Full control of crested wheatgrass carries the risk of weed invasion.