Approaching Oil and Gas Pad Reclamation with a Comprehensive Database: A Framework for the Future

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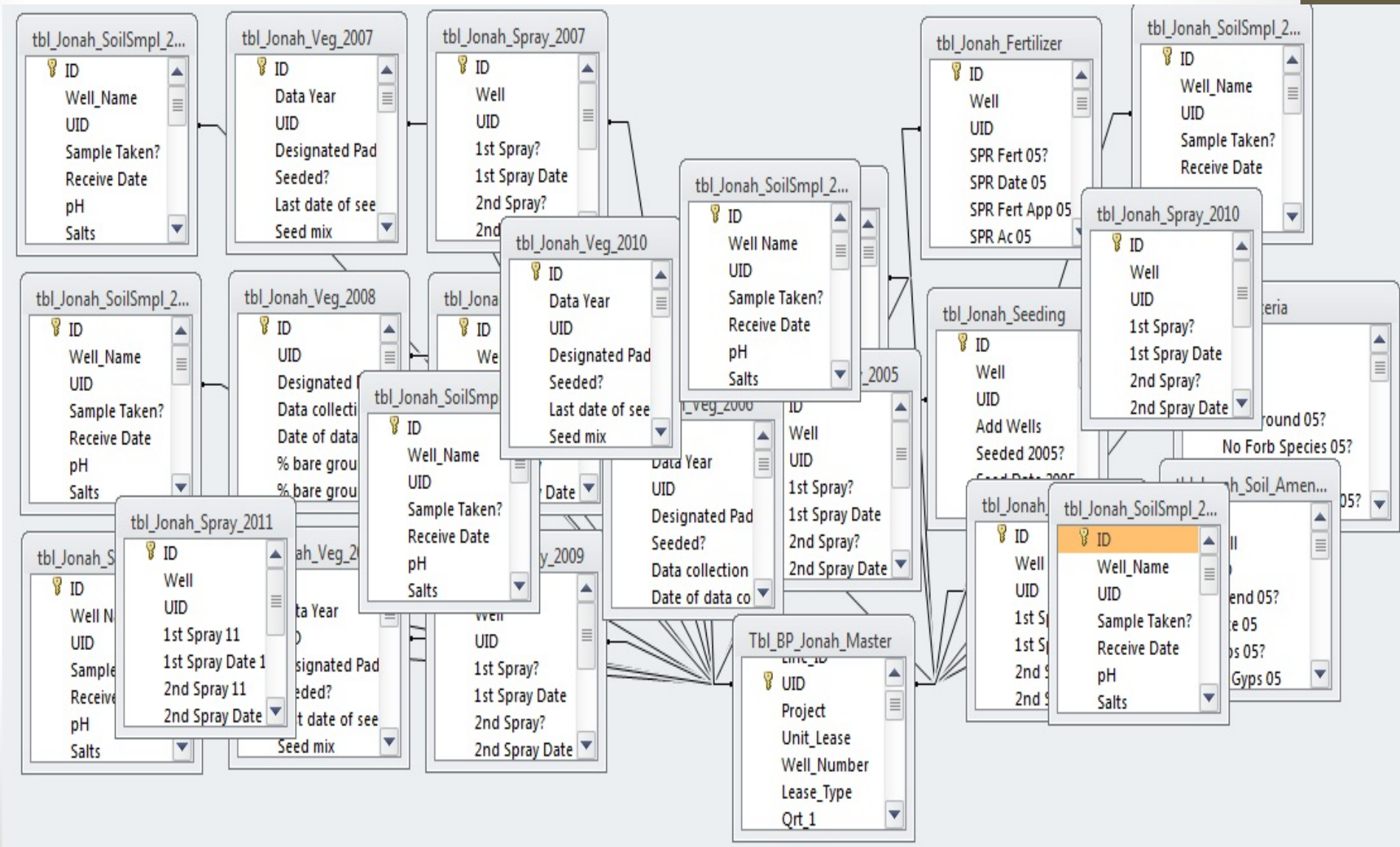
Outline

- How and why this started
- Where this started
- Where we are
- Limitations and how to overcome them
- Where we need to go

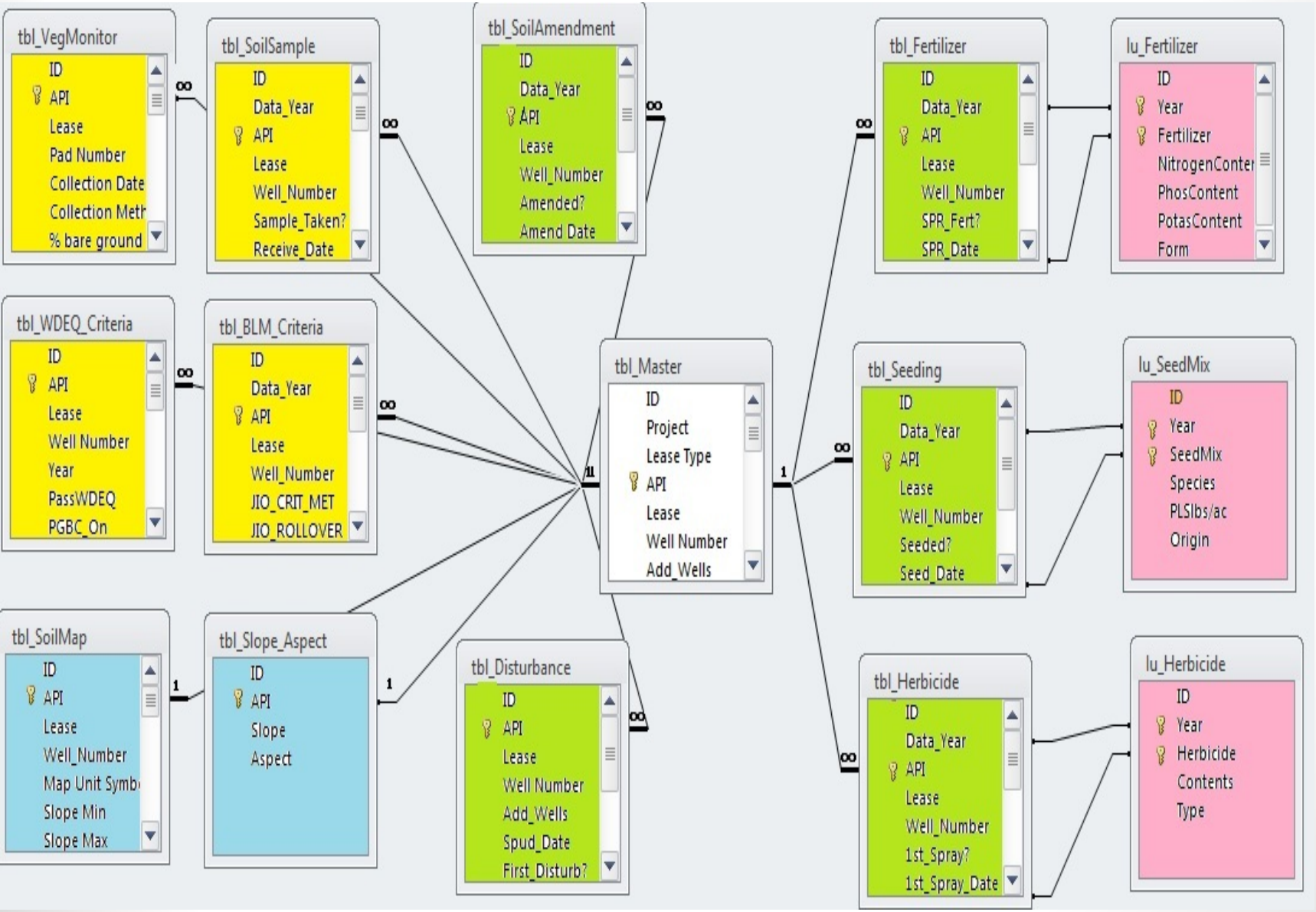
Master's Database Project

- Comprehensive collection of reclamation data
- Improved decision making capability
- Identify long- and short-term reclamation trends and trajectories
- Integrate multiple data sets
- Efficient data analysis and reporting
- Tool for evaluating and developing reclamation standards
- Improve reclamation techniques
- **Timely and sustainable functional ecosystem recovery**

Where we were



Where we are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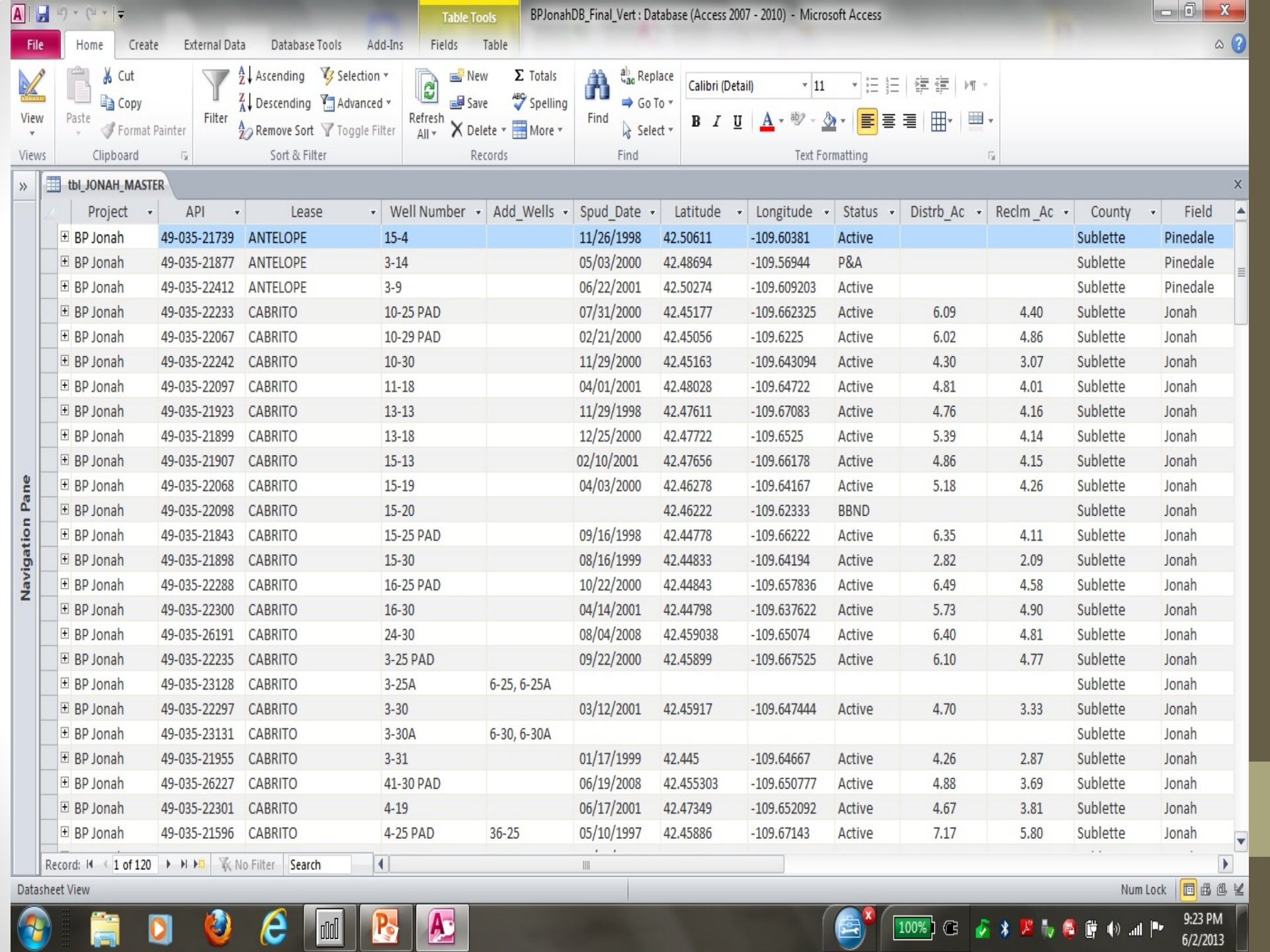
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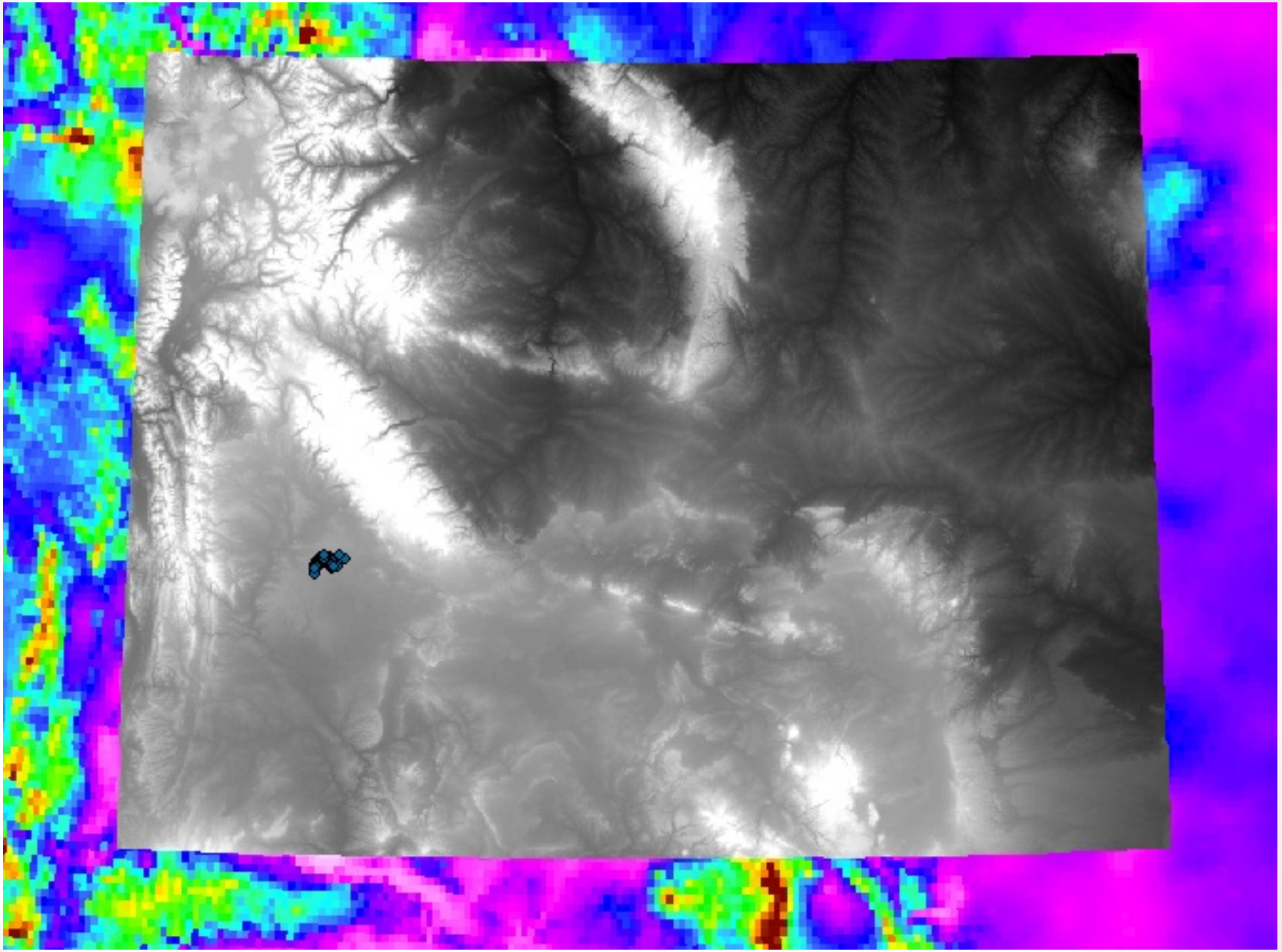

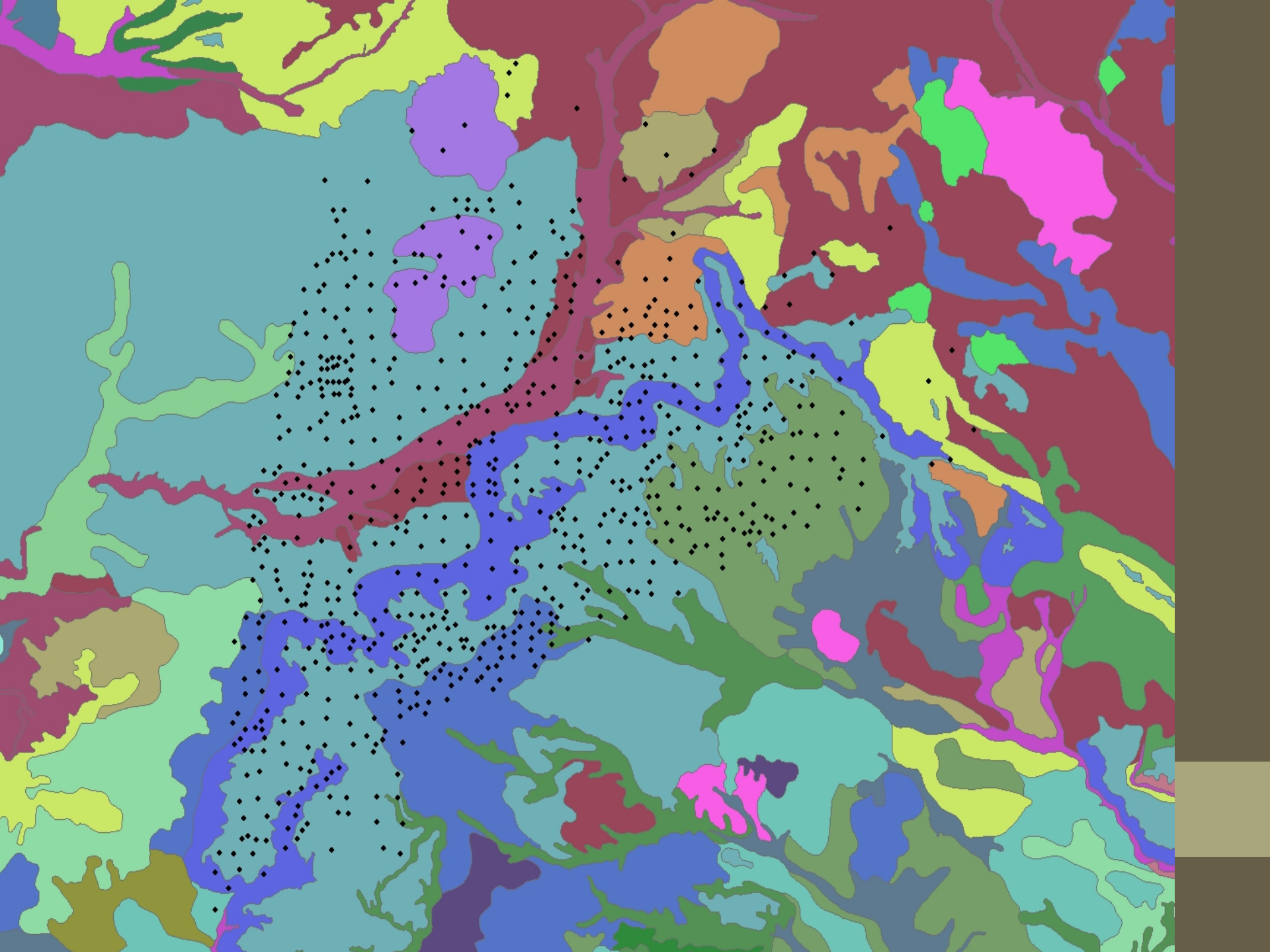

Problems Encountered

- Data analysis
  - Monitoring protocol/procedures vary over years and across agencies and locations
  - Collection Data varies from year to year
  - Monitoring timing changes from year to year
    - Generally, one veg sample per site in a year
  - Regulatory Standards vary across and amongst agencies
  - Reference sites – can be moving targets and can vary greatly in a small area
  - Limited time frame and small amount of treatments (reclamation practices)

Method Variation

Pad	Treatment	Year	PercentBG	Method
Cab5-29	A	2006	48	Ocular
Cab5-29	A	2007	74	Ocular
Cab5-29	A	2008	26.5	Modified daubenmire
Cor11-30	A	2006	57	Ocular
Cor11-30	A	2007	.	
Cor11-30	A	2008	50.5	Modified daubenmire
Cor11-31	A	2006	55	Ocular
Cor11-31	A	2007	74.5	Ocular
Cor11-31	A	2008	41.5	Modified daubenmire
Cor14-30	A	2006	57	Ocular
Cor14-30	A	2007	86	Ocular
Cor14-30	A	2008	58.75	Modified daubenmire
Shb15-15	A	2006	54	Ocular
Shb15-15	A	2007	84	Ocular
Shb15-15	A	2008	31.25	Modified daubenmire
Shb15-17	A	2006	54	Ocular
Shb15-17	A	2007	.	
Shb15-17	A	2008	44.25	Modified daubenmire
Cab13-13	B	2006	65	Ocular
Cab13-13	B	2007	89	Ocular
Cab13-13	B	2008	21.5	Modified daubenmire

AmocoMiller-01 2009

Monitoring and Analysis

Date Inspected: 7/9/2009

Kemmerer BLM Reclamation Evaluation

On-site Perennial Vegetation % Cover:	30
Off-site Perennial Vegetation % Cover:	45
Ratio Veg. Cover On-site to Off-site:	66
On-site Weed % Cover:	0
Kemmerer BLM Criteria Met:	**No**

Qualitative Data

Trash Present:	No
Undesirable Species Present:	Yes
Noxious Weeds Present:	No
Vegetation Reproduction Apparent:	Yes

Quantitative Data

	On-site	Off-site
Number of Forb Species Present:	1	3
Number of Shrub Species Present:	2	5
Number of Grass Species Present:	1	4
Perennial Grass % Cover:	22	24
Annual Forb % Cover:	2	0
Perennial Forb % Cover:	1	1
Shrub % Cover:	8	20
Annual Weed % Cover:	0	0
Perennial Weed % Cover:	0	0
Litter % Cover:	16	22
BSC % Cover:	2	6
Rock % Cover:	9	5
Bareground % Cover:	33	29

AmocoMiller-01 2010

Monitoring and Analysis

Date Inspected: 8/12/2010

Qualitative Data

Trash Present:	No
Undesirable Species Present:	Yes
Noxious Weeds Present:	No
Vegetation Reproduction Apparent:	No
Severe Grazing:	Yes
Severe Traffic Patterns:	No

Kemmerer BLM Reclamation Evaluation

On-site Perennial Vegetation % Cover:	19
Off-site Perennial Vegetation % Cover:	71

Quantitative Data	On-site	Off-site
Perennial Grass % Cover:	19	71
Perennial Forb % Cover:	0	0
Shrub % Cover:	0	0
Annual Weed % Cover:	30	0
Litter % Cover:	7	21
BSC % Cover:	0	0
Rock % Cover:	2	0
Bareground % Cover:	33	10
Perennial Forb Density (plants/m^2):		
Shrub Density (plants/m^2):	0.0	

UID	Designated	Data collecti	NumberFort	NumberFort	NumberShr	NumberShr	NumberGra	NumberGra	PG_Percent	PG_Percent	PF_Percent	PF_Percent
49-023-20328	Shute Creek 05	7/7/2009	1	3	2	5	4	3	22	3	0	2
49-023-22020	Shute Creek 05	7/11/2009	2	2	0	6	1	3	3		0	
49-023-21966	Shute Creek 05	7/7/2009	0	0	0	7	0	3	0		0	
49-023-20363	Shute Creek 06	7/7/2009	1	2	2	3	1	2	5	1	0	1
49-023-20424	Shute Creek 08	7/7/2009	3	3	2	5	3	3	17	17	1	2
49-023-20413	Shute Creek 09	7/11/2009	3	3	5	7	2	3	33	18	1	1
49-023-20440	Shute Creek 10	7/11/2009	2	0	1	4	1	1	2	1	0	0
49-023-20529	Shute Creek 12	7/11/2009	1	3	3	6	3	3	13	5	0	2
49-023-21797	Shute Creek 13	7/7/2009	0	2	0	4	0	3	0		0	
49-023-20781	Shute Creek 14	7/7/2009	4	2	4	5	3	3	11	15	0	1
49-023-20826	Shute Creek 15	6/11/2009	4	4	1	4	3	2	1		2	
49-023-21943	Shute Creek 15	7/11/2009	1	0	2	3	2	1	1		0	
49-023-20829	Shute Creek 16	7/7/2009	1	2	1	4	2	2	14	2	0	0
49-023-20584	Amoco Miller 1	8/9/2010							14	18	1	1
49-041-20245	Berkley Fed #1	7/29/2010							23	7	2	2
49-041-21279	Blacks Fork 1-3	7/26/2010							10	11	1	1
49-041-21297	Blacks Fork 2-3	7/27/2010							10	12	2	2
49-041-21328	Bruff 614	7/25/2010							6	10	1	1
49-023-20714	Champlin 122 A	8/12/2010							19	7	0	0
49-023-20736	Champlin 122 C	8/5/2010							20	4	1	1
49-023-21148	Champlin 122 C	9/13/2010							40	24	1	1
49-041-20141	Champlin 149 A	7/25/2010							18	10	1	1
49-041-20978	Champlin 149 A	7/25/2010							1	1	0	0
49-041-20980	Champlin 149 A	7/25/2010							4	2	2	2
49-023-21167	Champlin 149 A	8/2/2010							25	6	1	1

Solutions

- Monitoring
  - Consistent Timing – Currently working with degree day models
  - Consistent Methods
- Use more than one reference site per well pad
  - Median criteria across soil map units?
  - Trends over time on a given well-pad?
- More data will increase our treatment size
  - Allow for comparison between methods in given areas and region wide
- Select sites to be experimental controls
  - Allow us to determine if certain reclamation practices are working better than natural recruitment
- Select sites to be experimental replicates
  - Allow us to determine if certain reclamation practices are working better than other practices over given amount of time
- Unify monitoring protocols, unify our definition of Reclamation Success and Reclamation Success Criteria

Reasons to Expand this Project

- Increase knowledge of reclamation best management practices across the region
- Provide a central source for reclamation records and data
- Improve data analysis
- Help guide future regulatory decisions
- USFWS – Endangered Species Act (Sage grouse)
- USFWS is looking for a comprehensive, industry-wide, region-wide report on reclamation
  - Quantitative and verifiable
    - How many acres are disturbed,?
    - How many are being reclaimed?
    - What is the status of reclamation?

Listing Factors

A. Present or threatened destruction, modification, or curtailment of habitat or range

B. Overuse for commercial, recreational, scientific or educational purposes

C. Disease or predation

D. Inadequacy of existing regulatory mechanisms

E. Other natural or manmade factors affecting the species continued existence

Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) - Endangered Species Act

"Do we have a high level of certainty that the resources necessary to carry out the conservation effort are available? Do the parties to the conservation effort have the authority to carry it out? Are the regulatory or procedural mechanisms in place to carry out the efforts? And is there a schedule for completing and evaluating the efforts?"

"….Does the effort include quantifiable performance measures to monitor for both compliance and effectiveness?"

"Last-minute agreements (i.e., those that are developed just before or after a species is proposed for listing) often have little chance of affecting the outcome of a listing decision."

"Through PECE, we will evaluate, at the time of our listing decision, whether a formalized conservation effort adequately reduces threats and improves the status of the species to make listing unneccessary."

"…there is a conservation incentive because, if a species becomes listed, these efforts can contribute to recovery and eventual delisting or downlisting of the species"

Moving forward

- Proactive vs. Reactive
  - The need for additional data from additional operators in a larger area is driven (at least partially) by a reaction to the fear of the listing of the sage grouse
  - Understanding what practices work best in different regions will allow us to be proactive in the future
    - No more reinventing the wheel: save time, save money, inform decision making!
- Form systems can be used to aid operators, consulting firms, monitoring companies, regulatory agencies and scientific community
- Our current database framework has been dictated by data that has been provided
  - We are fully aware that different operators have datasets in very different formats
  - As soon as we receive data from other operators, there will be a thorough and thoughtful evaluation of the strengths and weaknesses of each dataset, which will aid us in developing a form system that is suitable industry-wide in our region (PAW 2013 – December Reclamation Conference)
  - Switch from Access to SQL due to 2GB limitation of Access

Example of Form

Acknowledgements

- BP
- CSR, Inc.
- WRRC
  - BP, Shell, Chesapeake Energy
- University of Wyoming
- Petroleum Association of Wyoming
- State of Wyoming
- NRCS
- USGS – JIDMS
- WOGCC
- BLM
- WDEQ
- WyGISC
- Companies who have agreed to share data moving forward: QEP, Chesepeake Energy, Linn Energy, Noble Energy, Chevron, ConocoPhillips

- Pete Stahl
- Gary Austin
- Steve Paulsen
- Michael Clancy
- Dave Brown
- Esther Wagner
- Doug Roehrkasse
- Steve Williams
- Brian Mealor
- Jeff Hammerlinck
- George Vance
- Shannon Albeke
- Tim Robinson
- David Legg

Questions?

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- unclem@uwyo.edu (Peter Stahl, Director – Wyoming Reclamation and Restoration Center)