SITE ASSESSMENTS AND TEST PLOTS IN DEVELOPING RECLAMATION STRATEGIES

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SITE ASSESSMENTS

(MUST KNOW YOUR SITE)

Type of disturbance
Extent of damage
Vegetation associations impacted
Soil types impacted
Site access
Slope – Erosion potential
T&E species
Wildlife concerns
Visibility
Public input and concern

SITE ASSESSMENTS

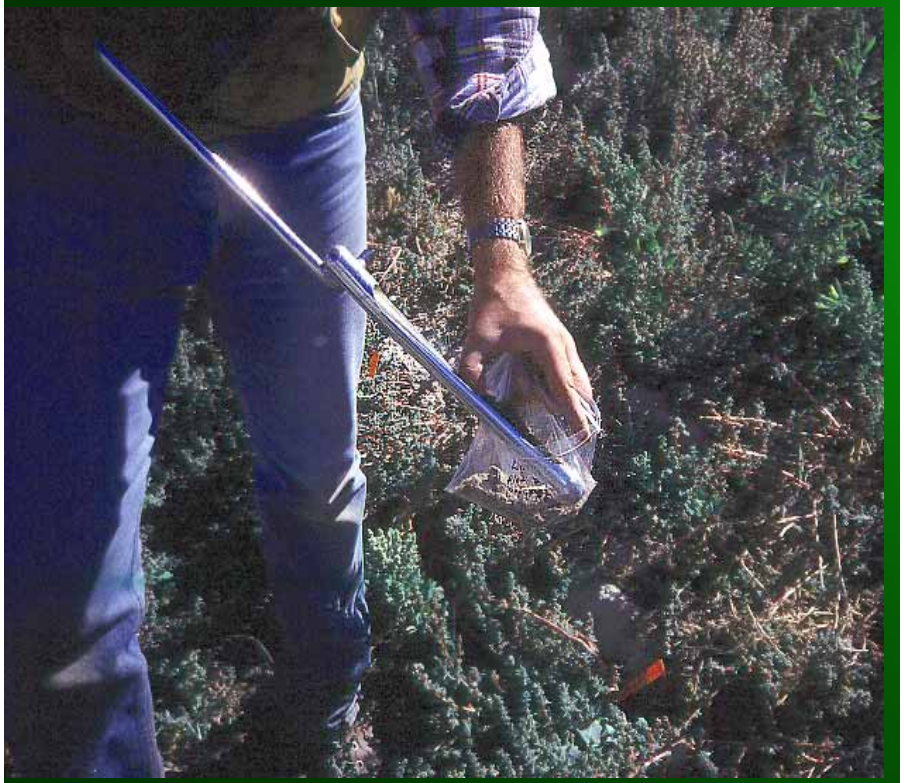


Table 2.1. Example of a field visit planning sheet.

Date: _____ Site: _____ GPS: Northing _____
Observer: _____ Location: _____ Easting: _____

Site Clearing & Preparation	*Samples*				
	1	2	3	4	5
Soils					
Location					
Depth					
Salvageable					
PH					
Fertility N/P/K					
Salinity					
Texture					
Plant Material Salvage					

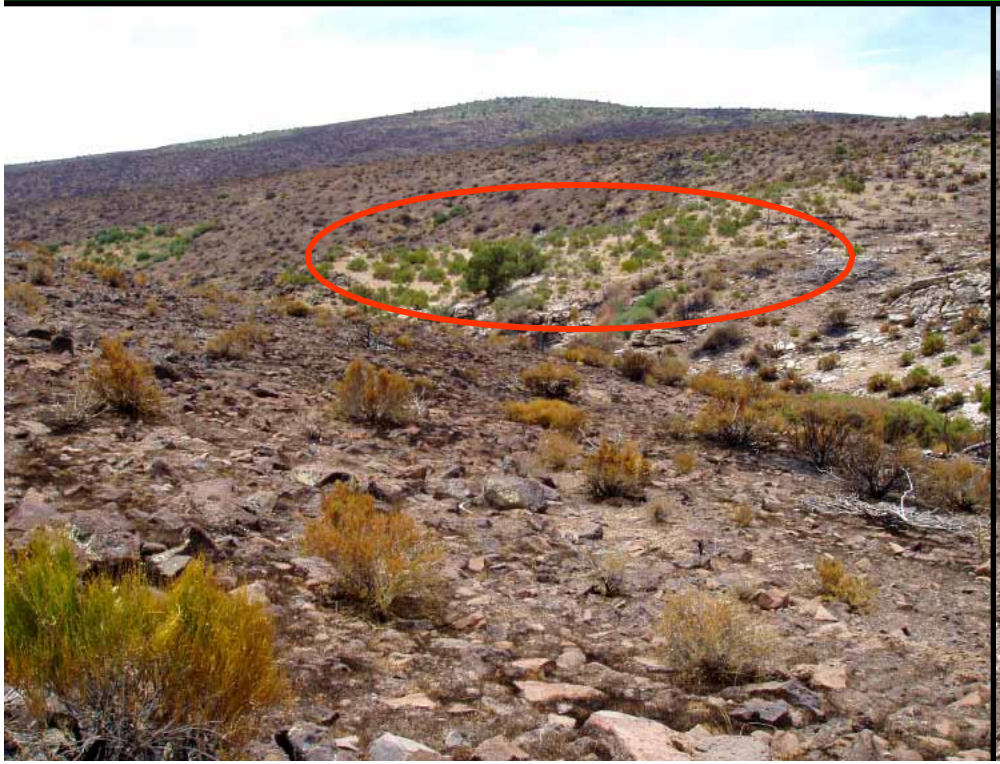
Vegetation	*Native Vegetation Type:*		
Dominant Species	Relative Abundance		
	Abundant >25%	Common 5-25%	Uncommon <5%
2			
3			
4			
5			
Invading Species or Weeds:			
1			
2			
3			
4			
5			
Potential Problems:			
Grazing/Rodents			
Steep Slopes			
Wind Erosion Potential			
Water Erosion Potential			
Remarks:			

TEST PLOTS

- Set up plots
- Take data
- Vary parameters when you revegetating
- Skip areas – mark them
- Double seed some areas
- Evaluate species performance
- Go back and evaluate
- Historic disturbances
- Old burns

RECLAMATION STRATEGY

When do you reclaim?
When do you do nothing?
What techniques do you use?
How do you decide?



RECLAMATION STRATEGY

What happens if I do nothing?

2 studies

Burn

Construction – roads, pads

When you should actively reclaim?

Rules

What does it take to be successful?

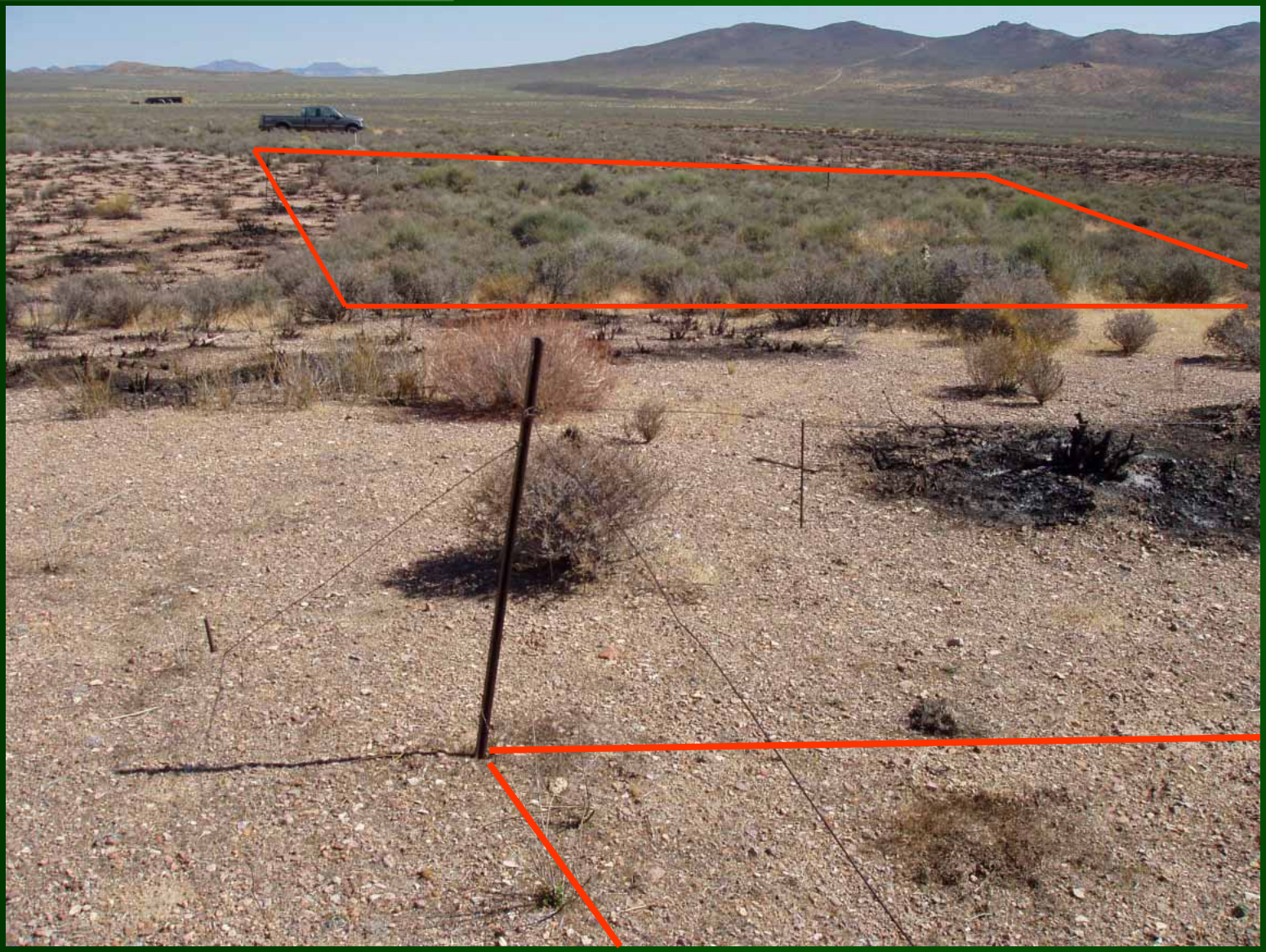
Examples of test plots/demonstrations

Do nothing after a burn

J. Beatley set up 68 permanent plots in 1963 on NTS to monitor change
Webb et al. 2003

1) 6 paired sites in blackbrush
2) 46 years since burn (late 1950s)
3) Total cover
4) Cover by species
5) Species density
6) Species diversity

Paired plots



Paired plots

Beatley's Burn Plots Cover

Control	1963	1976	2000	1963	1976	2000	1963	1976	2000
CORA	43.0	43.9	32.8	44.9	44.2	31.6	16.9	18.4	20.7
EPNE	2.1	1.9	2.1	2.6	4.6	4.7	3.7	4.6	4.5
GRSP	0	0	0	0	0	0	6.8	8.5	0.5
ELEL	0	0	0	0	0	0	0.1	1.0	0
ACSP	0	0.3	0.1	0	0	0	0.8	2.6	0.1
TOTAL	45.03	46.1	35.1	47.6	48.9	36.6	32.8	42.4	29.0

Burned									
CORA	0	0.1	0.5	0	0	0.6	0.3	0.1	0.6
EPNE	1.9	2.2	7.2	1.7	9.8	17.7	1.3	4.0	4.6
CHVI	0	0	0	0	0	0	0	0	1.6
HYSA	0	0	0.4	0	0	0	0.7	2.2	2.5
ELEL	0	0	0.1	0	0	0	0.8	1.9	0
ACSP	0	0.8	1.1	0	0.7	1.8	6.9	19.0	6.8
SPAM	0.2	0.4	3.4	0	0.9	3.2	0	0.2	0.4
TOTAL	2.0	3.5	18.8	1.7	12.6	25.8	10.8	30.2	20.8

Beatley's Burn Plots Density

	1963	1976	2000	1963	1976	2000	1963	1976	2000
CORA	278	393	294	356	368	321	144	154	165
EPNE	16	16	19	26	43	52	25	28	27
GRSP	0	0	0	0	0	0	47	51	6
ELEL	0	0	0	1	0	0	2	12	0
ACSP	0	5	1	0	1	0	14	37	2
TOTAL	294	415	322	383	414	380	290	351	240

Burned

CORA	0	1	2	0	0	5	1	1	4
EPNE	23	17	35	26	39	61	12	20	28
CHVI	0	0	0	0	0	0	0	20	28
HYSA	0	1	2	0	0	0	6	13	20
ELEL	0	0	1	0	0	0	14	29	0
ACSP	0	7	13	0	8	19	68	176	122
SPAM	3	22	111	3	29	113	1	9	21
TOTAL	26	48	237	29	124	213	115	278	289

Beatley's Burn Plots Species Diversity

	1963	1976	2000	1963	1976	2000	1963	1976	2000
SHRUBS	2	2	2	3	3	4	9	9	7
CACTI	0	1	1	0	1	2	0	0	1
GRASSES	0	1	1	1	1	0	2	2	2
FORBS	0	0	1	0	0	0	0	2	0
TOTAL	2	4	5	4	5	6	11	13	10

Burned

SHRUBS	1	3	7	1	2	5	5	6	11
CACTI	0	0	1	0	0	0	0	0	0
GRASSES	1	1	3	0	2	3	2	3	2
FORBS	0	1	3	1	2	2	1	4	3
TOTAL	2	5	14	2	6	10	8	13	16

Do nothing after construction activities

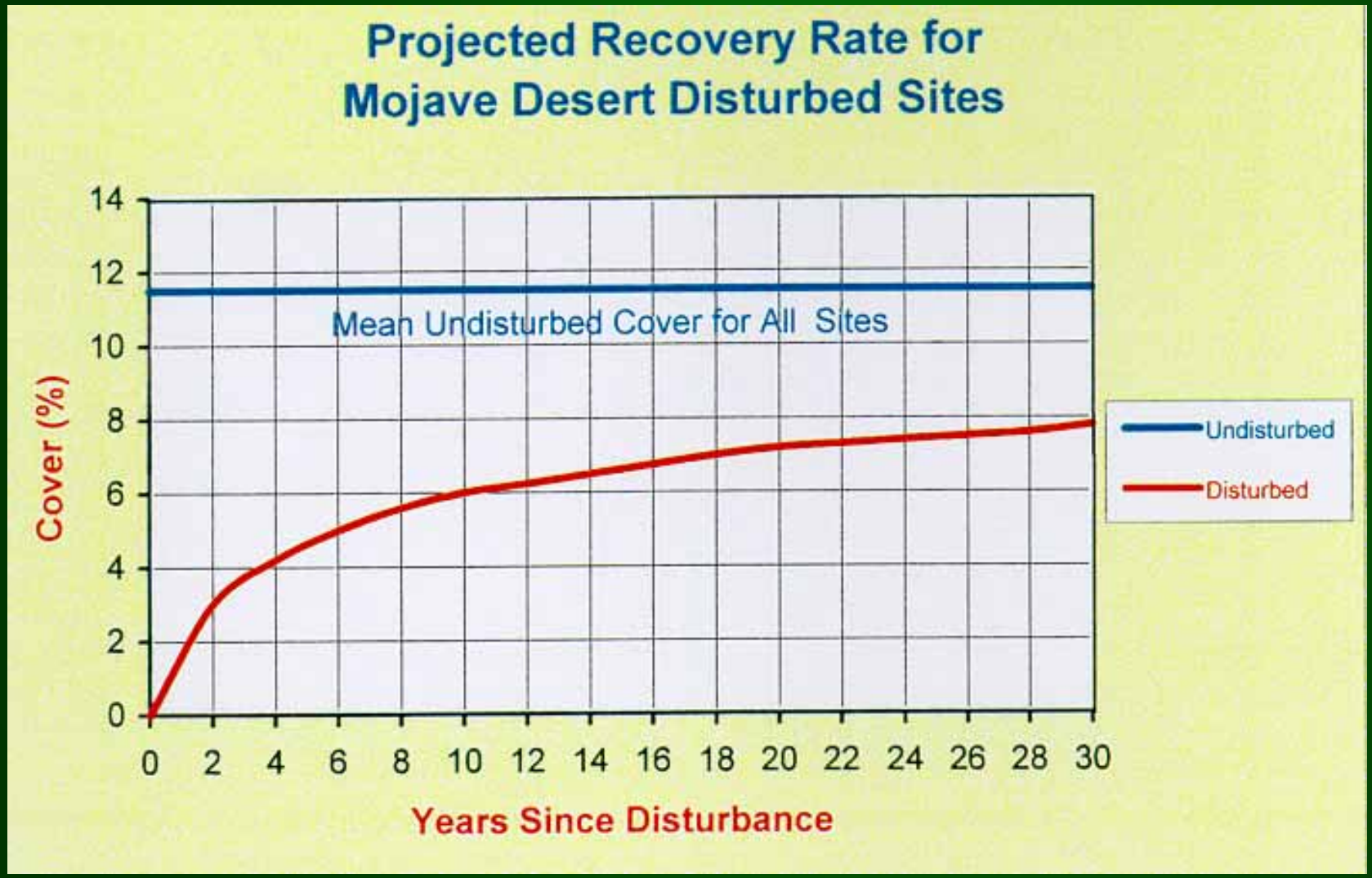
Secondary Succession on Disturbed Sites at Yucca Mountain, Nevada

Angerer et al. 1994

1) 236 sites
2) 7-13 years since disturbance (1978-1984)
3) Total cover, Cover by species
4) Species diversity
5) Factors that influenced succession rate

Succession

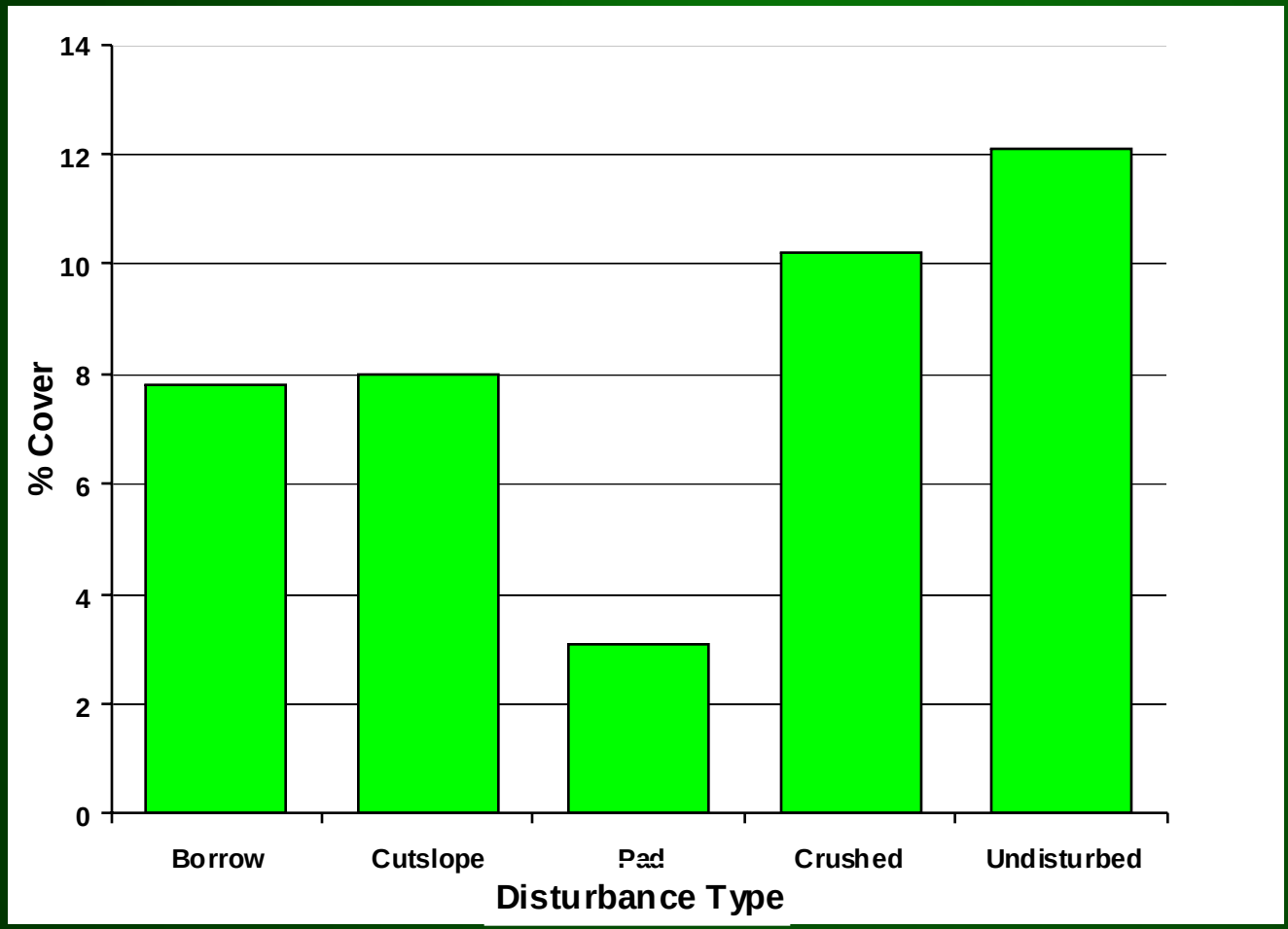
Results



Succession

Results

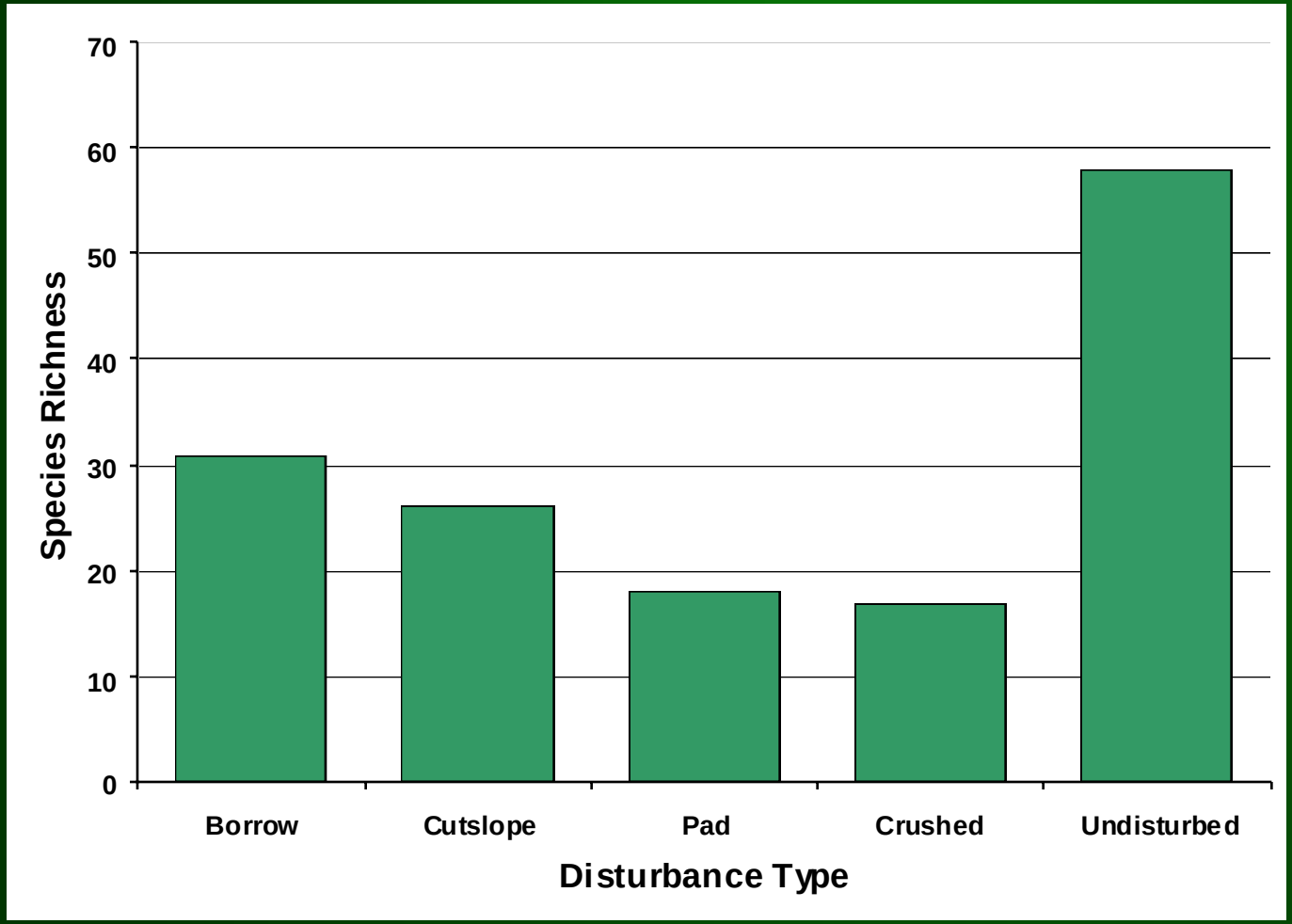
Type of disturbance influenced cover, species composition, diversity and dominance, and succession rates



Succession

Results

Type of disturbance influenced cover, species composition, diversity, and dominance, and succession rates



Succession

Conclusions

1) Time required for cover 20-845 years
2) Time required for species composition even longer
3) After 10 years - reclamation goal of cover, form, productivity not met
4) Species dominate in disturbed sites were minor components of undisturbed sites
5) Elevation (+), soil compaction (-), soil potassium (+), % sand (+) and gravel (-) were key factors that influenced succession rate

When do you actively restore a disturbance?

1) Active erosion - Water

When do you actively restore a disturbance?

2) Active erosion - Wind

When do you actively restore a disturbance?

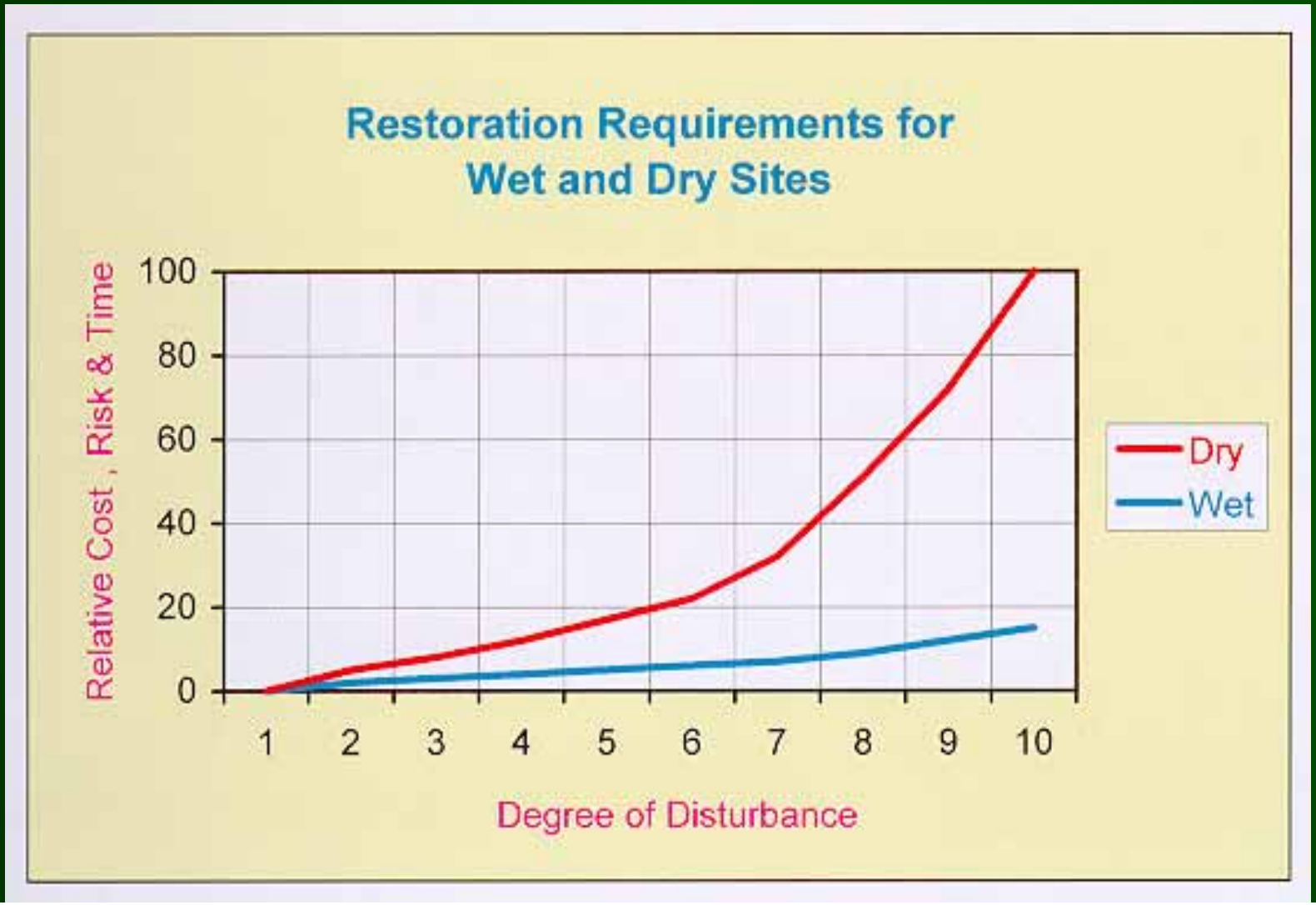
3) Large disturbances/lack of seed sources

When do you actively restore a disturbance?

4) Poor soils – low nutrients, no fines, low organic matter, lack soil microbes
5) Soil compaction
6) Visual/Aesthetics needs
7) Weed Problems

What does it take to restore the Mojave Desert?

CONCEPTUAL MODEL



What does it take to restore the Mojave Desert?

- Planning
- Timing
- Techniques
- Equipment
- Materials
- Irrigation/rainfall
- $$ Money $$

Test Plots Demonstration Areas

Taken from D.C. Anderson and W. K. Ostler, 2002 Revegetation of Degraded Lands at Department of Energy and Department of Defense Installations: Strategies and Successes. Arid Land Research and Management Vol.16:197-212.

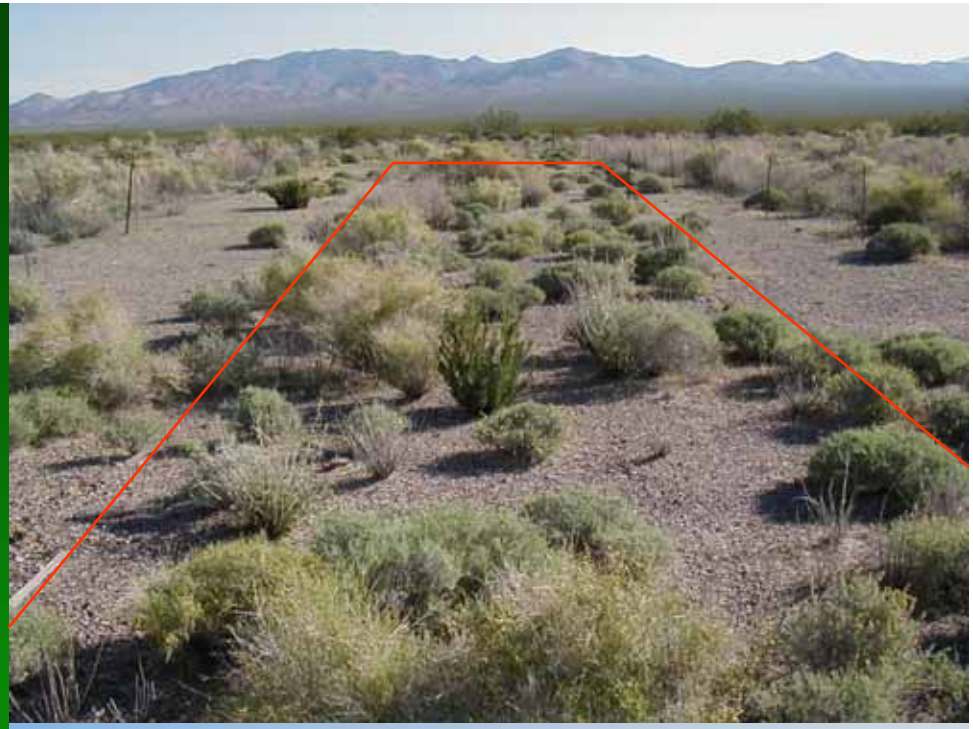
YMP Demonstration

Seeded 1992

33 different treatments -

Water conservation, seeding techniques, soil amendments

Winkel et al. 1999



Do nothing

Test Plots - YMP JF-3 drill pad

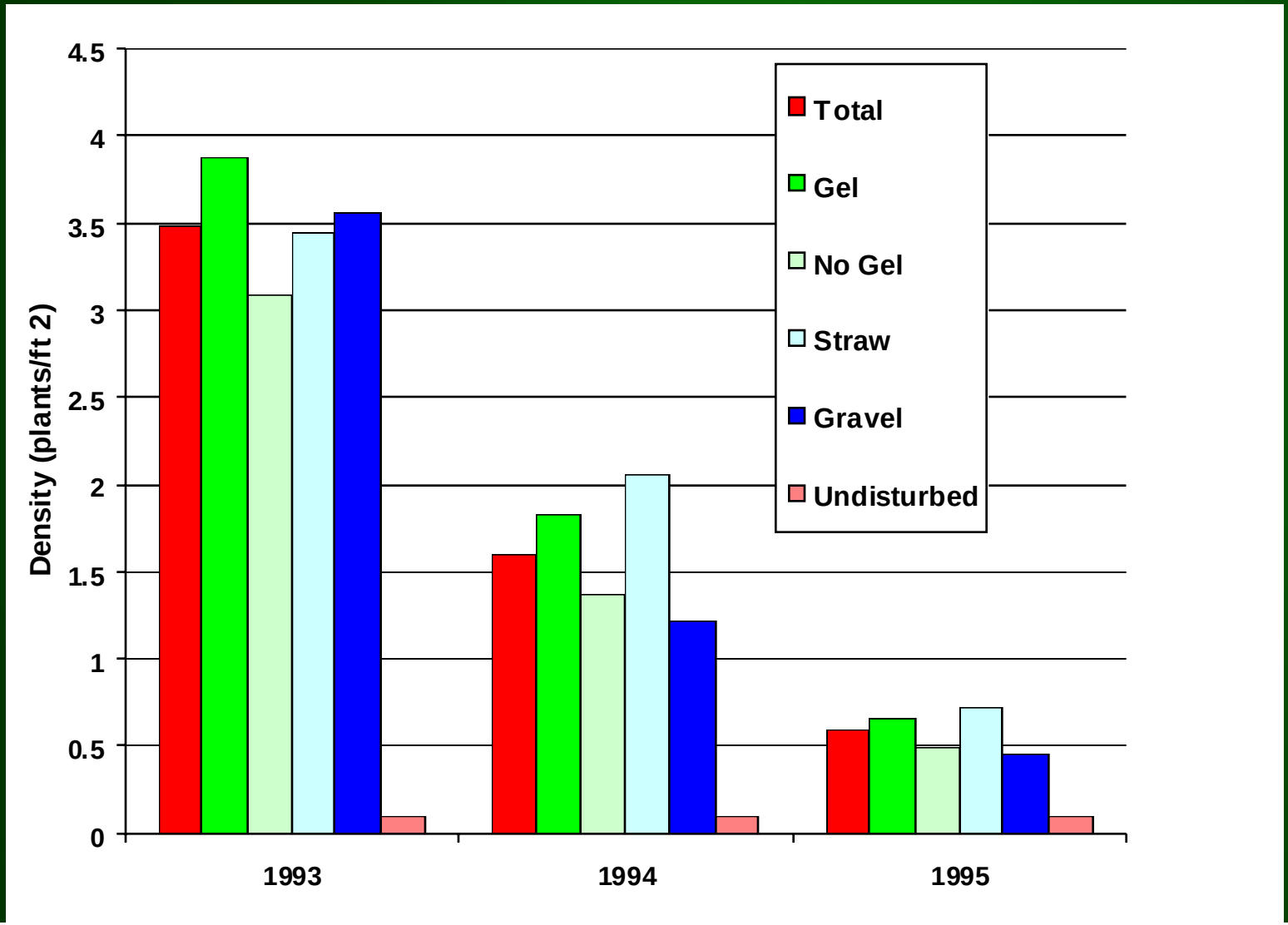
Seeded fall 1992

Mulch and gel treatments

Winkel et al. 1999

Test Plots – YMP JF-3 drill pad

1995 Cover = 8.3-10.6%
Undisturbed Cover = 8-16%



Test plots - YMP JF-3 drill pad

1994

Test plots - YMP JF-3 drill pad

1999

Test Plots - YMP JF-3 Drill pad

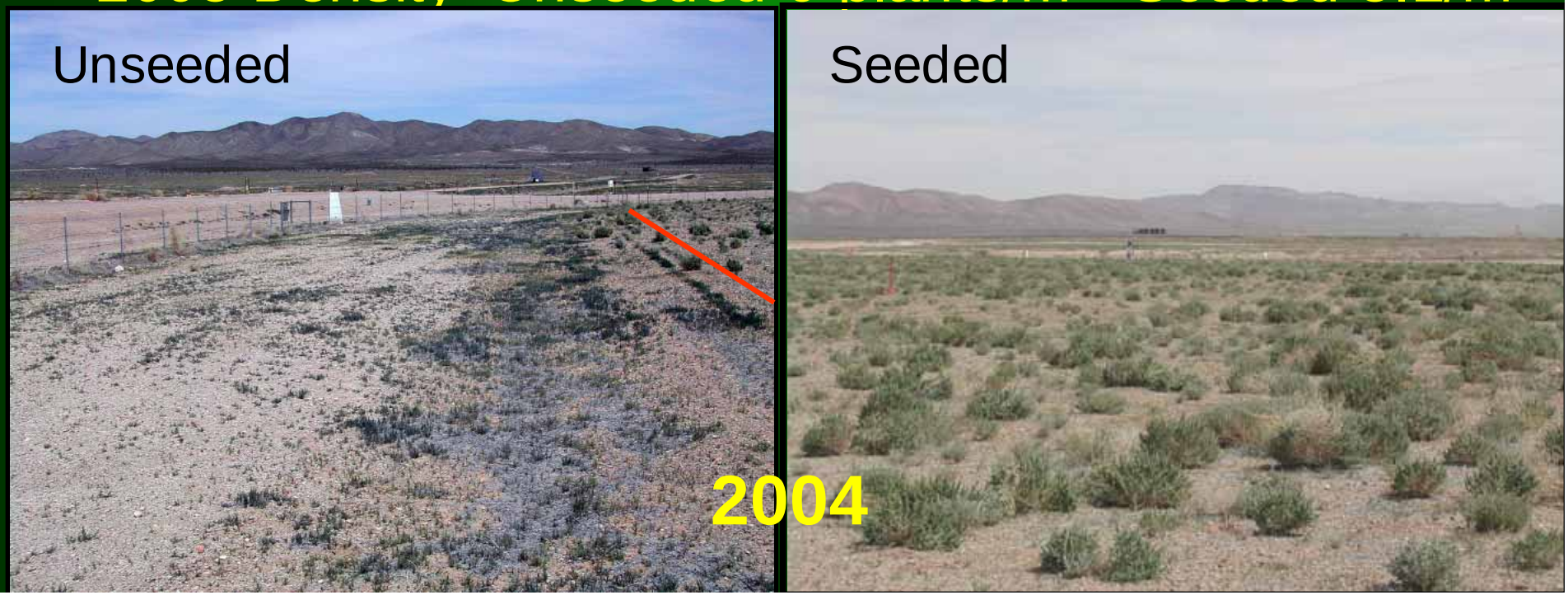
January 2002

Test Plots - YMP JF-3 Drill pad

January 2002

Demonstration - NTS Uaxbl cover cap

- Subsoil cap - sterile
- Seeded with 12 species native to area in 2000
- Irrigated 4.9 inches first spring
- 2005 Cover Unseeded 0% Seeded 16.8%
- 2005 Density Unseeded 0 plants/m^2 Seeded 5.1/m^2

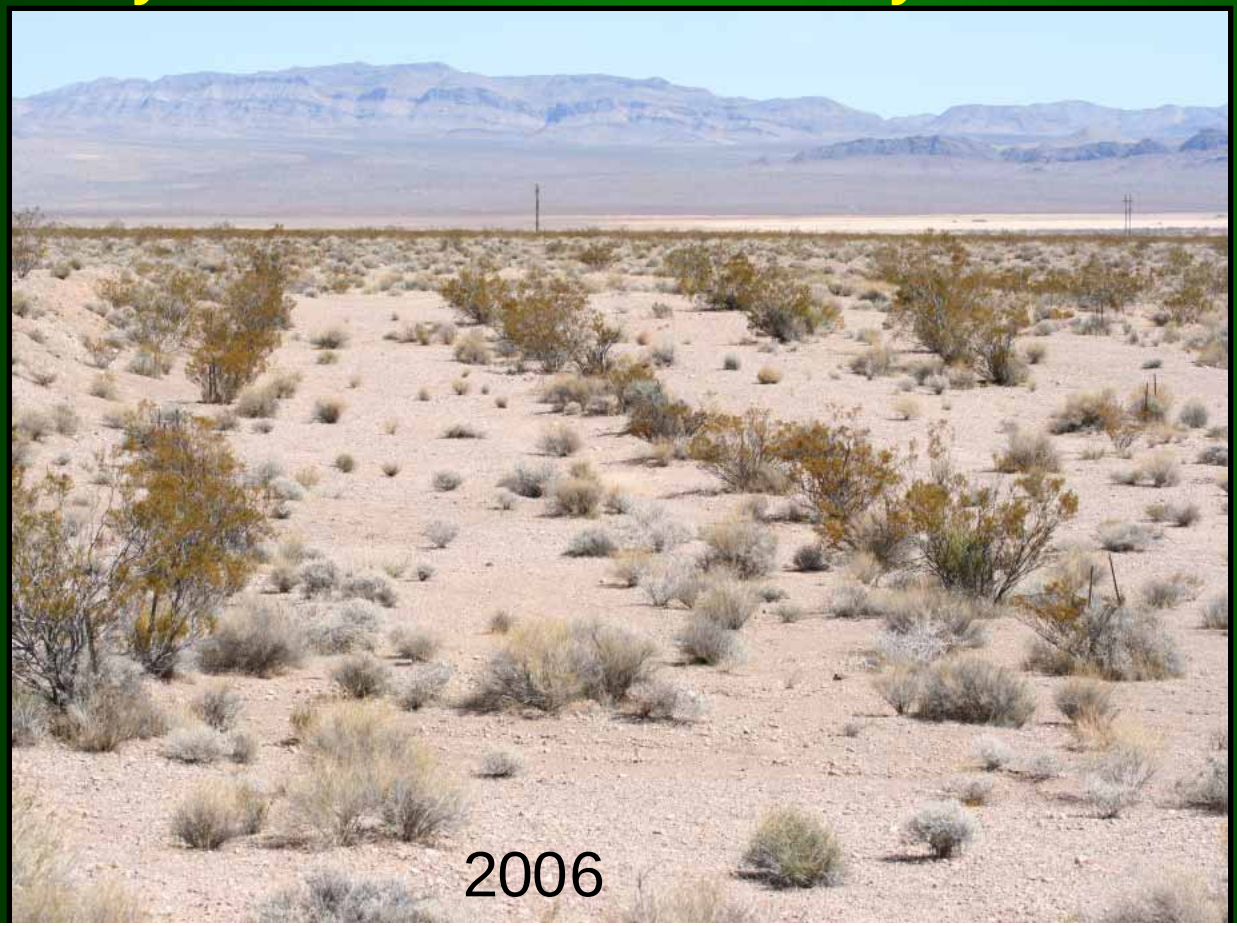


Double Tracks

- Removed top 2-6 inches of topsoil
- Seeded with 15 species native to area in 1996
- Irrigated 4.4 inches first spring
- Density 1997 = 0.81 plants/ft^2
- Density 1998 = 0.64 plants/ft^2 (Undisturbed = 0.21)

Test Plots - NTS Frenchman Flats

- UCLA plots – Dr. Van Romney
- Transplants with 5 species native to area - 1981
- Irrigated by hand as needed first year



2006

Test plots - Fort Irwin

Drinkwater
Seeded, mulched, irrigated
May 2000 density = 6.4 plants/m^2

December 1999

March 2002

Test plots
Fort Irwin

Langford
Seeded, mulched, irrigated
May 2000 density = 0.37 plants/m^2
No Larrea or Ambrosia

May 2001

Test Plots - Fort Irwin

2001 test plots
Treated seed, mulches, seeding dates
irrigated

April 2001

July 2001

Demonstration Area - Fort Irwin

Spring 2002 Ammo Supply Road

One Ugly Site

Fort Irwin

Ripped to relieve compaction

Fort Irwin

Treated seed

Broadcast seeded and harrowed

Fort Irwin

Minimal irrigation

Fort Irwin

November 2002

Fort Irwin

November 2004

Fort Irwin

March 2002

Fort Irwin

November 2004

Fort Irwin

March 2002

November 2004

Conclusions

You can successfully reclaim disturbances in the Mojave Desert but it takes:

- **Knowledge (assessments, test plots)**
- **Skill - Equipment**
- **Time**
- **Money**

Questions