

Bridging the Gaps Between Policy, Practice, and Science

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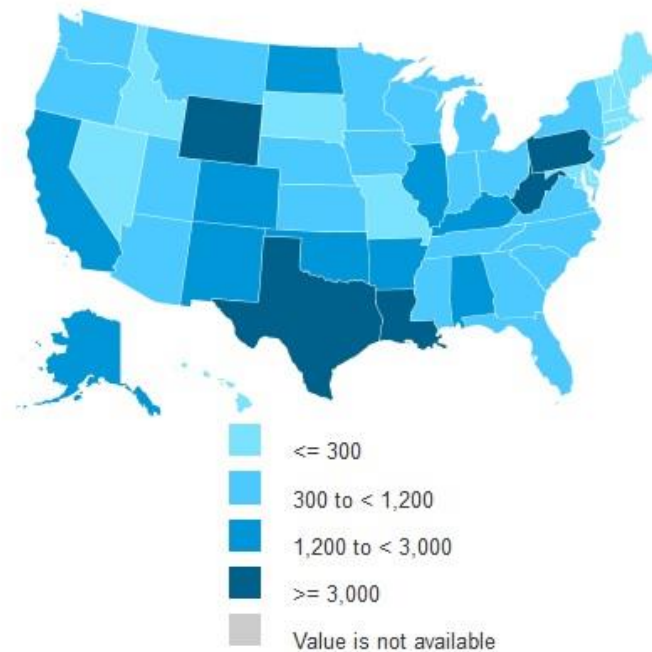


Energy Production by State

Rankings: Total Energy Production, 2010 (Trillion Btu)

 [Download Table Data as CSV](#)

Rank 	State 	Total Energy Production (Trillion Btu)	
1	Texas	11,408	<div></div>
2	Wyoming	10,533	<div></div>
3	West Virginia	3,674	<div></div>
4	Louisiana	3,197	<div></div>
5	Pennsylvania	3,051	<div></div>
6	Kentucky	2,779	<div></div>
7	Colorado	2,560	<div></div>
8	Oklahoma	2,546	<div></div>
9	California	2,525	<div></div>
10	New Mexico	2,258	<div></div>
11	Illinois	2,085	<div></div>
12	Alaska	1,743	<div></div>



Additional State Rankings

Consumption

Production

Natural Resource Production in Wyoming

- Ranked #1 producer of the following natural resources:
 - Coal
 - Uranium
 - Bentonite
 - Trona
- Other significant natural resources in WY:
 - #2 producer of natural gas
 - 36.75 Trillion Cubic tons of known, recoverable natural gas
 - Wamsutter – largest on-shore production field in North America
 - #7 producer of petroleum
 - Top 15 in wind production, with most potential
 - Rare earth metals
 - Lithium

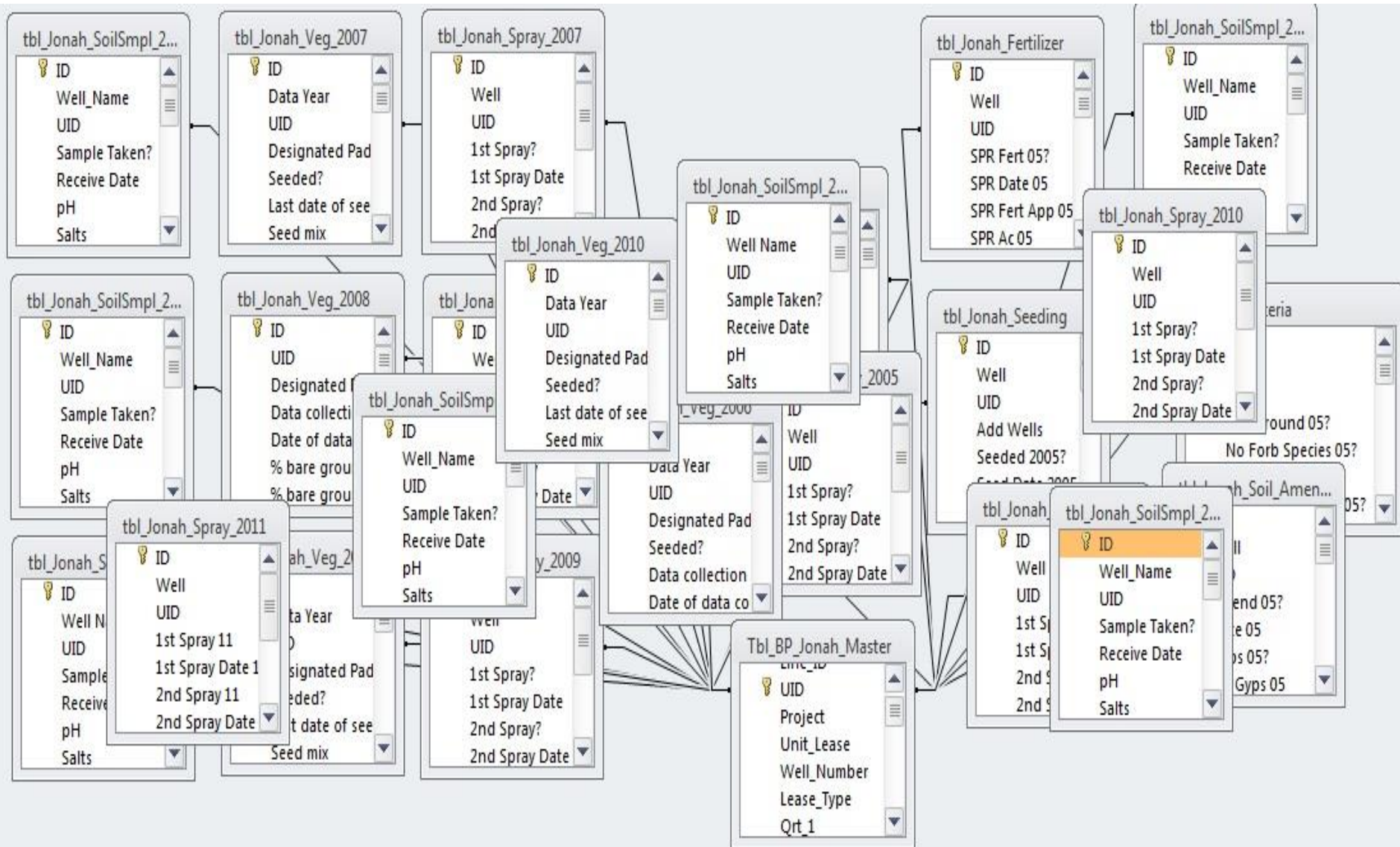
Bridger Coal Mine



Jonah Infill Natural Gas Field



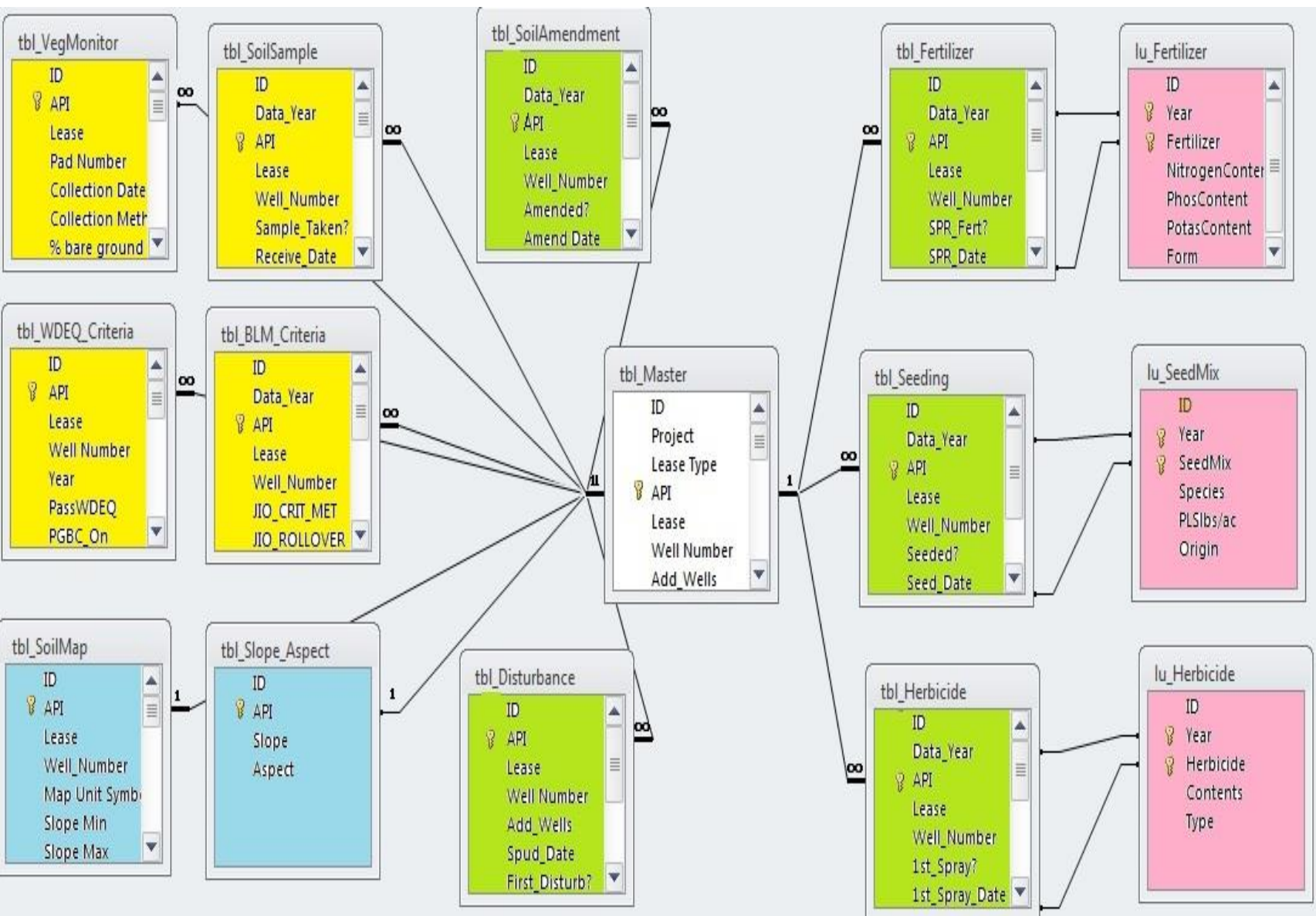
Where we were

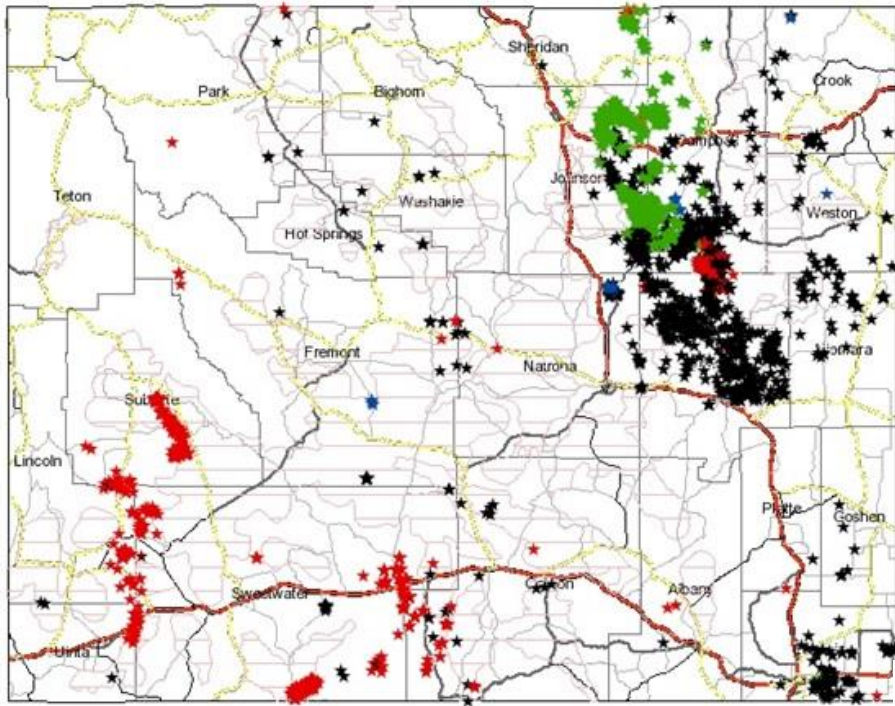


Project Management

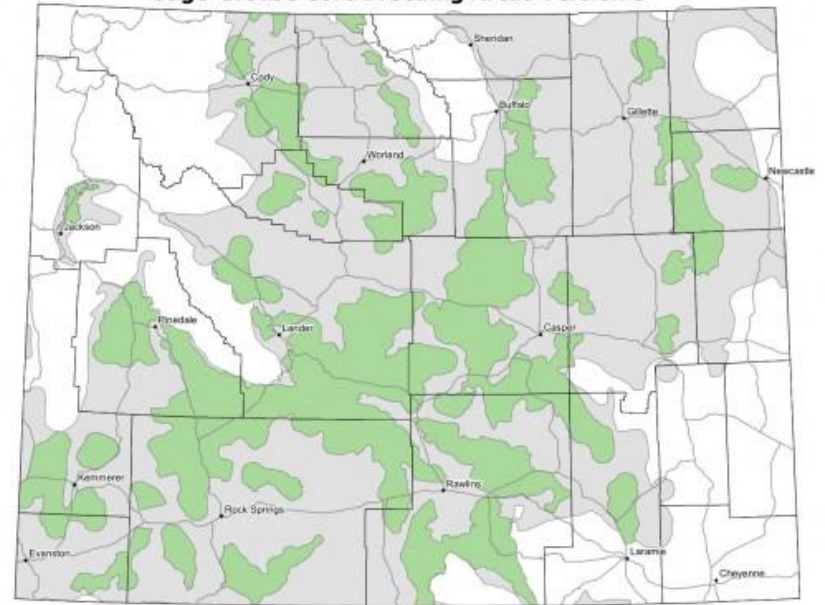
- “Today, everyone seems concerned about information overload. Unfortunately, the real issue is non-information overload. In other words, there are too many useless reports that cannot easily be read and that provide readers with too much information, much of which may have no relevance... it simply distracts us from the real issues” (Kerzner 2013)

Where we are





Sage-Grouse Core Breeding Areas Version 3




 Nyssa Whitford
 Sage-Grouse GIS Analyst
 Lander Regional Office
 06.30.10

0 15 30 60 90 120 Miles
 Core Areas shown were updated from the version two core areas. The version three core areas were updated under the direction of the Governor by the Sage-Grouse Local Working Group and the Sage-Grouse Implementation Team. The version 3 core areas were finalized on 06.25.10.

• Cities
 — Roads
 — Counties
 ■ Core Areas Version 3
 ■ Current Sage-Grouse Distribution

Project Management

- “The 3 most important words in a stakeholder’s vocabulary are: ‘Making Informed Decisions’.... You cannot correct something that cannot be effectively measured or identified”. (Kerzner 2013)

Monitoring in Jonah Infill

- 2006 – CSR randomly placed five 1 m² frames on well pads and adjacent reference areas for vegetation measurements (most between June 5 and June 8)
- 2007 – CSR randomly placed five 1 m² frames on well pad and adjacent reference areas for vegetation measurements (all between July 11 and July 19)
- 2008 – CSR placed a 1 m² frame 10 times along a 50 m transect on well pads and adjacent reference areas for vegetation measurements (in accordance with BLM tech. notice 1734-4) (most between June 11 and June 14)
- 2009 – CSR placed a 1 m² frame 10 times over a 50 m transect on well pads and adjacent reference areas for vegetation measurements (in accordance with BLM tech. notice 1734-4) (most between July 13 and July 17)
- 2010 – CSR used either one 100 m or two 50 m transects and recorded basal ground cover at 200 points (in accordance with BLM tech. notice 1734-4) (all between June 1 and June 7)
- 2011 – CSR used either one 100 m or two 50 m transects and recorded basal ground cover at 200 points (in accordance with BLM tech. notice 1734-4) (all between July 6 and July 10)
- **There is no evidence that the same locations on pads or reference sites were monitored between years when the same method was used.

134 caterpillars

Quantitative Vegetation Measures:

Plot	Density		On-Site Cover Class Value									Density		Reference-Site Cover Class Value									
	Shrub	Forb	Shrub	Forb	Grass	Weeds	Litter	BSC	Rock	Bare	Grd	Shrub	Forb	Shrub	Forb	Grass	Weeds	Litter	BSC	Rock	Bare	Ground	
1	0	0	0	0	2	0	2	0	1	2	2	5	3	1	2	0	3	1	0	3			
2	0	0	0	0	3	1	2	0	2	2	6	3	5	1	2	0	3	2	0	1			
3	0	0	0	0	2	0	2	0	1	3	4	3	5	1	1	0	3	1	1	2			
4	0	0	0	0	3	0	3	0	1	2	3	1	2	1	2	0	1	1	3	2			
5	0	0	0	0	3	1	2	0	1	3	3	3	3	1	1	0	2	1	1	3			
6	0	0	0	0	2	1	3	0	1	2	3	4	3	2	2	0	2	1	1	2			
7	1	0	1	0	3	0	3	0	2	2	2	2	4	1	2	0	3	1	1	1			
8	0	0	0	0	3	0	3	0	1	2	10 ⁺	3	3	1	2	0	2	1	3	1			
9	0	0	0	0	4	0	2	0	1	2	2	1	2	2	2	0	2	1	2	1			
10	0	0	0	0	3	0	2	0	1	3	4	5	3	1	1	0	2	3	2	0			

Reference Site Description: circle all species present, mark "D" next to dominant species

Shrubs:	Grasses:	Forbs:	Land Attributes:
A.t. wyomingensis D	Achnatherum hymenoides	Phlox hoodii D	Rolling hills
A.t. tridentata	Agropyron cristatum	Stenotus armerioides	Steep slopes
A. arbuscula/nova	Elymus elymoides D	Xylorrhiza glabriuscula	Riparian/wetland
Ericameria nauseosa	Elymus lanceolatus	Castilleja linariifolia	Meadow
Sarcobatus vermiculatus	Elymus smithii	Eriogonum caespitosum/ovalifolium/umbellatum	Rock/shale outcrops
Atriplex gardneri	Elymus trachycaulus	Cymopterus bulbosus	Gullies
Atriplex confertifolia	Hesperostipa comata	Allium sp.	<3% slopes (flat)
Grayia spinosa	Leymus cinereus	Lupinus sericeus/argenteus	Playas
Krascheninnikovia lanata	Pleuraphis jamesi	Penstemon arnicola/sp.	Mountain shrub
Picrothamnus desertorum	Poa secunda	Cryptantha sp.	Juniper woodland
Parshia tridentata	Pseudoroegneria spicata	Astragalus sp.	Other
Tetradymia sp.	Carex filifolia	Gutierrezia sarothrae	
Other		Sphaeromeria argentea	
		Other	

Noxious Weed List On-Site:

Bromus tectorum	Cirsium vulgare	Lepidium latifolium
Cardaria draba	Descurainia sophia	Ranunculus testiculatus
Carduus nutans	Halogeton glomeratus	Salsola kali
Centaurea maculosa	Hyoscyamus niger	Tamarix spp.
Cirsium arvense	Isatis tinctoria	Thermopsis montana

Quantitative Vegetation Measures:

06/04/08 ZP

tative Vegetation Measures:											Reference-Site Cover Class Value											Ground
On-Site Cover Class Value											Density											
Density		On-Site Cover Class Value									Density		Reference-Site Cover Class Value									
Shrub	Forb	Shrub	Forb	Grass	Weeds	Litter	BSC	Rock	Bare	Grd	Shrub	Forb	Shrub	Forb	Grass	Weeds	Litter	BSC	Rock			
0	0	0	0	4	1	2	0	1	3		5	10	2	2	2	0	2	1	2			
0	0	0	0	3	1	2	0	1	3		1	4	3	1	3	0	4	2	1			
0	0	0	0	3	0	3	0	1	3		2	6	4	2	3	0	4	2	1			
0	0	0	0	3	0	3	0	1	3		3	3	3	1	3	0	5	2	0			
0	0	0	0	3	1	3	0	1	3		0	10	0	2	4	0	3	0	1			
0	0	0	0	4	0	5	0	0	2		1	10	4	2	3	0	4	2	1			
0	0	0	0	4	0	4	0	1	2		2	10	1	2	4	0	3	0	2			
0	0	0	0	3	0	4	0	1	2		4	4	4	1	4	0	4	0	0			
0	0	0	0	3	0	3	0	0	2		2	10	3	2	3	0	4	1	2			
0	0	0	0	4	0	3	0	1	3		5	10	2	2	3	0	4	1	1			

Conditions:

Pipeline Comments:

Pipeline Conditions:

Seed Germination Apparent	Y N	Noxious Weeds Present	Y N
ash Present	Y N	Vegetative Reproduction Apparent	Y N
vis Stable	Y N	Grazing	Low Med High
Feeds Under Control	Y N		

Pipeline Comments:

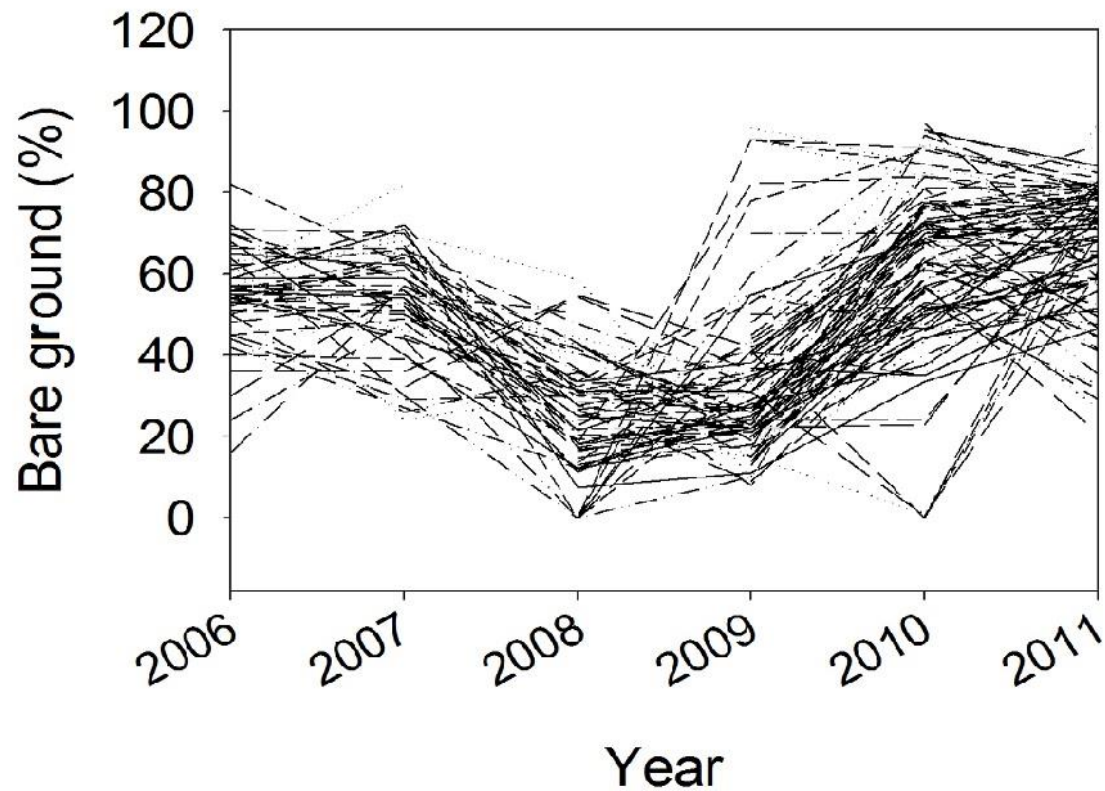
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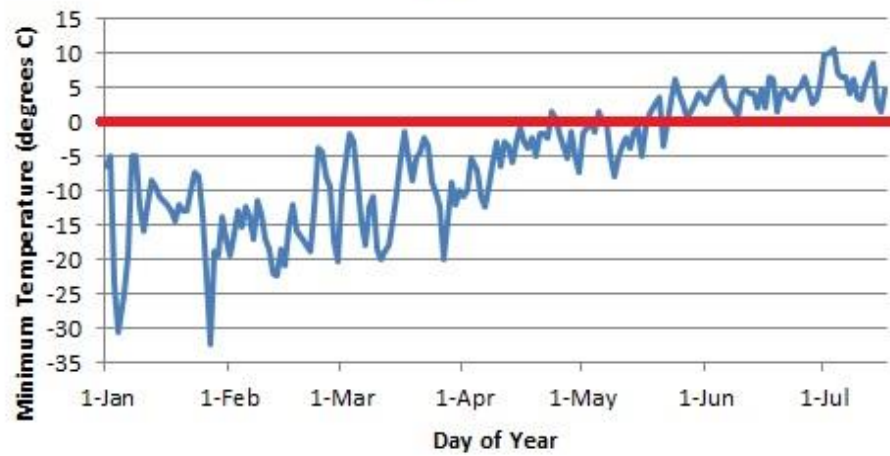
Bare ground Percent in Jonah



Project Management

- Critical questions:
 - What to measure?
 - When to measure?
 - How to measure?
 - Who will measure?
 - How to report information?

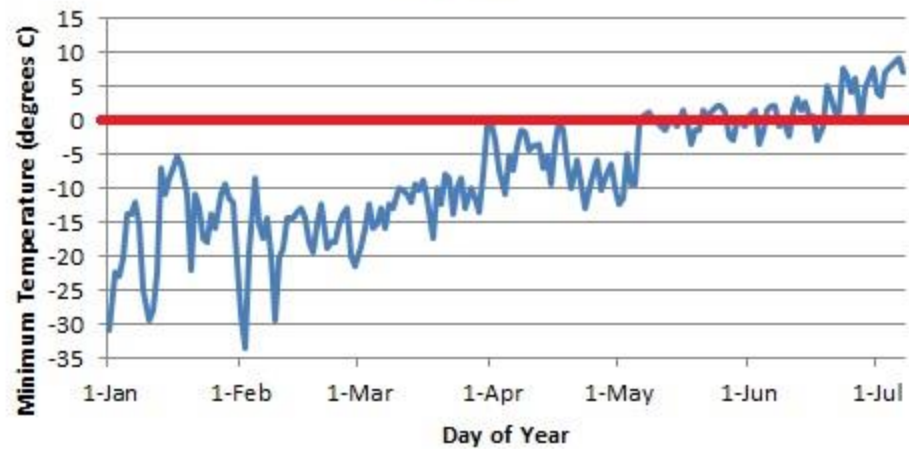
2009



2010



2011



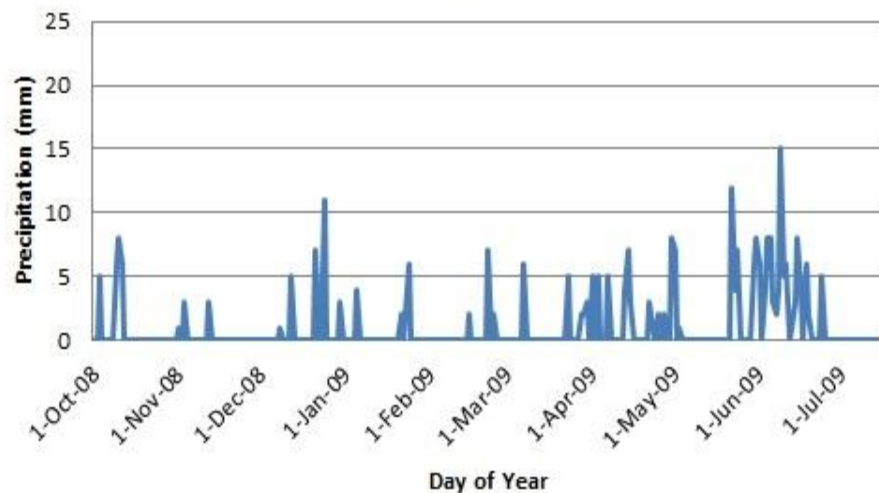
Mean Collection Dates:

2009 – July 16

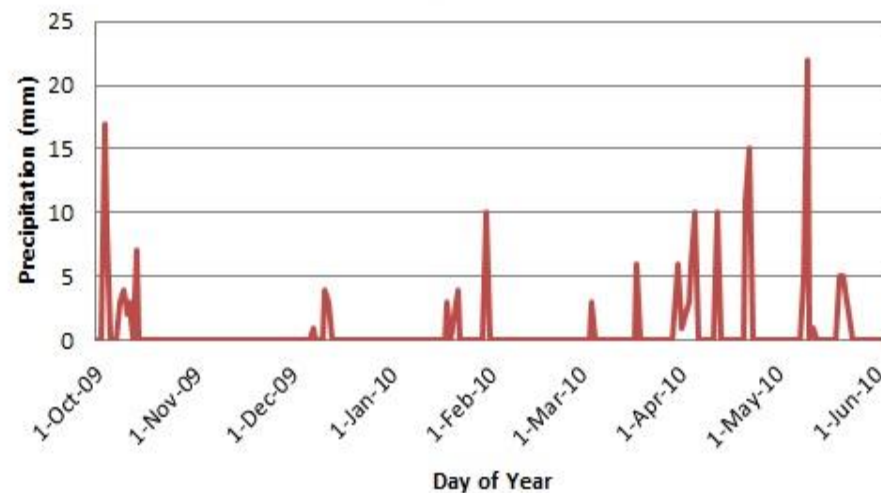
2010 – June 4

2011 – July 7

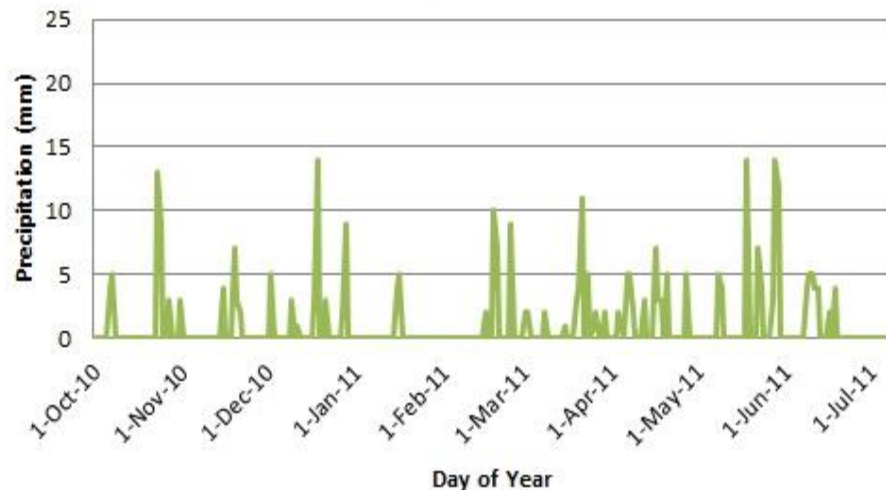
2009



2010



2011



Mean Collection Dates:

2009 – July 16 – 282 mm (11.1 inches)

2010 – June 4 – 193 mm (7.6 inches)

2011 – July 7 – 297 mm (11.7 inches)

Project Management

- “Governance structure should be expected to change as the environment changes and people in decision roles change.... Because of all these changes, the final target of a complex project will most likely be moving, so the project plan must be constructed to hit a moving target” (Kerzner 2013)



2013 Reclamation Requirements

Field Office	Percent Cover	Erosion Control/Soil Stability **	Weeds **	Grass Richness* *	Forb Richness	Forb Density Or Frequency	Shrub Richness	Shrub Density or frequency	Plant Vigor **
Jonah Interagency Office	Greater than or equal to reference site	Site must be stable according to BLM Tech Note 346	No noxious weeds or highly competitive Invasives	At least 2 bunch grass species and 3 total species	Equal or greater than reference	At least 75% of reference	Equal to or greater than reference	At least 50% of reference with no more than 10% rabbitbrush	Plants must be resilient as displayed by root system, flowers, and seed heads
Pinedale Anticline Project Office	Plant community sufficient to minimize visual impacts, provide habitat and forage, impede noxious weed invasion	Plant community must stabilize soils	No state or federally listed noxious weeds. Active treatment in place for weedy bromes	At least 2 bunch grass species and 3 total species	Equal to or greater than reference within 5 years	At least 75% of reference within 5 years	Equal to or greater than reference within 5 years	At least 50% of reference within 5 years	Plants must be resilient as above. Removal of external influences required for at least 1 year
Kemmerer BLM	Greater than or equal to 80% of reference site	Disturbed areas are immediately stabilized by mulching	Less than or equal to 10% of total vegetative cover						
Rawlins BLM	Greater than or equal to 80% of reference site	Erosion features equal to or less than reference	No noxious weeds						
WDEQ	Greater than or equal to 70% of reference	Grass must extend to any active roadway unless permanent anchor in place							

Kemmerer BLM vs. JIO

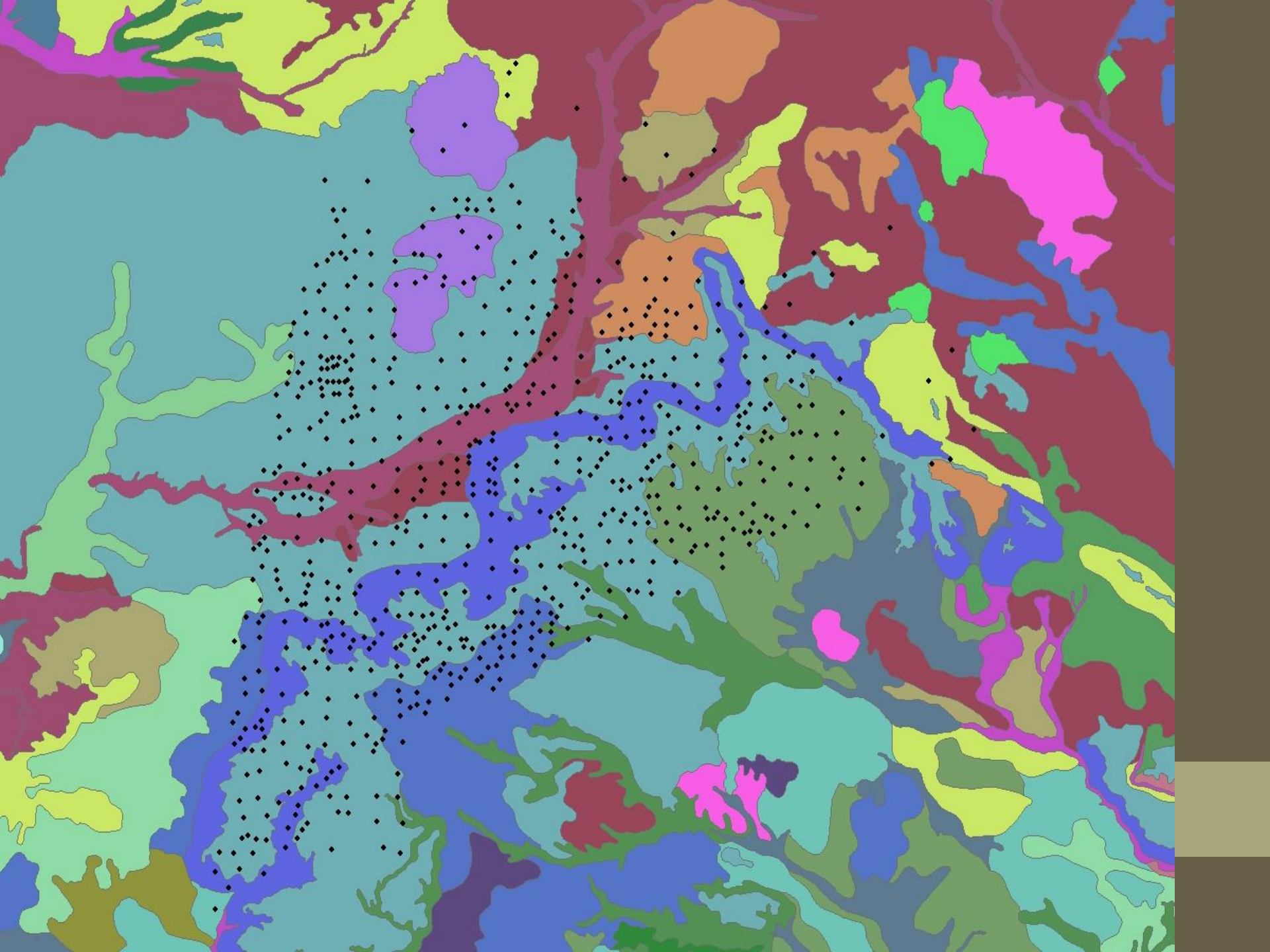
- Jonah 2011 (102 sites monitored with 200 basal points recorded on one 100 m or two 50 m transects to represent well pad and reference site between July 6 and July 10):
 - 67 Sites pass WDEQ SWPPP Criteria (65.7%)
 - 0 Sites pass every JIO Interim Criteria (0%)
- Moxa 2011 (619 sites monitored with ten 1 m² frames placed across a 50 m transect to represent well pad and reference site – 254 sites monitored between June 7 and June 14, 365 well pads monitored between June 21 and June 28):
 - 338 Sites pass WDEQ SWPPP Criteria (54.6%)
 - 312 Sites pass Moxa ROD Interim Reclamation Criteria (50.4%)
- Cross-Query Results 2011:
 - 63 Jonah Sites pass Moxa ROD Interim Criteria (61.8%)
 - 0 Moxa Sites pass every JIO Interim Criteria
 - No species richness measurements taken
 - 82 sites pass forb density requirement (43 reference sites had 0 forbs)
 - 53 sites pass shrub density requirement (22 reference sites had 0 shrubs)
 - 82 sites pass percent ground cover requirement
 - 215 sites pass weed requirement
 - 0 sites pass all 4 of these categories simultaneously

Problems with Reference Sites

- Using NRCS Soil Map we found in one map unit in one year:
 - Forbs
 - Diversity ranged from 1-7 forbs on reference sites
 - Average was 2.57 forbs per site
 - Percent Bareground Cover
 - Ranged from 11% - 48%
 - Average was 30.56%
 - Large variations across other vegetation measurement categories
- Binary criteria may be questionable when using only one transect to define a reference site

Ecological Site Descriptions

- 2005 – Memorandum of Understanding between NRCS, BLM, USFS to use ESD's as a management tool
 - “Ecological Sites provide a consistent framework for classifying and describing rangeland and forestland soils and vegetation; thereby delineating land units that share similar capabilities to respond to management activities or disturbance”



Reference Sites

Soil Map Unit	Reference Transects per Map Unit	Percent Bare ground Range	Percent Bare ground Average	Percent Bare ground Standard Deviation	Forb Richness Range	Forb Richness Average	Forb Richness Standard Deviation
5203	53	35-80 %	59.2 %	12.56	1-7	3.35	2.09
2205	4	51-73 %	63 %	9.32	2-5	3	1.41
5332	18	66-83 %	78.2 %	5.82	0-8	4.4	2.66
5504	5	49-75 %	57.8 %	11.58	3-9	6	2.45

Map

Aerial

Terrain



300ft



DANGER

NO SMOKING,
MATCHES OR
OPEN FLAMES
BEYOND THIS POINT

In Case of Emergency
Call 24 Hour Toll-Free#

1-877-365-7038



LINN OPERATING, INC.

CABRITO 06-30 MULTI-WELL PAD

FEDERAL LEASE NO. WYW-102717

WELL 03-30A SE/4 NW/4 SEC. 30, T29N-R107W

WELL 06-30 SE/4 NW/4 SEC. 30, T29N-R107W

WELL 06-30A SE/4 NW/4 SEC. 30, T29N-R107W

SUBLETTE COUNTY, WYOMING

CAUTION

Corrosion Cathodic
Protection Connection
LTO Procedures Apply

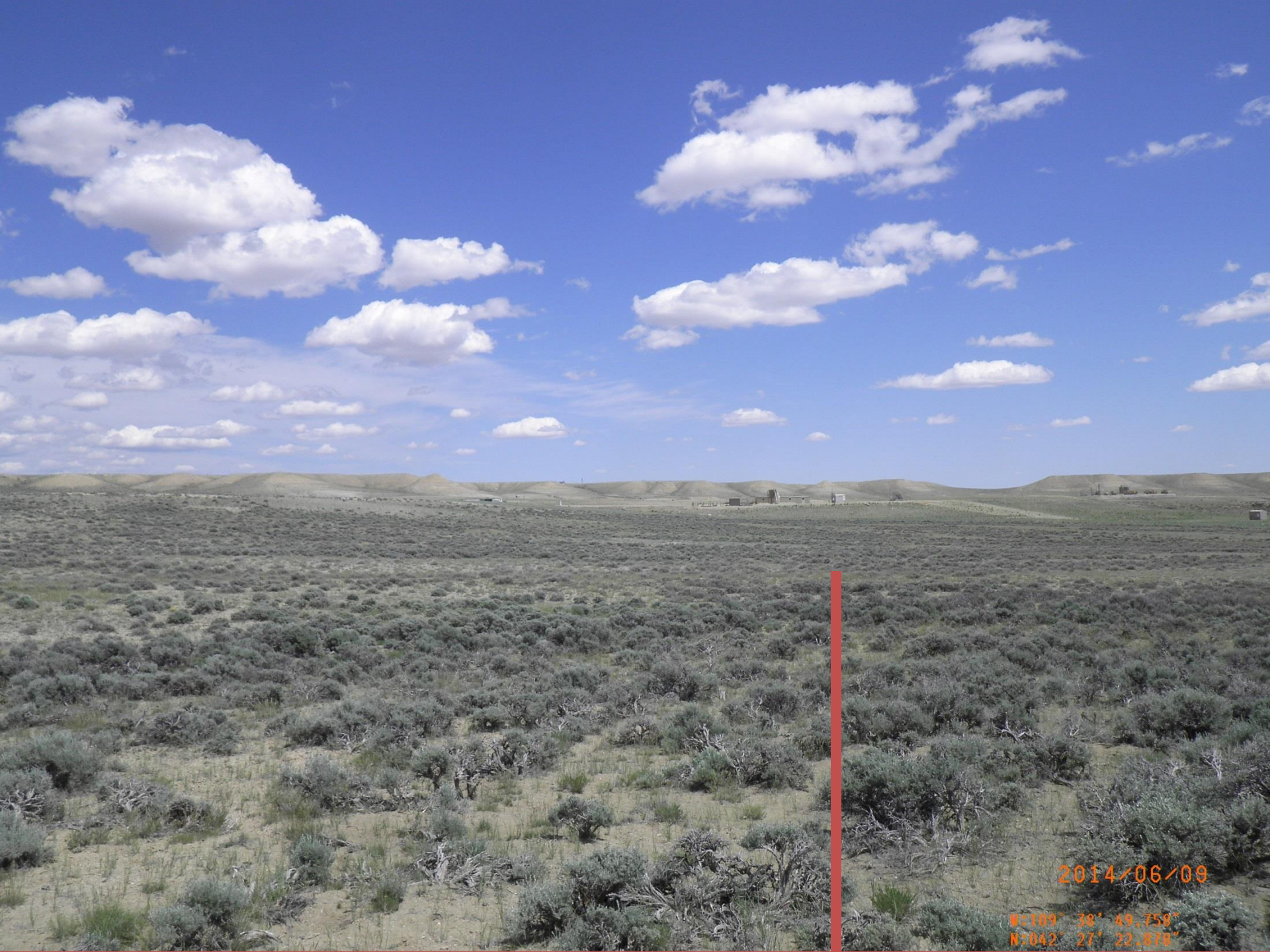


UNIT OPERATOR

LINN OPERATING, INC.

UNIT # WYW 138889L

2014/06/09



2014/06/09

N1109° 38' 49.758"
N7042° 27' 22.878"



2014/06/09

W: 109° 38' 49.188"
N: 042° 27' 22.926"



2014/06/09

W:109° 38' 48.474"
N:042° 27' 22.212"



2014/06/09

N:109° 35' 47.79"
W:043° 27' 21.738"



2014/06/09

W:109° 38' 48.144"
N:042° 27' 15.30"



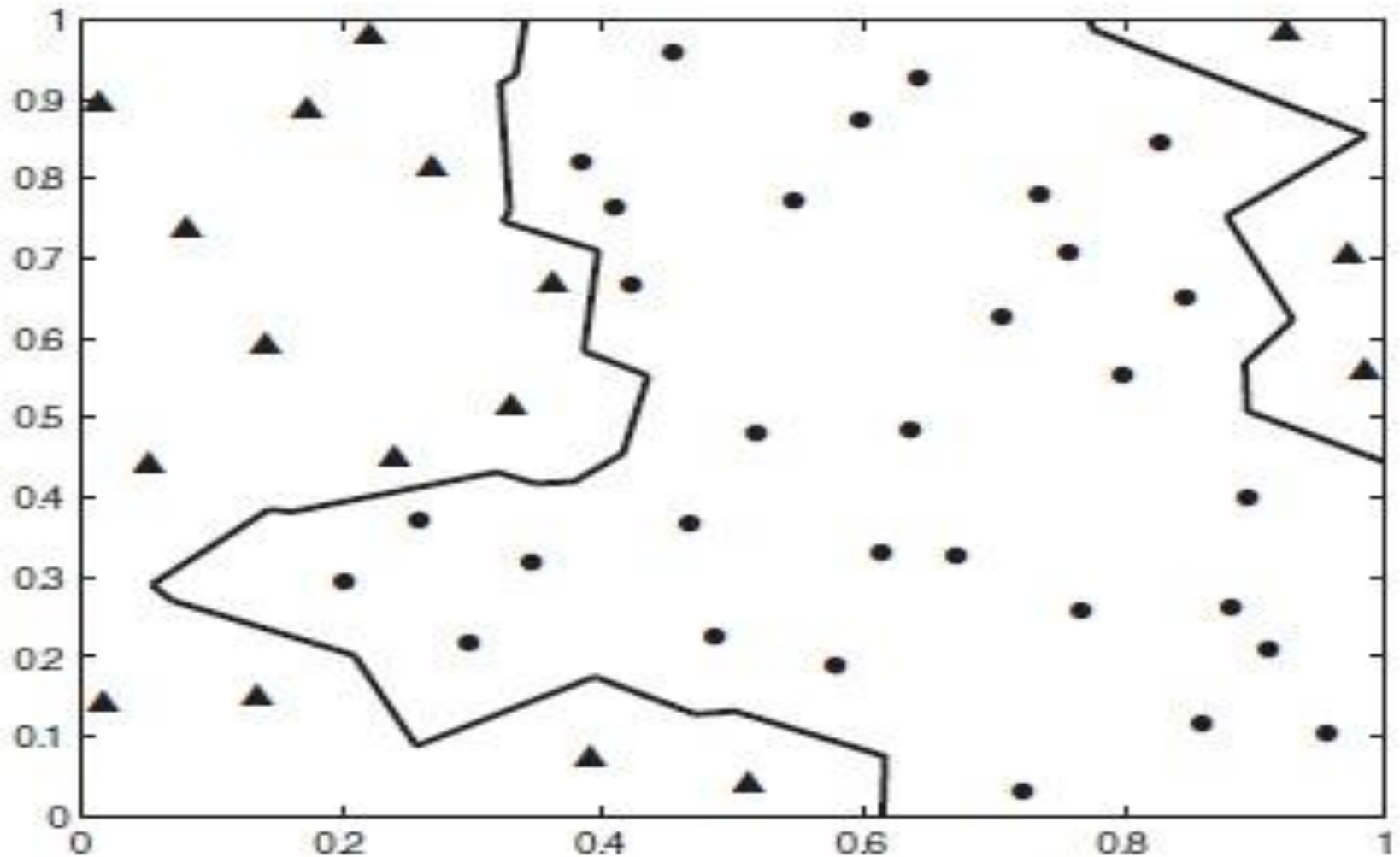
2014/06/09

W:109° 38' 50.118"
N:042° 27' 14.394"

Ecological Site Descriptions

- If we set a standard for success based on ESD's, we can reduce our monitoring timing on reference areas and can trade off by increasing our monitoring on reclaimed sites

Balanced Acceptance Sampling





03/06/2014



2014/06/10

N:109° 38' 50.082"
W:042° 27' 19.164"

Conclusions

- Must improve our monitoring to evaluate our success
- Correct metrics allow us to be proactive rather than reactive
- Incorporate trends into our definitions of success
 - Trends allow us to evaluate resiliency and trajectory
- Indicators of success
 - Results Indicators: Tell us what is accomplished
 - Performance Indicators: Tell us if we are on the right path and can increase our ability to meet objectives
- Be consistent with key performance indicators but allow for flexibility

Questions?



2014/06/10

W:109° 40' 00.834"
N:042° 27' 27.942"