Diversification of Crested Wheatgrass Stands in Utah

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Why diversify Crested Wheatgrass stands in Utah?

- >10 million hectares
- Highly competitive
- Longevity
- Loss of biodiversity

Background

1998-1999 Study "Increasing Native Diversity of Cheatgrass Dominated Rangelands Through Assisted Succession" Cox and Anderson; JRM 2004, 57:203-210

Question: Will native species establish better in a perennial or annual monoculture?

Answer: It is easier to establish native vegetation in a perennial monoculture.

Background

Assisted Succession Steps:

1. “Capture” the site with crested wheatgrass
2. Reduce crested wheatgrass (mechanical or herbicide)
3. Reseed the site with natives

Goals & Objectives

To determine effective ways to diversify crested wheatgrass seedings while minimizing weed invasion.

1. What treatment best controls crested wheatgrass?
2. How does wheatgrass control followed by native revegetation affect weed invasion?
3. How do wheatgrass control methods affect native plant revegetation success?

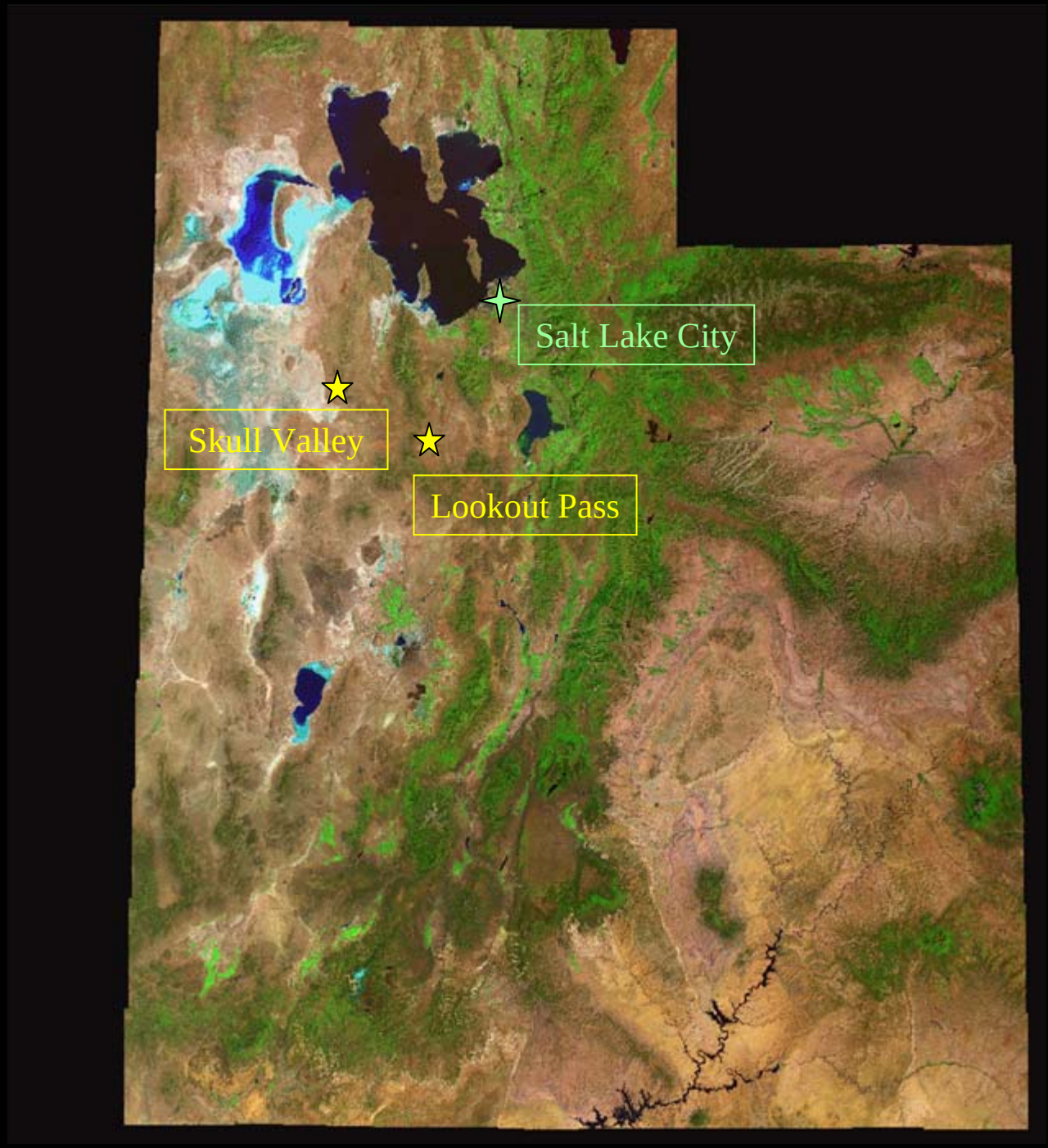
Goals & Objectives

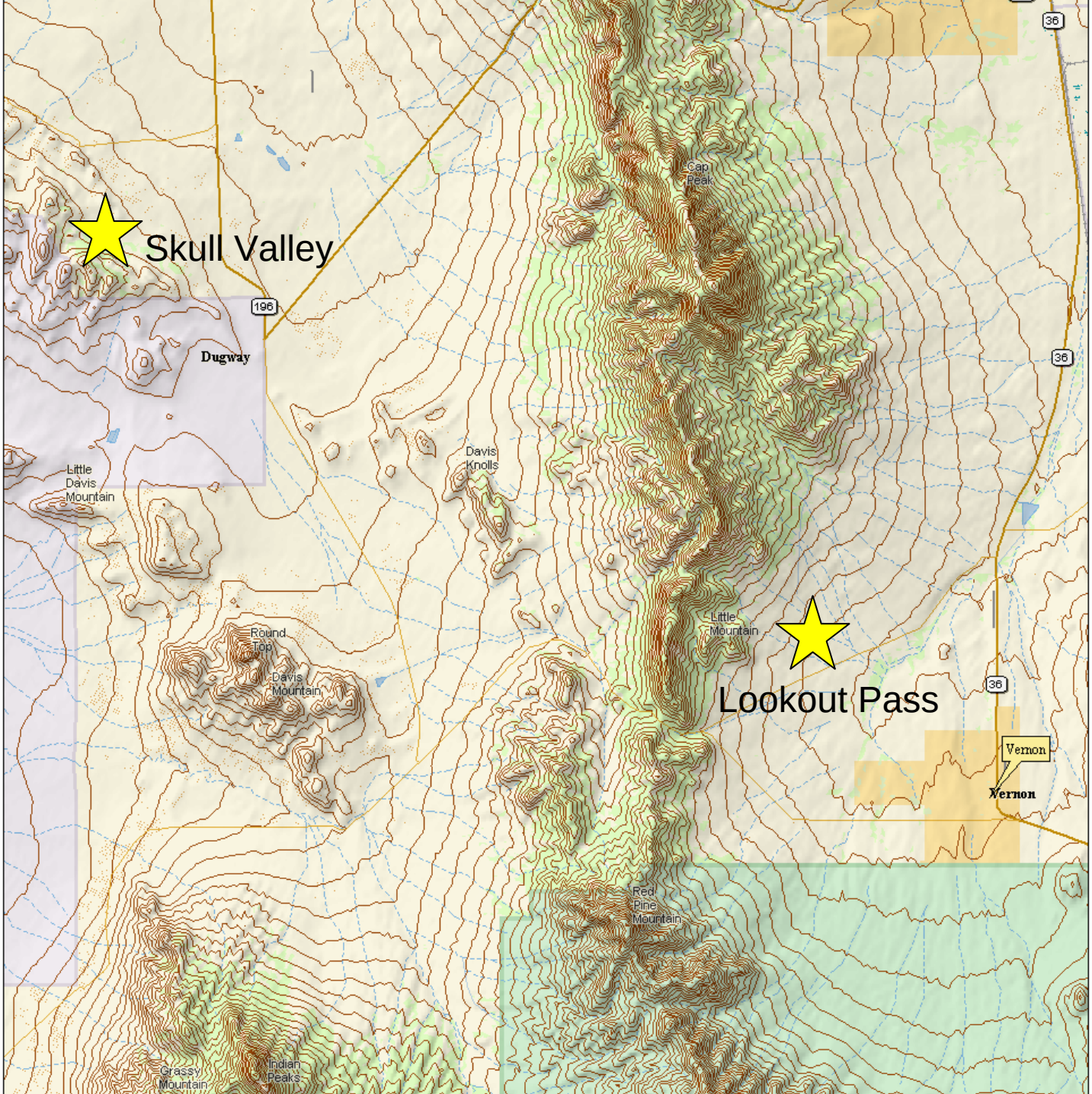
THE HOPE:

Goals & Objectives

THE FEAR:

Site Location




Skull Valley
Lookout Pass
196
36
Dugway
Little Davis Mountain
Davis Knolls
Round Top
Davis Mountain
Little Mountain
Cap Peak
Vernon
Red Pine Mountain
Grassy Mountain
Indian Peaks

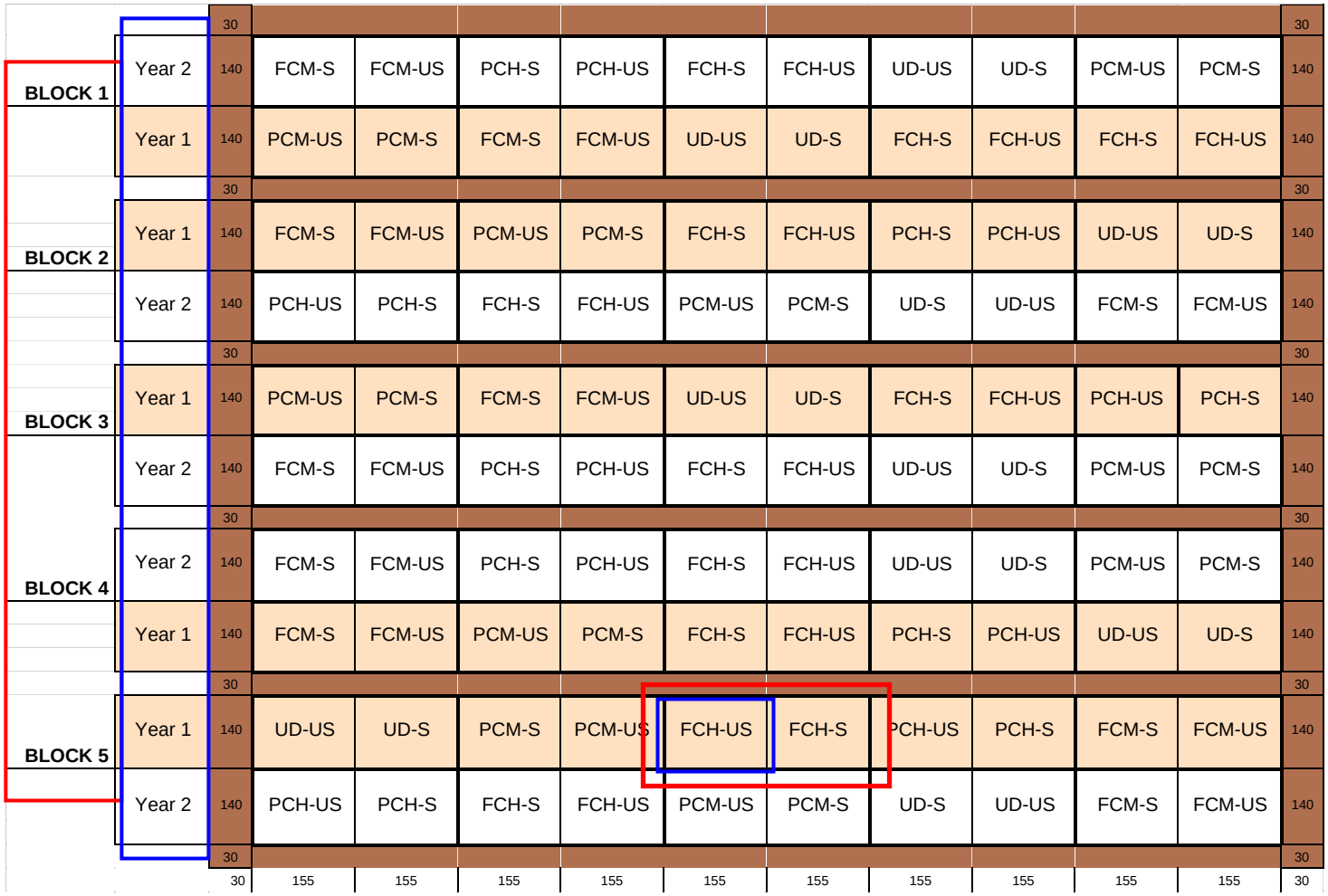
Site Description

Skull Valley

- 1525m (5000’)
- 200 – 254mm (8 – 10”)
- Medburn fine sandy loam
- Wyoming big sage, Bluebunch wheatgrass, Douglas rabbitbrush, Indian ricegrass

Lookout Pass

- 1676m (5500’)
- 254 – 305mm (10 – 12”)
- Taylorsflat loam
- Wyoming big sage, Bluebunch wheatgrass



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 = 16 oz/ac Roundup Original Max

FCH = 44 oz/ac Roundup Original Max

UD = Undisturbed (no treatment)

Sub Plot: ½ acre (0.2 ha)

S = Seeded

US = Unseeded

Timeline

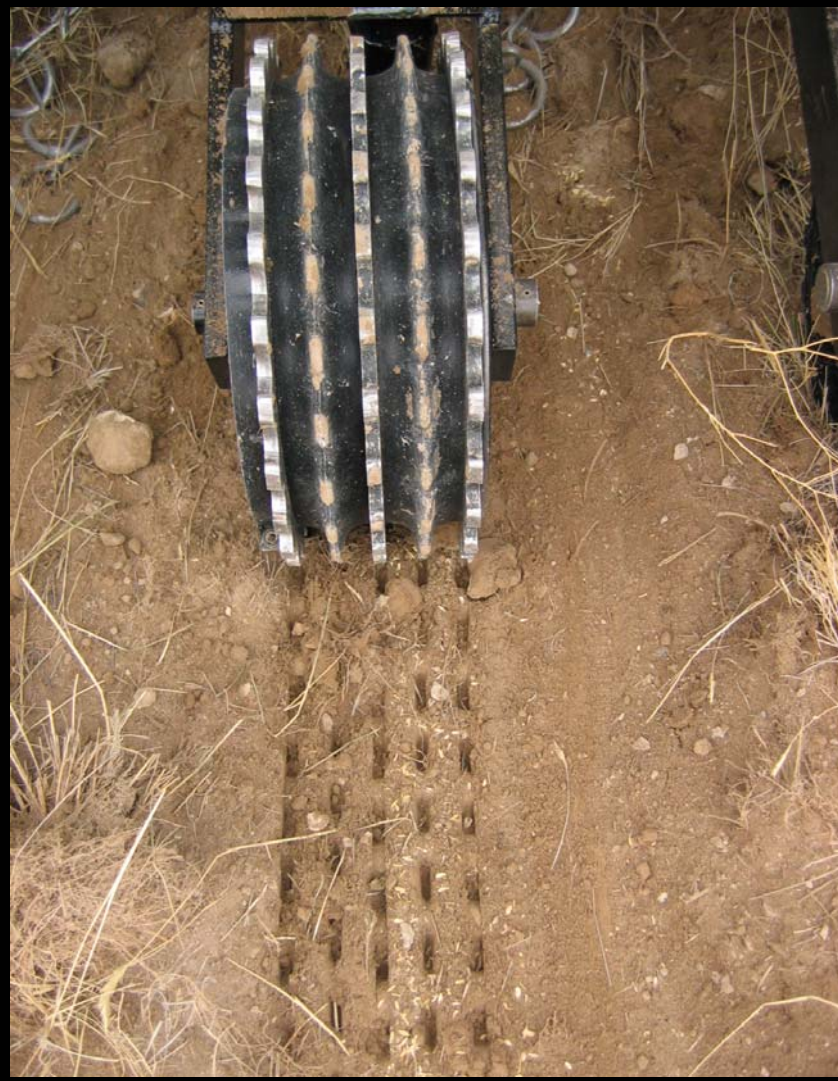
2005	2006	2007
May – Sprayed herbicide (Year 1)	May – Sprayed herbicide (Year 2)	June – Collect Data (Years 1 & 2)
June – Disked (Year 1)	June – Disked (Year 2)	
	June – Collected Data (Year 1)	
October – Seeded plots (Year 1)	October – Seeded plots (Year 2)	

Drill Configuration

Truax Rough Rider

Drill Configuration

Drill Configuration



Drill Configuration

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Seed Mix

	Species	PLS kg/ha	Bulk kg/ha
Drilled	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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Sampling Methods

5 transects X 6 quadrats = 30 samples per subplot treatment

Total of 1500 samples per site

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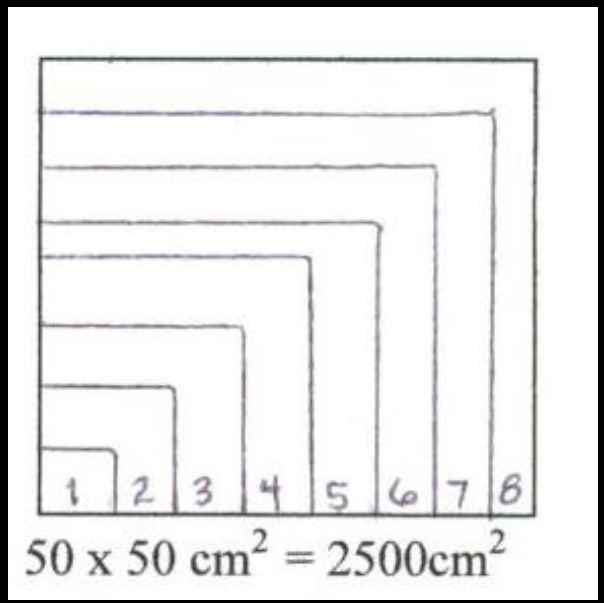
- Density: all species
- Modified Duabenmire Cover class: crested wheatgrass, cheatgrass, Sandberg bluegrass



Cover Class	Cover	Midpoints
1	0-1%	0.5
2	1-5%	3
3	5-15%	10
4	15-25%	20
5	25-50%	37.5
6	50-75%	62.5
7	75-95%	85
8	95-100%	97.5

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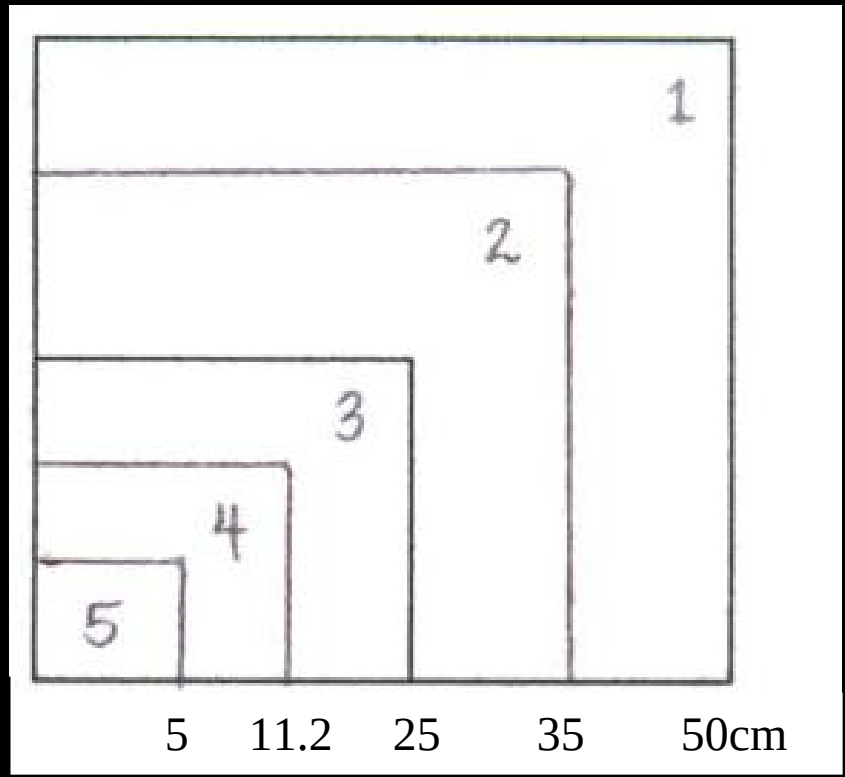

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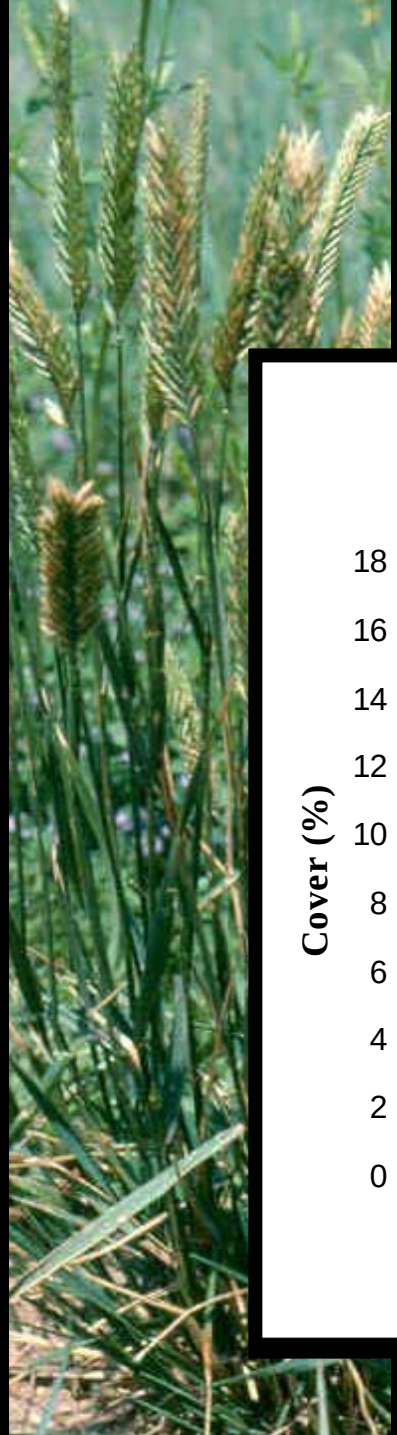
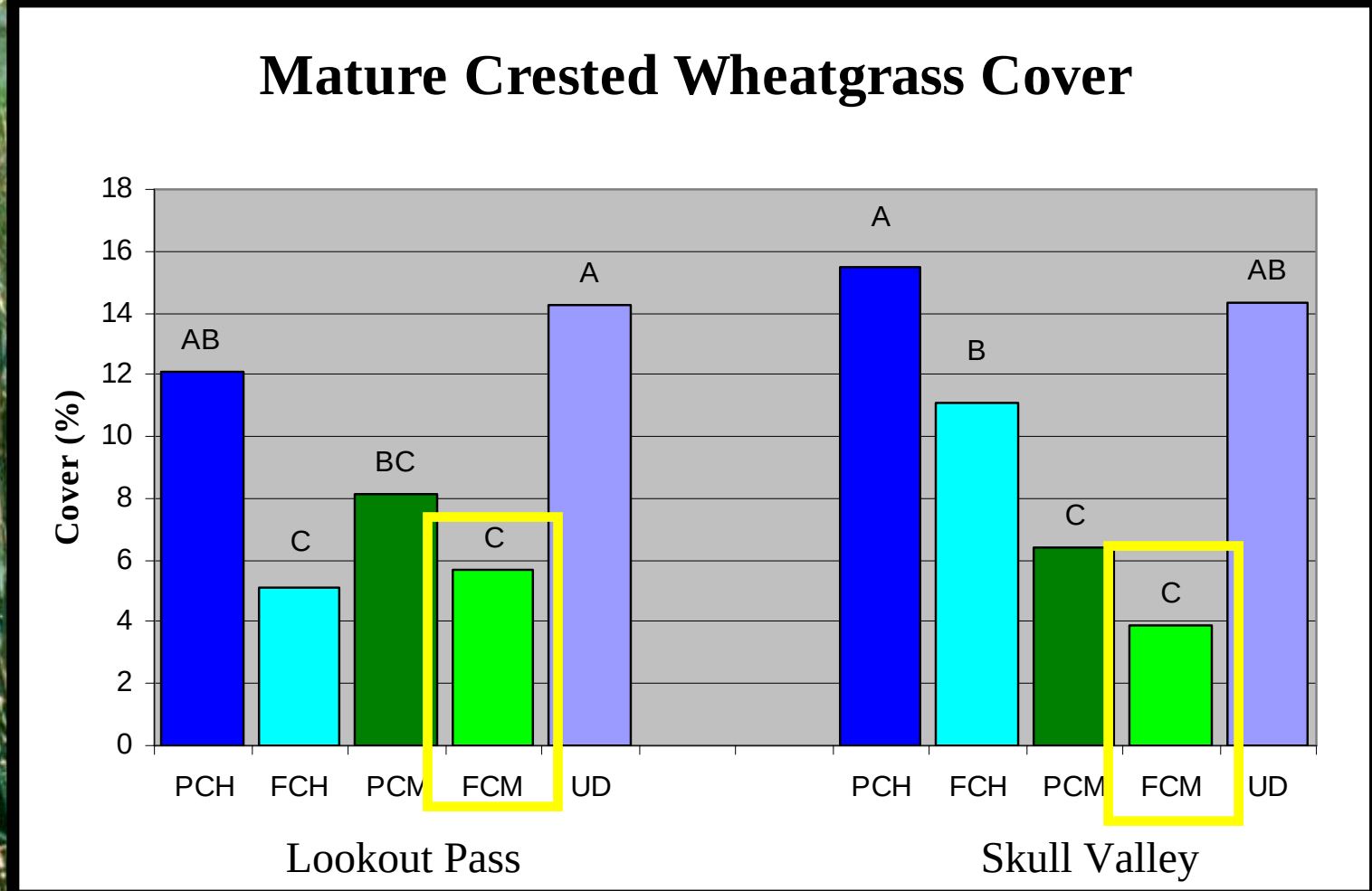
Seedbank Bioassay

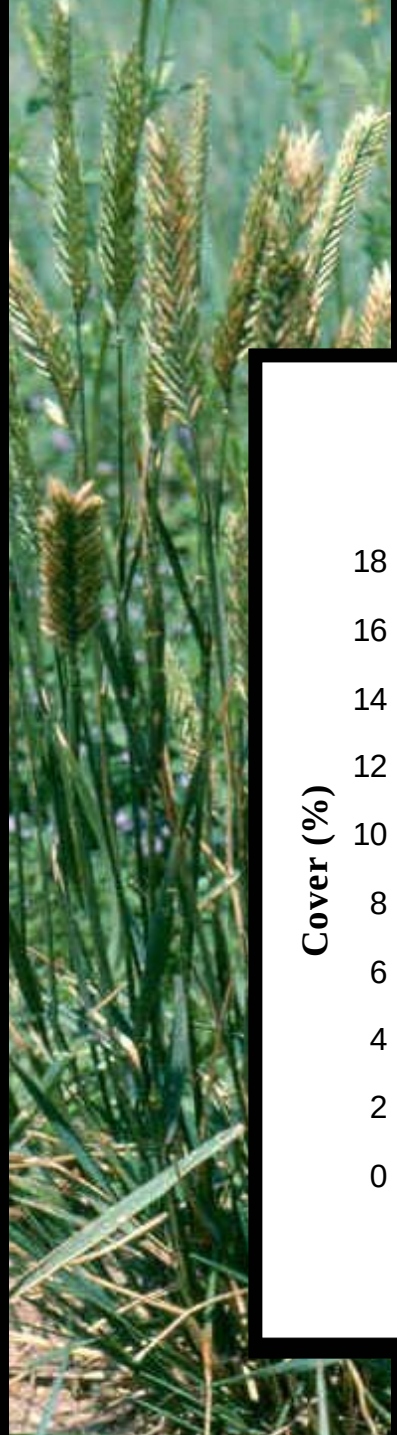
$P < 0.05$



Results

1. What treatment best controls crested wheatgrass?





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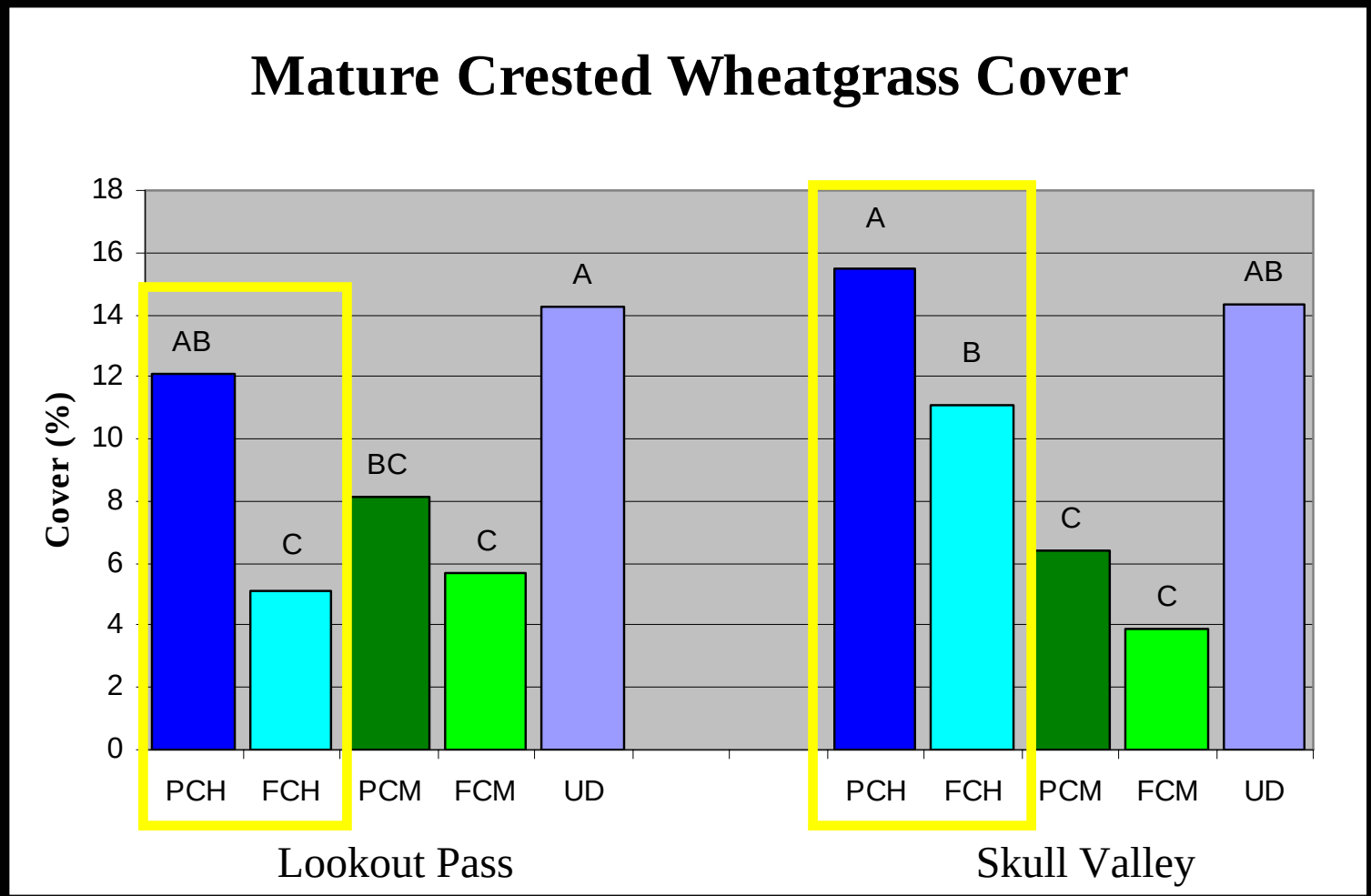

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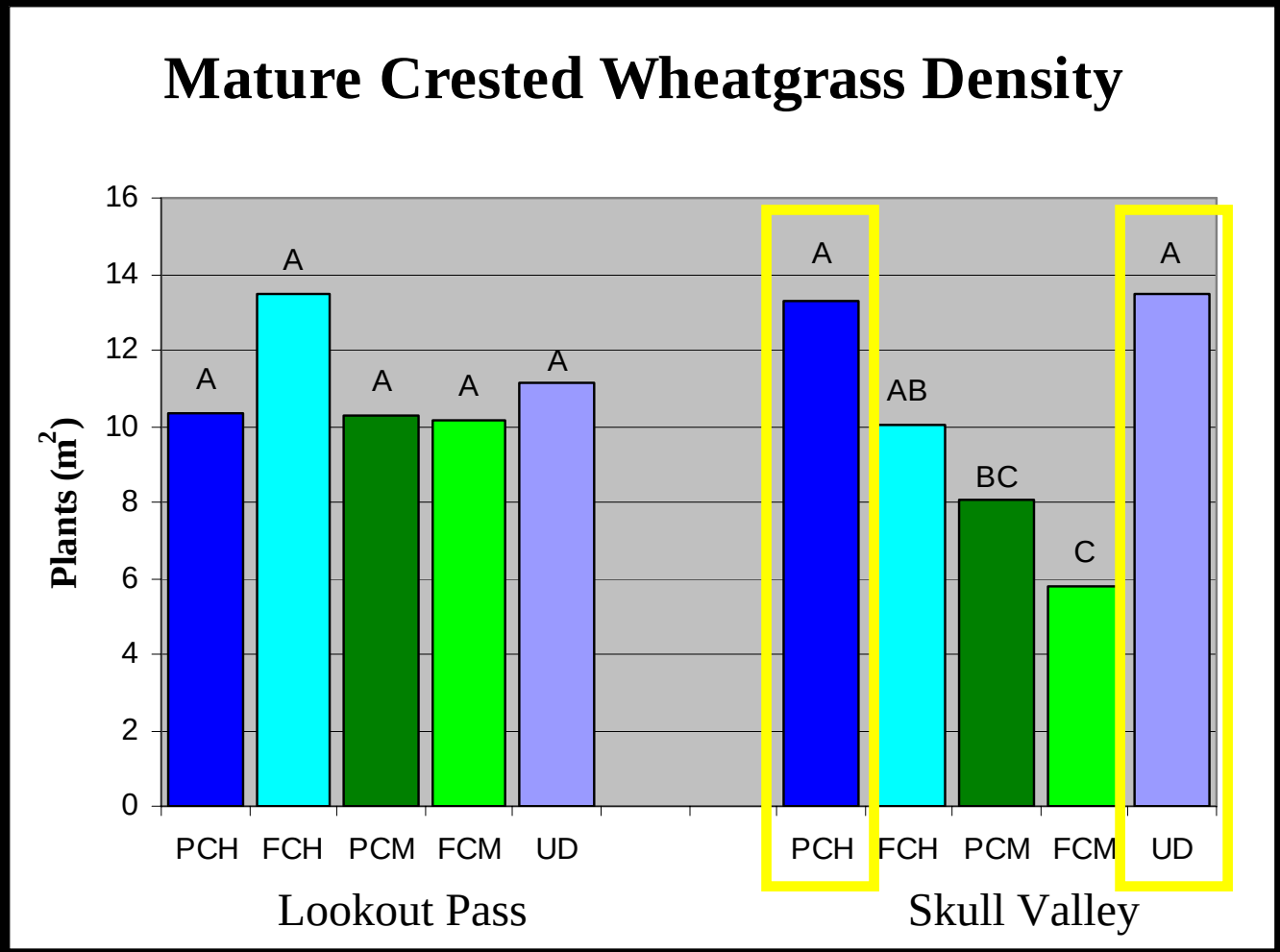

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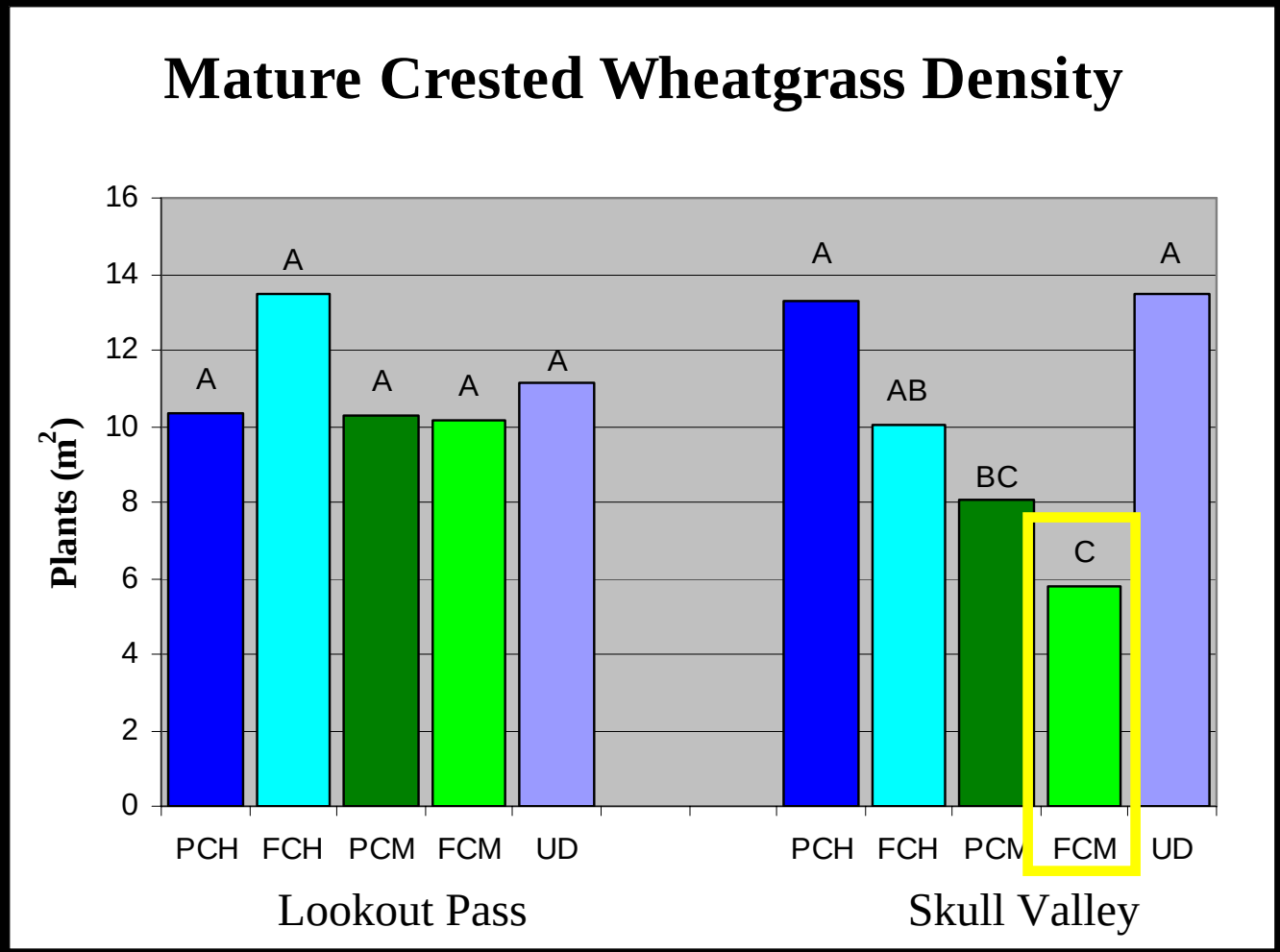

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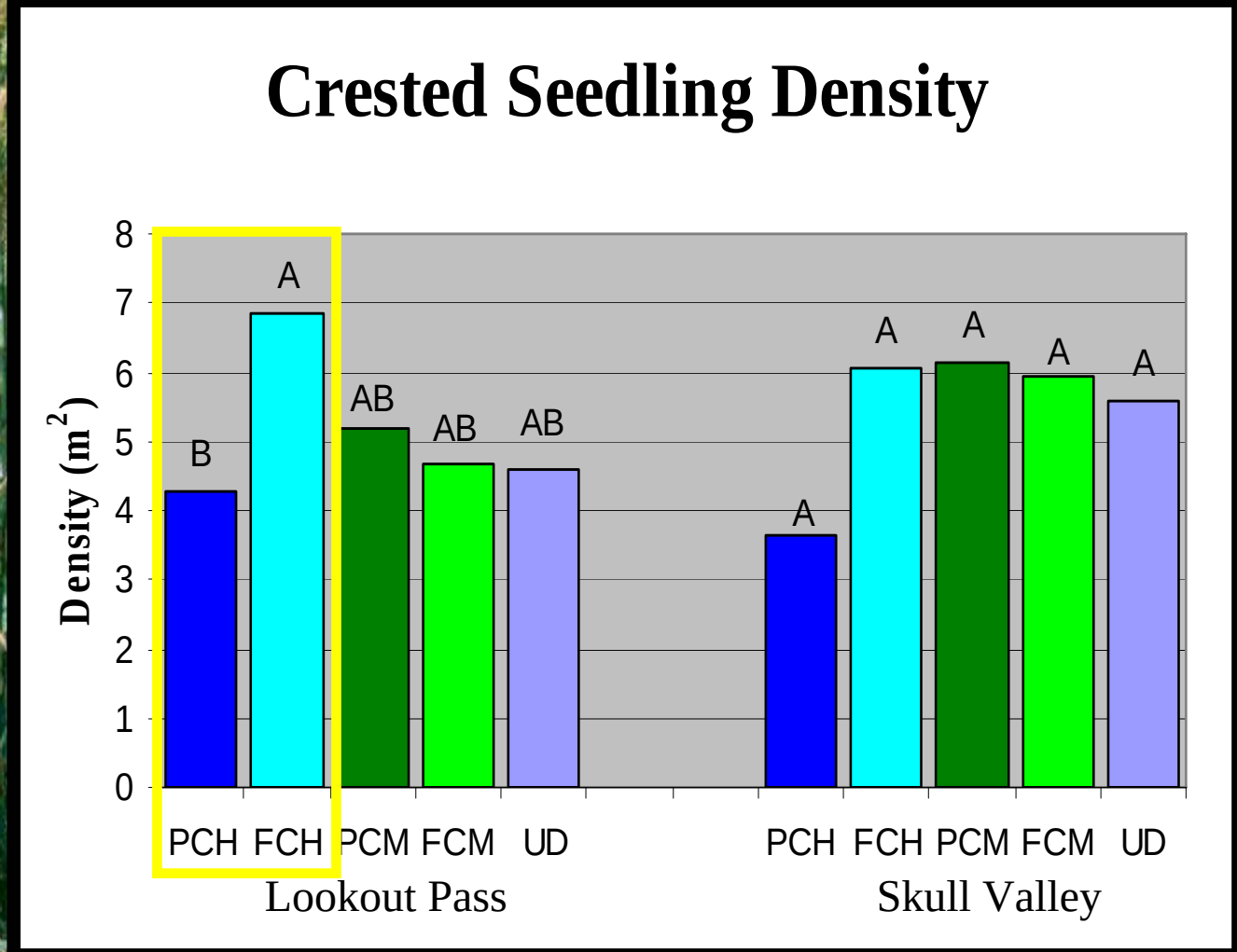


Results

1. What treatment best controls crested wheatgrass?
Roundup Original Max

PCH – 1.1 L/ha

FCH – 3.2 L/ha

Results

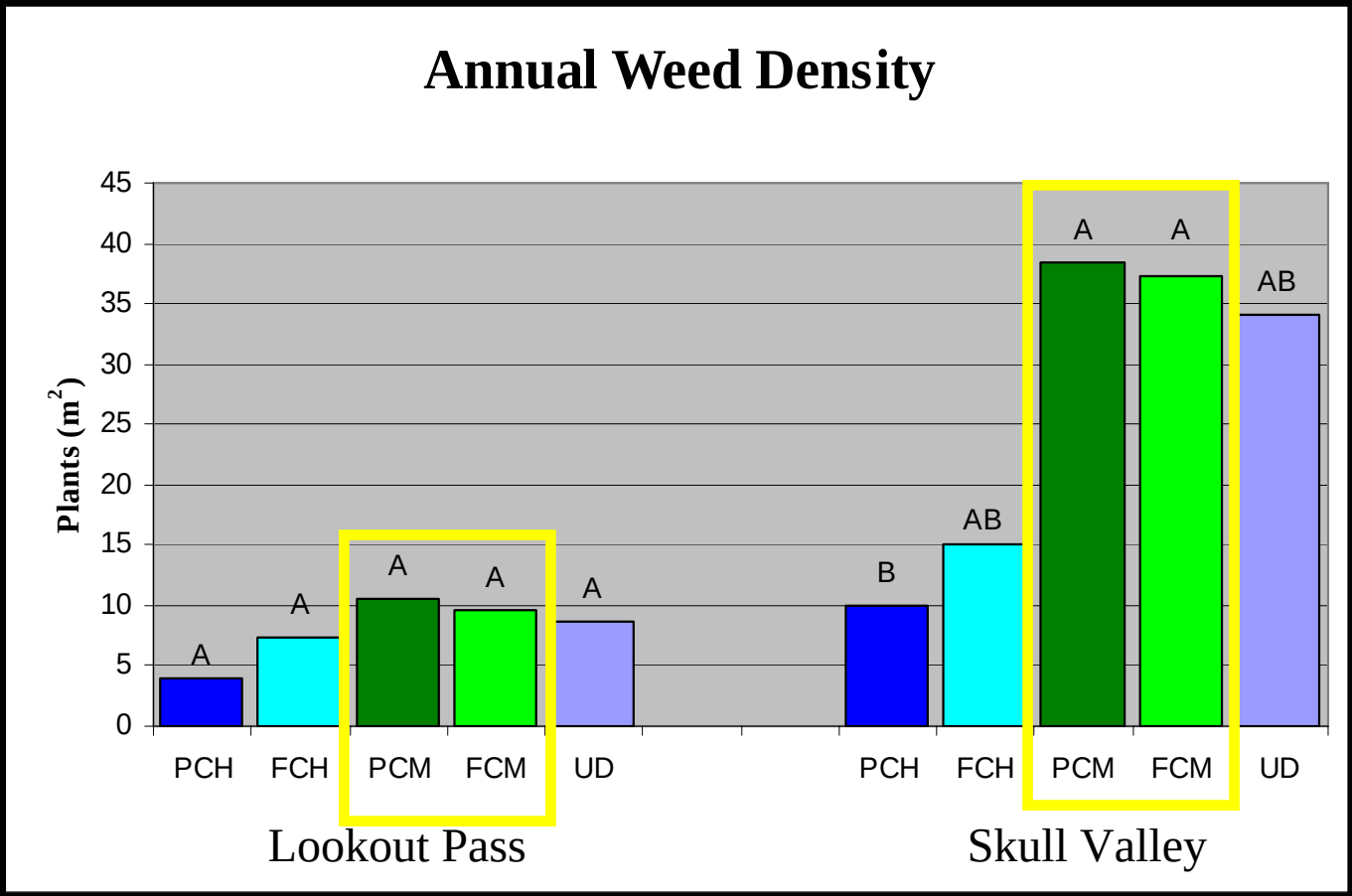
1. What treatment best controls crested wheatgrass?

PCM – 1 way disk

FCM – 2 way disk

Results

2. How does wheatgrass control followed by native revegetation affect weed invasion?



Lookout Pass:

80% alyssum

11% cheatgrass

9% tumblemustard

Skull Valley:

92% cheatgrass

7% Russian thistle

0.5% tumblemustard

<0.1% alyssum

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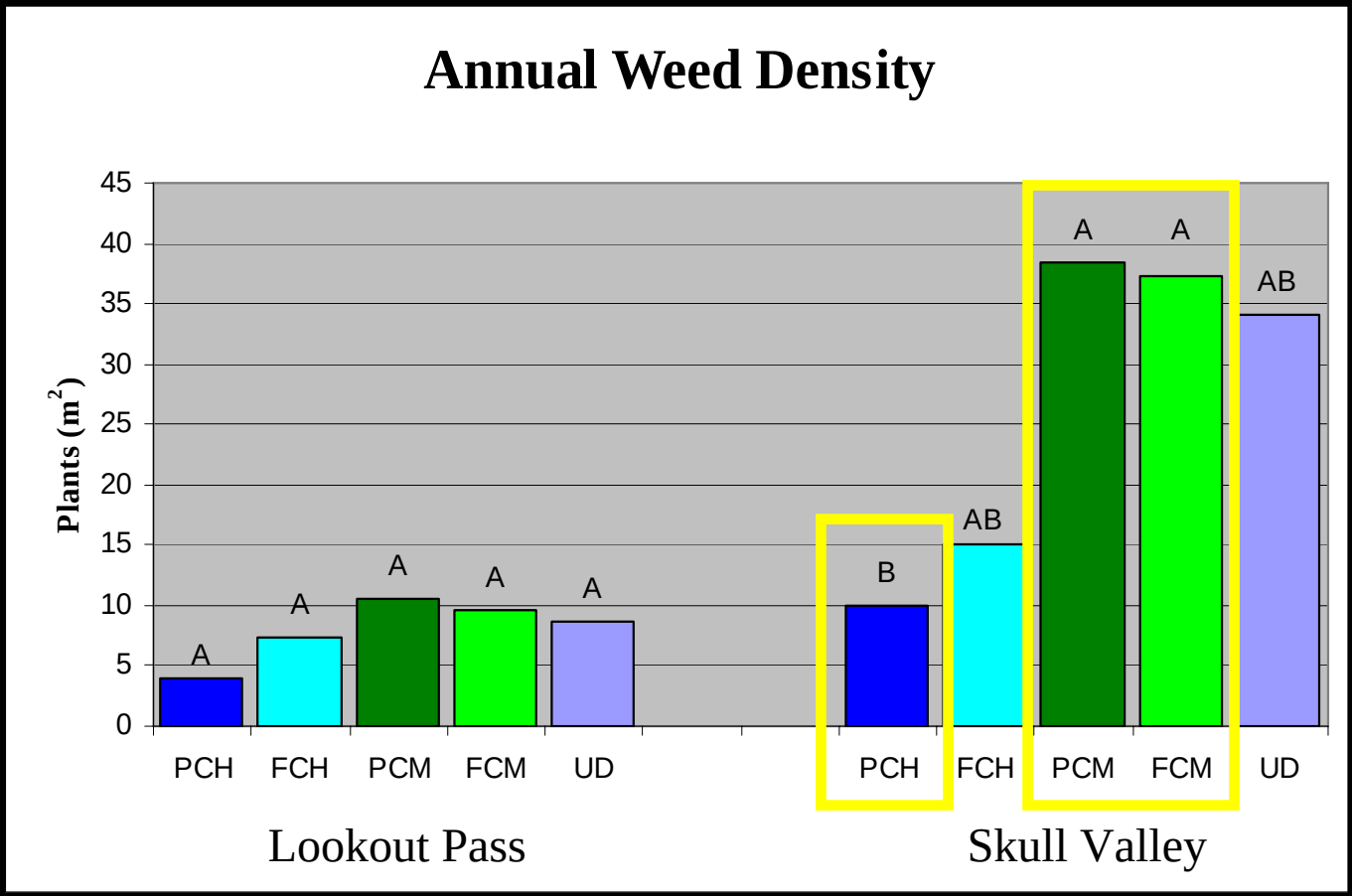

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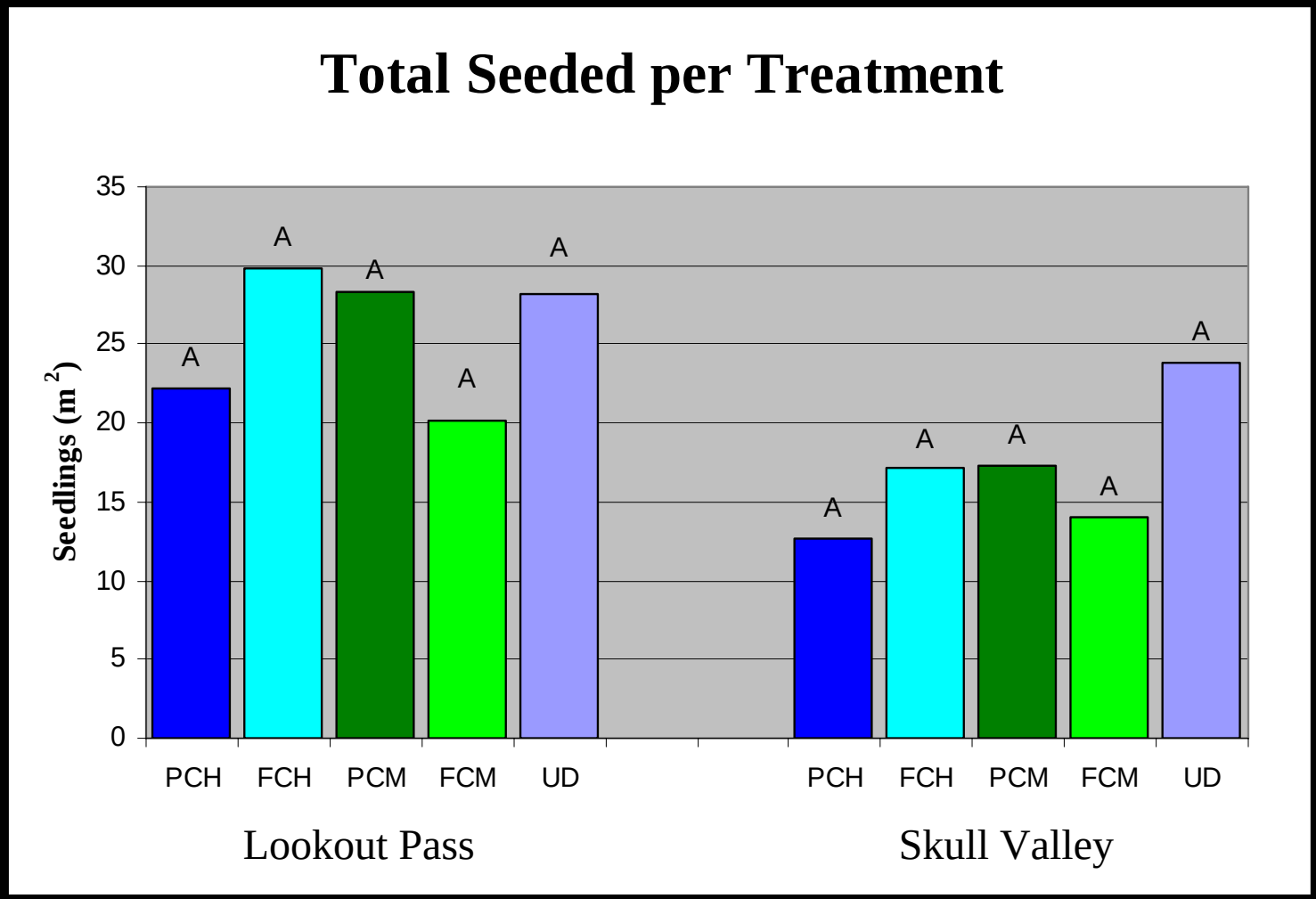

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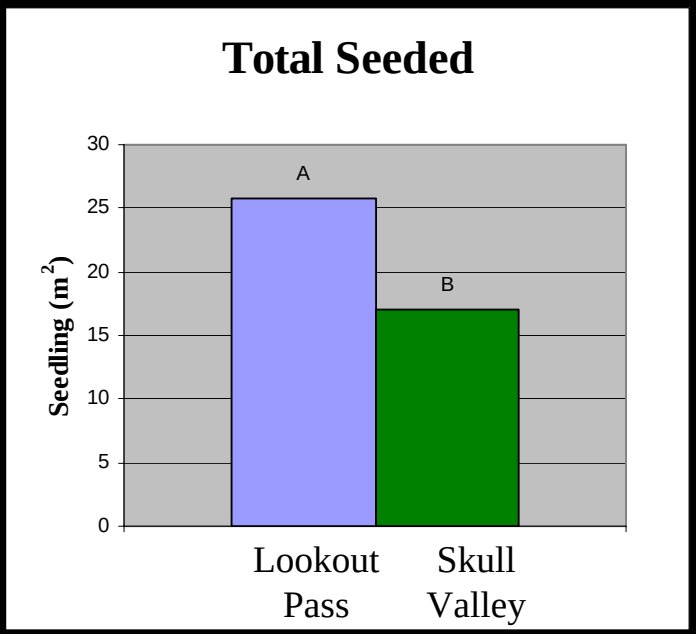

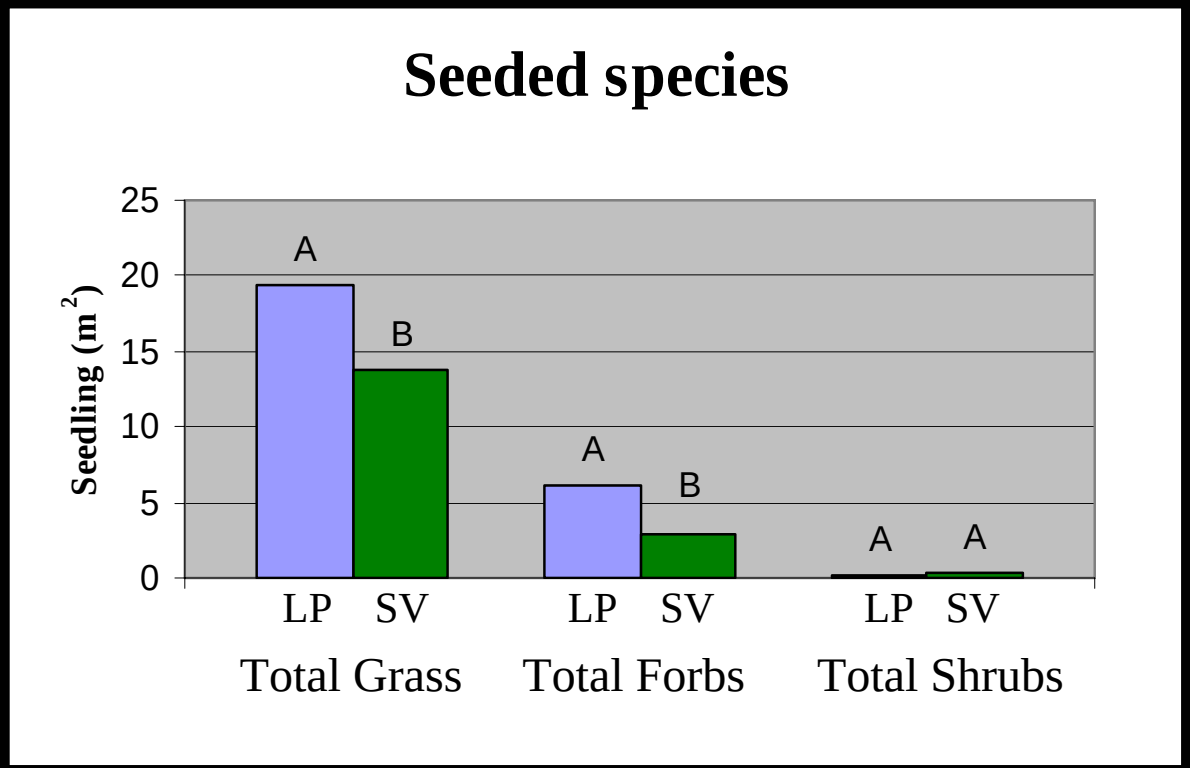

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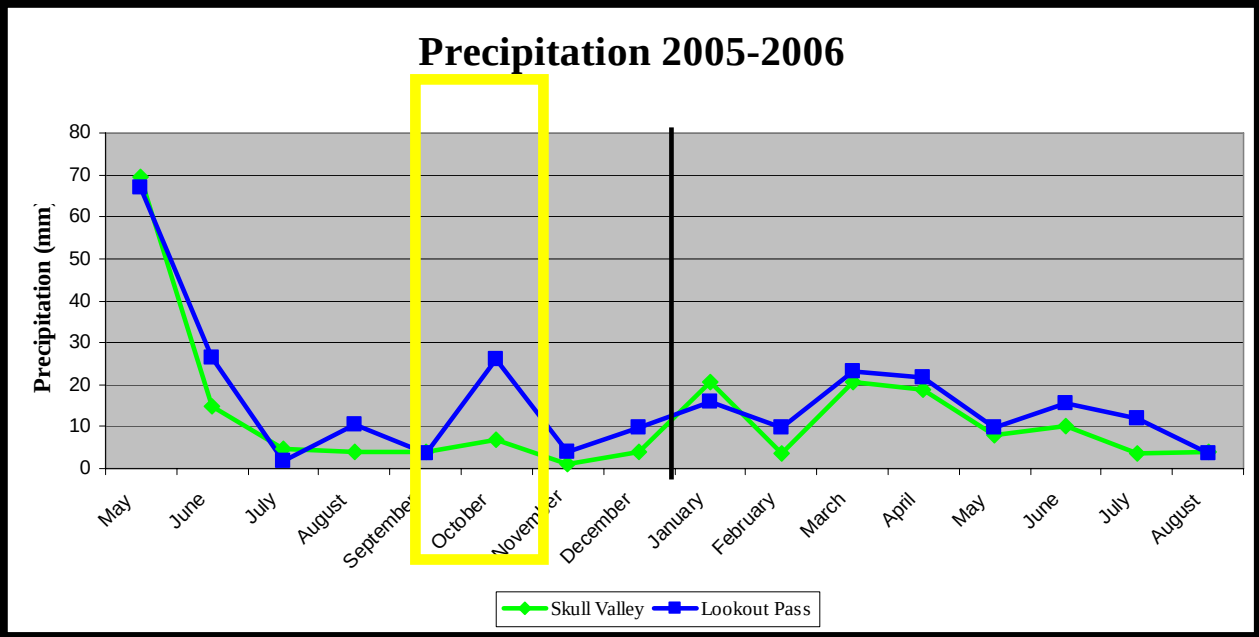
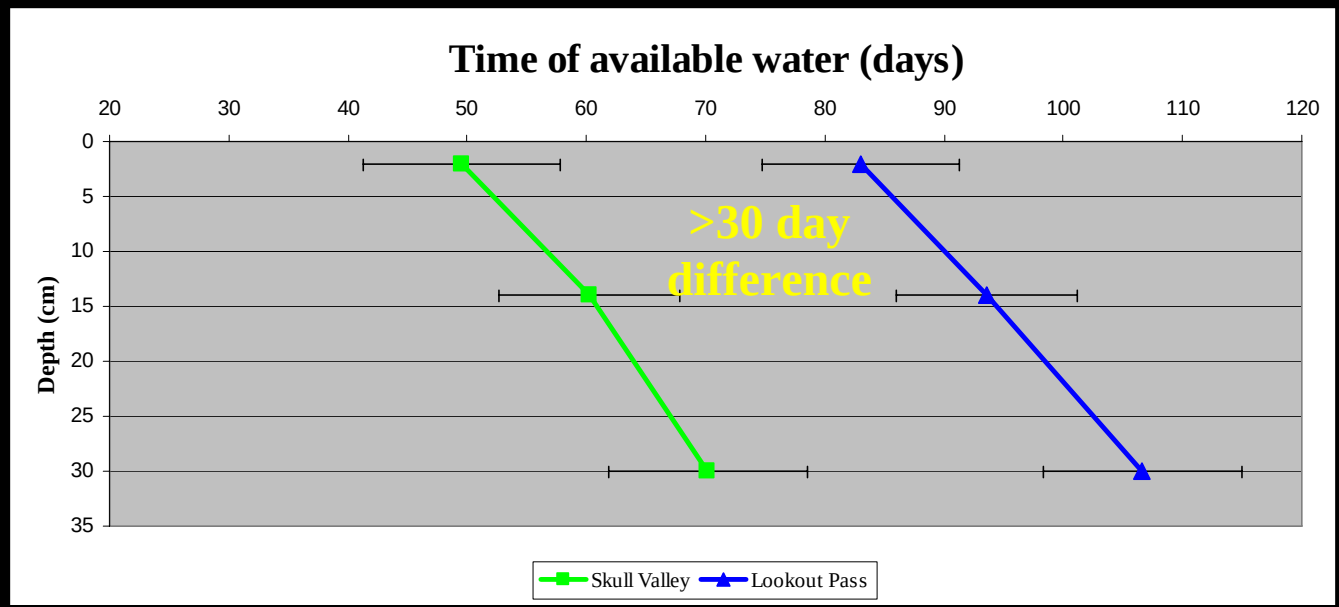
Precipitation Data:



- Top: 1-3 cm
- Middle: 13-15 cm
- Bottom: 28-30 cm



Summary

- Mechanical treatments best controlled crested wheatgrass
- There were significantly less weeds in the herbicide treatments than the mechanical treatments at Skull Valley
- Treatments had no affect on seedling emergence

In June we will collect data on
1st and 2nd year plots

- Grasses had good emergence, but how many will survive?
- What is the response to the 2nd year treatments?

TIME WILL TELL…