

MESA SAGEBRUSH FERTILIZATION PROJECTS

Theresa Gulbrandson
BLM – Wildlife Biologist



BLM
Pinedale Field Office

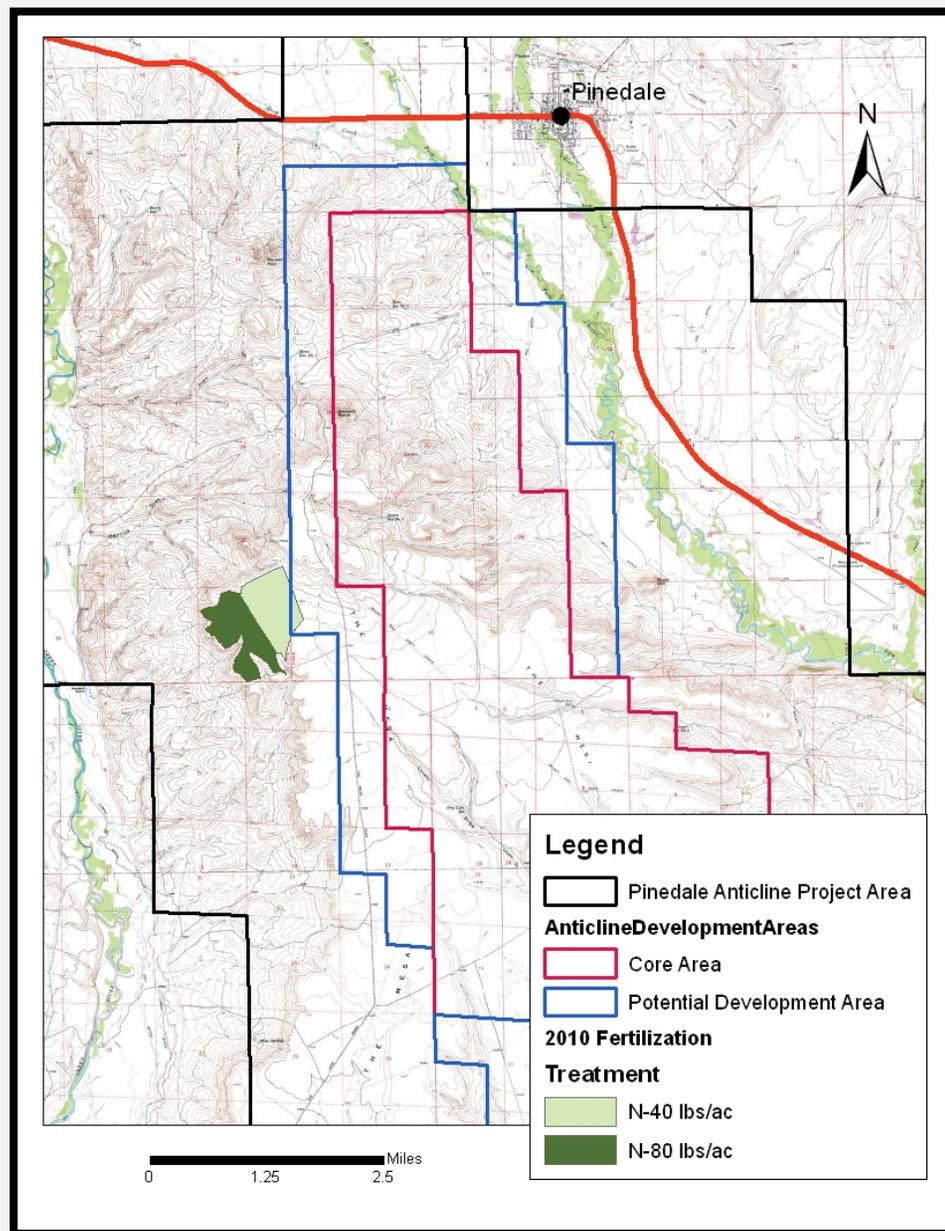


2010 Fertilization Project

- In 2009 WGFD proposed sagebrush fertilization trial in crucial mule deer winter range on the Mesa
- Goals of project were to
 - Increase sagebrush production (leader growth)
 - Potentially increase nutrient quality and palatability
- PAPO funded project: total \$46,000
- Project on BLM land so NEPA was completed
- In fall 2010, 468 acres of sagebrush was fertilized
- 228 acres treated with 40 lbs Nitrogen/acre
- 240 acres treated with 80 lbs Nitrogen/acre



2010 Fertilization Project



2010 Fertilization Project

Annual Monitoring of this project includes:

- Herbaceous production (grasses and forbs)
- Shrub Production (annual leader growth)
- Canopy and Ground Cover (%)
- Precipitation (rain gauges)
- Nutrient Sampling



Monitoring Results

Herbaceous Production

YEAR		CONTROL	40 lbs./N/acre Site	80 lbs./N/acre Site
2010 (pre)	Grass	269 lbs./acre	198 lbs./acre	168 lbs./acre
2011 (post)	Grass	237 lbs./acre	250 lbs./acre	240 lbs./acre
2010 (pre)	Forbs	112 lbs./acre	44 lbs./acre	54 lbs./acre
2011 (post)	Forbs	124 lbs./acre	54 lbs./acre	86 lbs./acre



Monitoring Results

Shrub Production (Average Leader Length)

YEAR	CONTROL	40 lbs./N/acre Site	80 lbs./N/acre Site
2010 (pre)	2 mm (0.08 inches)	4 mm (0.16 inches)	3 mm (0.12 inches)
2011 (post)	20 mm (0.79 inches)	49 mm (1.93 inches)	35 mm (1.34 inches)



Monitoring Results

Canopy Cover

YEAR	Life Form	CONTROL	40 lbs./N/acre Site	80 lbs./N/acre Site
2010	Shrub	-	-	-
2011	Shrub	28%	32%	32%
2010	Grass	-	-	-
2011	Grass	13%	16%	49%
2010	Forb	-	-	-
2011	Forb	26%	26%	18%



Monitoring Results

Ground Cover

YEAR	Ground Cover	CONTROL	40 lbs./N/acre Site	80 lbs./N/acre Site
2010	Vegetation			
	Litter			
	Soil (bare ground)			
	Rock			
2011	Vegetation	9%	15%	5%
	Litter	56%	48%	52%
	Soil (bare ground)	35%	36%	42%
	Rock	0	1%	1%



Monitoring Results

Precipitation and Nutrient Sampling

- No results at this time
- Rain gauges were put out in the project area in summer 2011
- First nutrient samples will be taken in fall 2011



2011 Mesa Fertilization Project

- WGFD propose fertilizing 30,598 acres of sagebrush in CWR
- Operators offered additional 2,100 acres of lease suspension
- PAPO board approved funding for fertilization of up to 3,000 acres of sagebrush habitat: Total \$215,700
- NEPA was conducted by BLM with several comments received.
- 3 Alternatives were analyzed:
 - No action
 - Alternative 1 (3,000 acres)
 - Alternative 2 (30,598 acres)



2011 Mesa Fertilization Project

Decision Record selected a modified Alternative 2:

- 1,000 acre treatment was approved for 2011
- 2,000 acre treatment was approved contingent on results of the 1,000 acre treatment and the previous 468 acre trial treatment



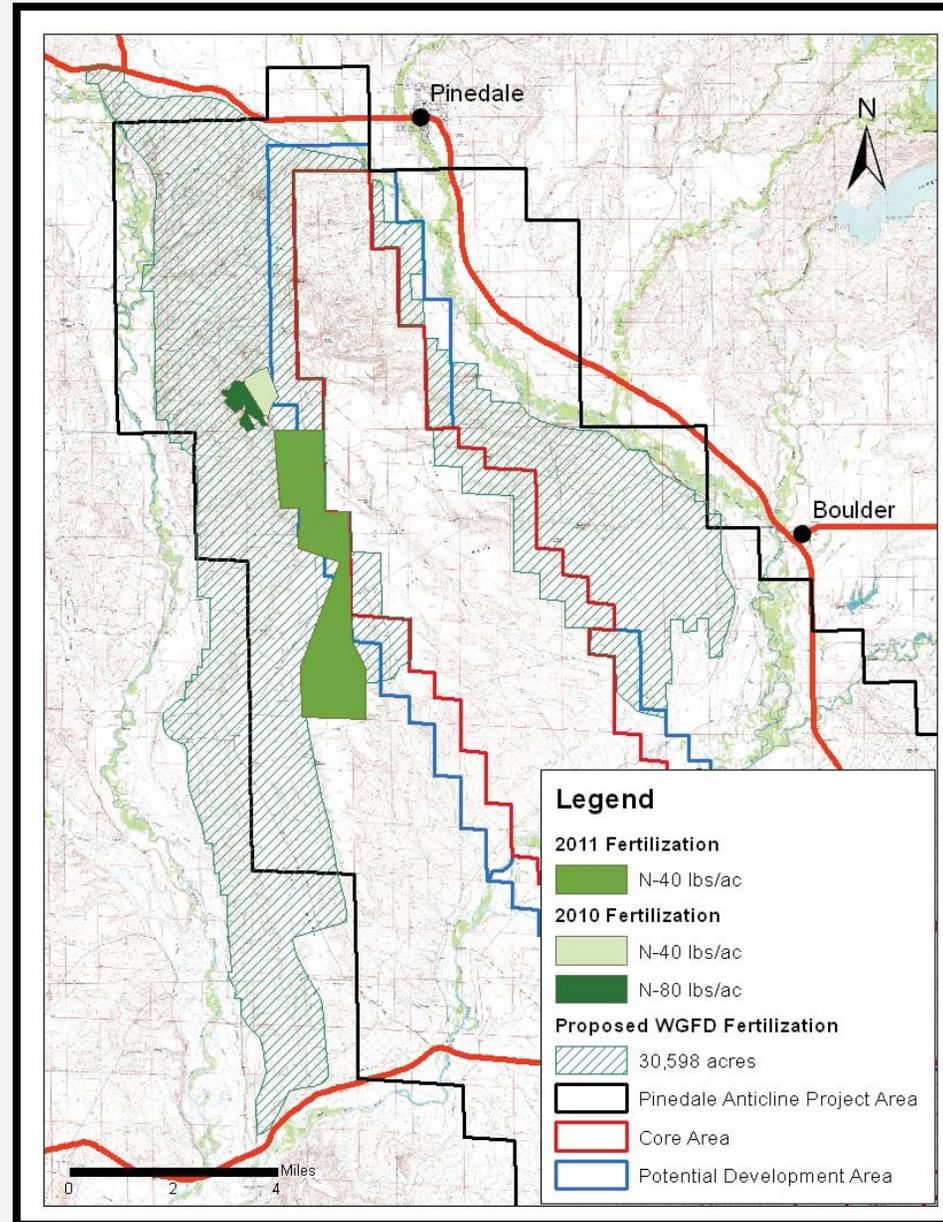
2011 Mesa Fertilization Project

Future fertilization treatments within the 30,598 acre delineated project area may occur subject to:

- Funding approval
- Achievement of all project goals and objectives and avoidance of negative impacts
- At least two years of monitoring data collected
- Public notification one year prior to implementation of each additional treatment
- Priority for additional treatments given to areas under lease suspension, unavailable for leasing, or agreement with leaseholder to be deferred from development for a minimum of three years following treatment



2011 Mesa Fertilization Project



2011 Mesa Fertilization Project

- 1,000 acres to be treated late fall 2011
- 40 lbs Nitrogen/acre
- Same monitoring components as in the 2010 fertilization project
- Depending on future monitoring results, remaining 2,000 acres may be treated in late fall 2012
- Additional fertilization treatments may be implemented within the 30,598 acre project area depending on results of 2010, 2011 and potentially the 2012 treatments



QUESTIONS????





Habitat Assessments

In the summer of 2010, the Pinedale Anticline Project Office (PAPO) conducted a habitat assessment of about 93,000 acres in the Ryegrass and Soapholes area located to the immediate west of the Pinedale Anticline Project Area (PAPA).



Habitat Assessments

- All ecological sites were visited.
- Quantitative and qualitative data was collected from 62 sites.
- Data was collected on uplands, riparian areas and aspen woodland sites.
- From the data, preliminary treatment opportunities were identified.



Habitat Assessments

The PAPO will be working with the Wyoming Game & Fish Department, conservation districts, landowners and permittees, as appropriate, over the winter to further refine the priority areas based on potential for

- Response
- Scale of the project
- Focus of the treatment
- Consideration of other resources using the area

All treatment methods are presently being evaluated.

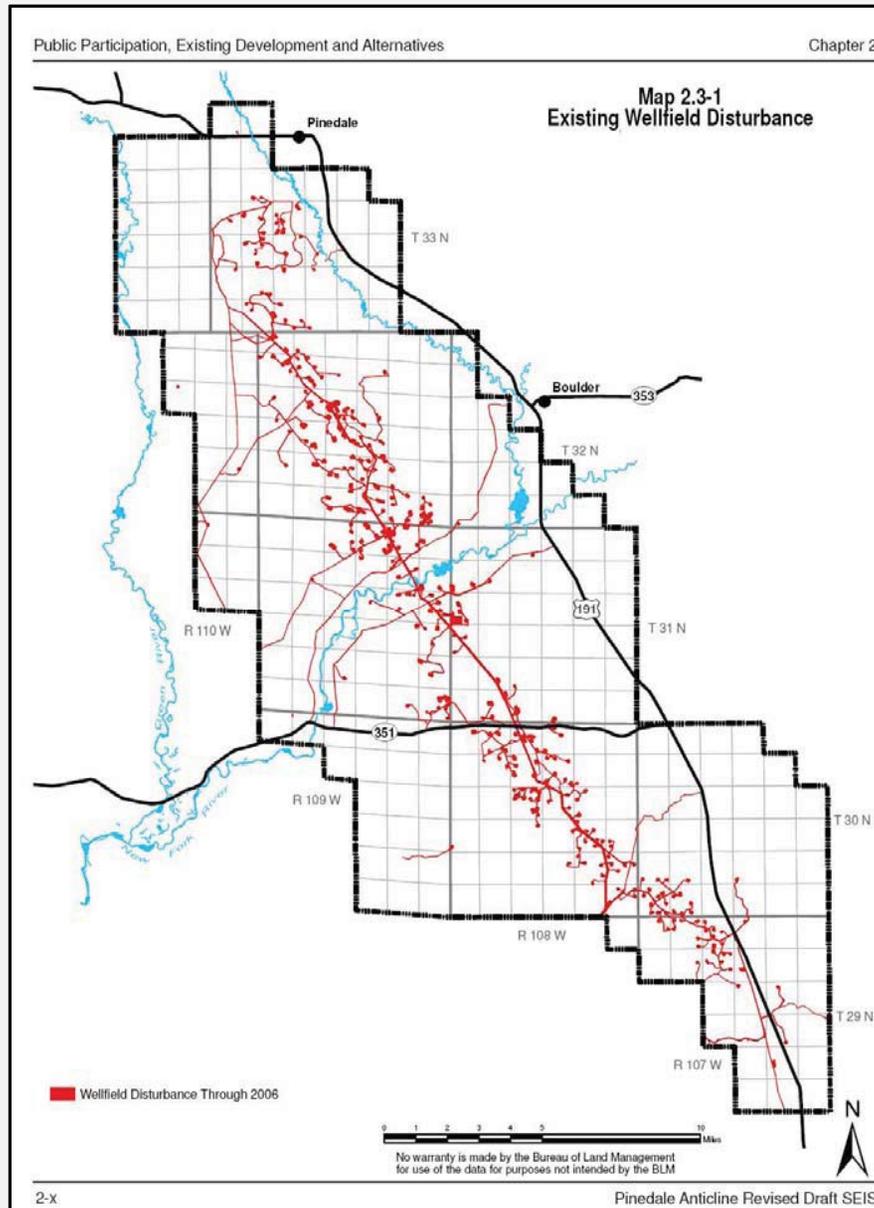




**PINEDALE ANTICLINE
SUPPLEMENTAL
ENVIRONMENTAL IMPACT
STATEMENT
2008 RECORD OF DECISION
WILDLIFE MONITORING AND
MITIGATION MATRIX**
Shane DeForest



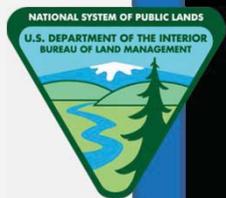
Pinedale Anticline Project Area



Area: \approx 198,000 acres
South of Pinedale, WY
(8.5X the size of the Jonah Infill)

Land ownership:
80% federal
5% state
10% private
5% mixed ownership

One of the Nation's
Largest Natural Gas
Fields \sim 25 TCF of
Recoverable Natural
Gas



Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project (SEIS)

Summary of Reasons Leading to this Decision

- Proponents long term development plan changed from that analyzed in 2000
- Improvements In Understanding Of Geology Allowed Access To More Of The Reserve
- Analysis Thresholds In 2000 ROD Were Being Reached Or Were Being Exceeded
 - NOx
 - Maximum Well/Well Pad Limit in Many of the Management Areas



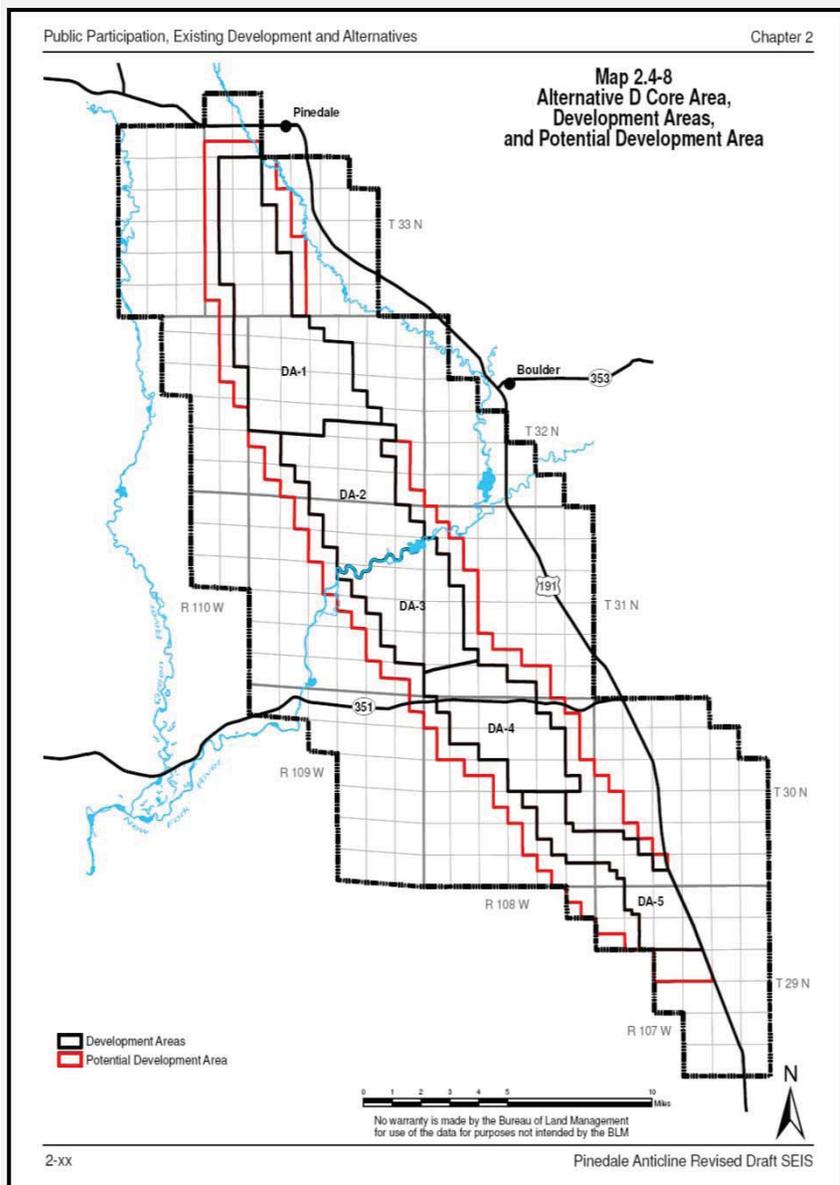
SEIS Background Cont.

Summary of Reasons Leading to this Decision

- Operators Were Unable To Maintain Efficient And Qualified Workforce With Seasonal Restrictions
- Retention/Deployment of Higher Efficiency Lower Emission Drill Rigs and Other Equipment Was Hampered By Seasonality Of Work
- Unanticipated Impacts To Wildlife Species Were Being Experienced With Scattered Development, Intense Seasonal Activity During Summer Months And Delayed Reclamation
- Large Seasonal Workforce was Taxing Local Community.



SEIS Preferred Alternative



- Spatially and Temporally phased
- Year-round drilling
- Concentrated development
- Field-wide allowance of exceptions
- Centralized facilities for wildlife, reclamation, visibility, and ozone protection
- Flank areas (64% OF PAPA); About 87,000 acres are either leased but activity suspended or not leased
- Mitigation for wildlife
- Establishment of Mitigation Fund
- Air emissions must be reduced 80%
- 4,399 new wells (not more than 600 total well pads)

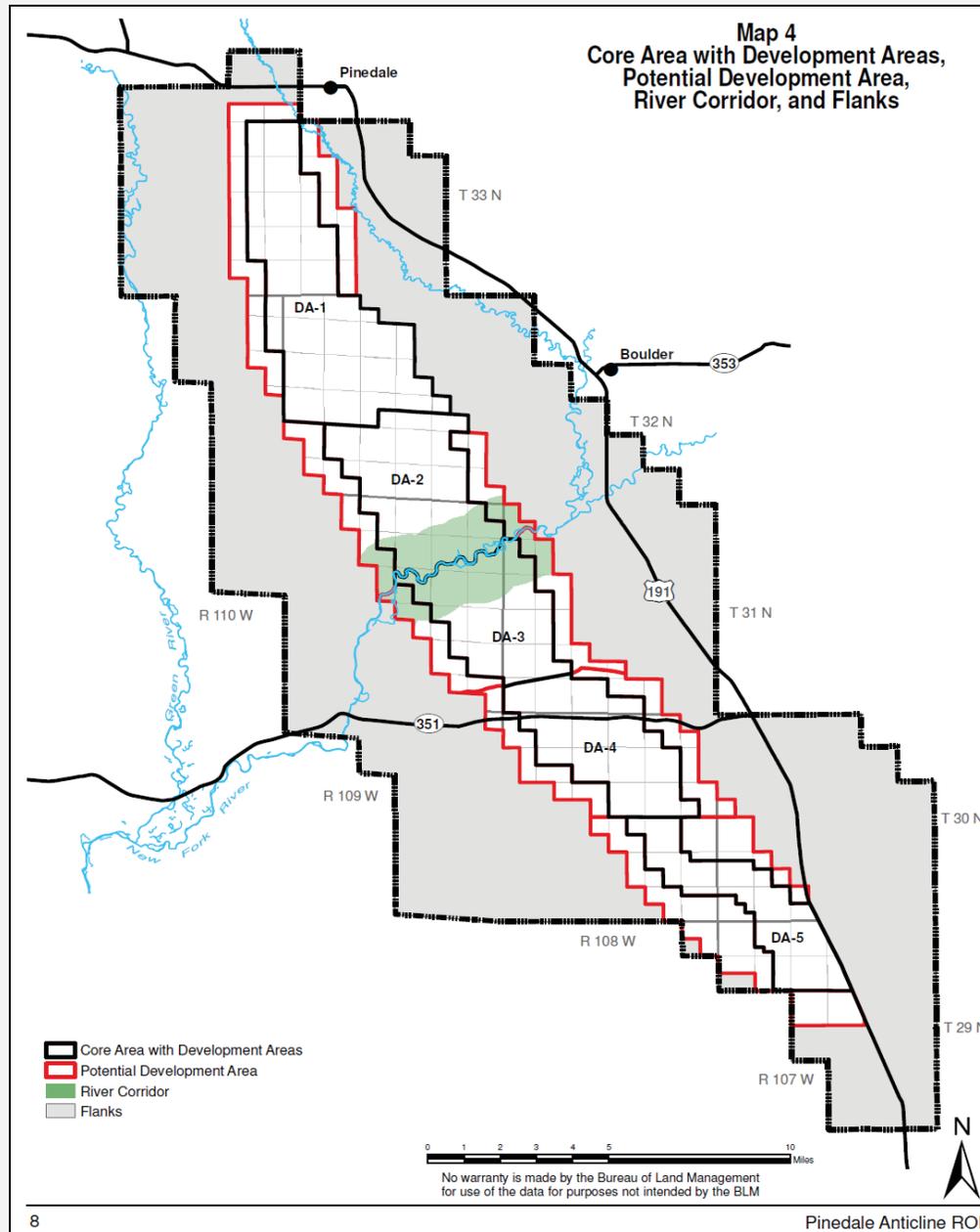


Decision

- 4399 wells from no more than 600 well pads
- 24 month “transition/delineation period”
- Annual Planning Meeting
 - Annual and 10 year planning
- Year round development by granting of exceptions
- Use of “concentrated development” and Development Areas
- Minimum 5 year lease suspensions on 49,903 acres based on return of developed areas to “functioning habitat”
- No more than 1 well pad per quarter-section PER OPERATOR
- Installation of liquids gathering system (165,000 truck trips annually during peak production ARE ELMINATED) or equivalent
- Extensive mitigation and monitoring
- Establishment of the Pinedale Anticline Project Office
- \$36 million proffered at signing of ROD
- Annual contribution to mitigation fund of \$7,500 per well spud
- Continued Management Area Approach (flanks)



Decision



Matrix Species Monitored

Mule Deer

Pronghorn

Sage-grouse

Pygmy Rabbit

Prairie Dog

Snow/Traffic

Raptor



Mule Deer Monitoring Objectives

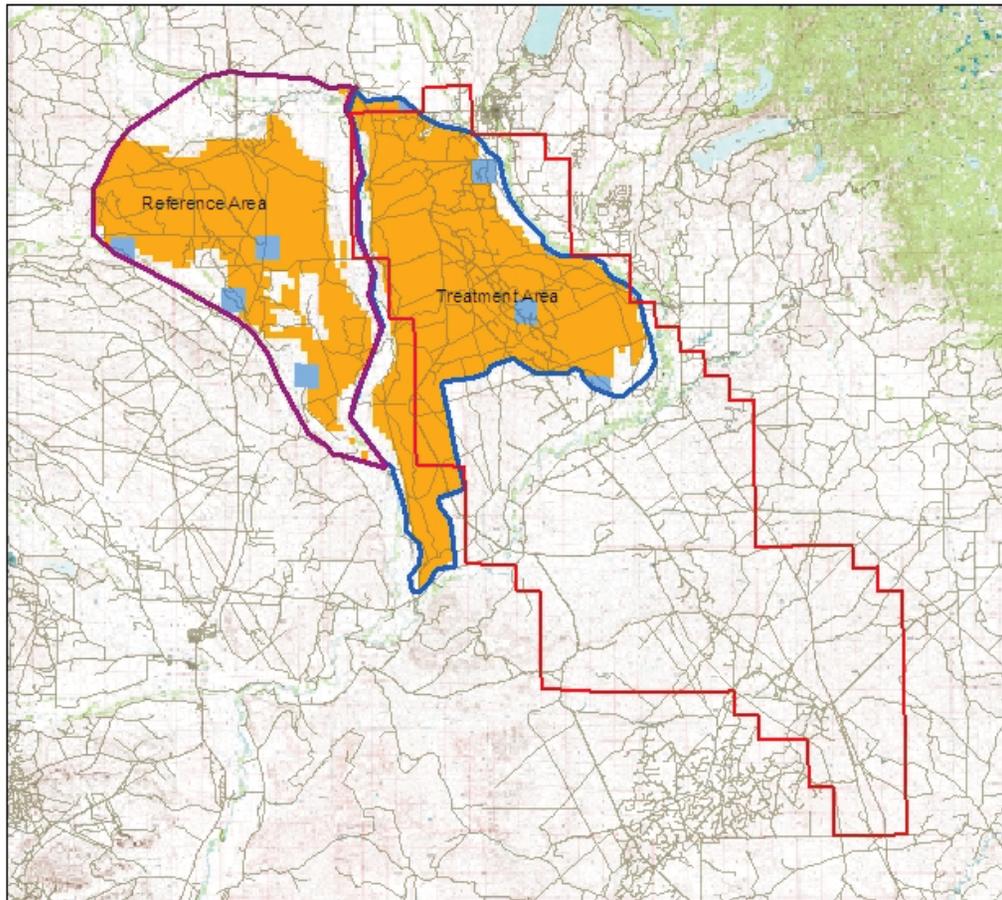
- Monitor mule deer during winter and report changes in population numbers.
- Monitor female survival
- Map collared mule deer locations and migration routes.
- Analyze mule deer distribution and habitat selection



Mule Deer Monitoring Areas

Legend

- RAPA Boundary
- Reference Area
- Treatment Area
- Surface Ownership
 - Bureau of Land Management
 - Private
 - State

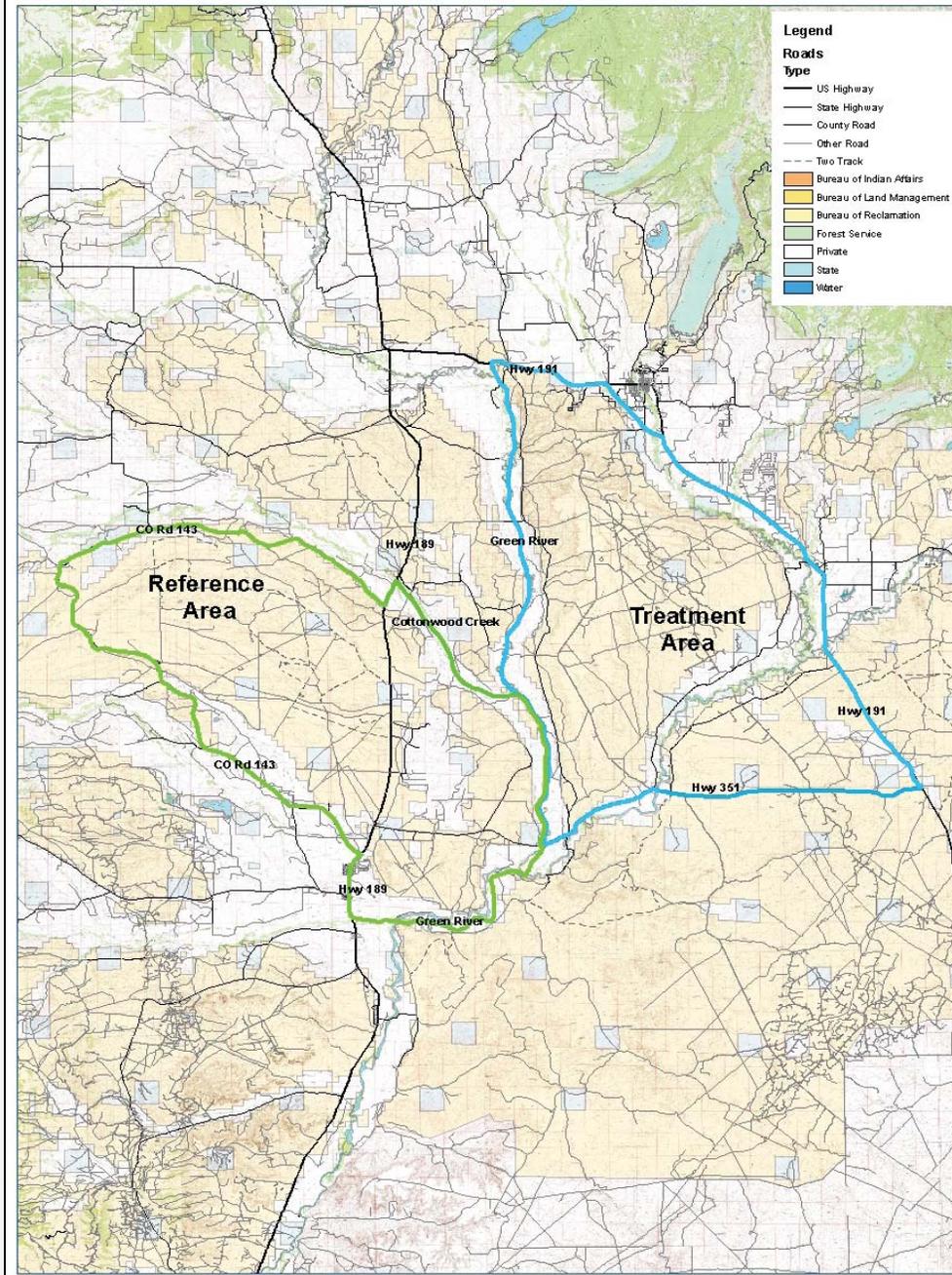


Pronghorn Monitoring Objectives

- Monitor pronghorn during winter and report changes in population numbers.
- Monitor female survival
- Map collared pronghorn locations and migration routes.
- Analyze pronghorn distribution and habitat selection



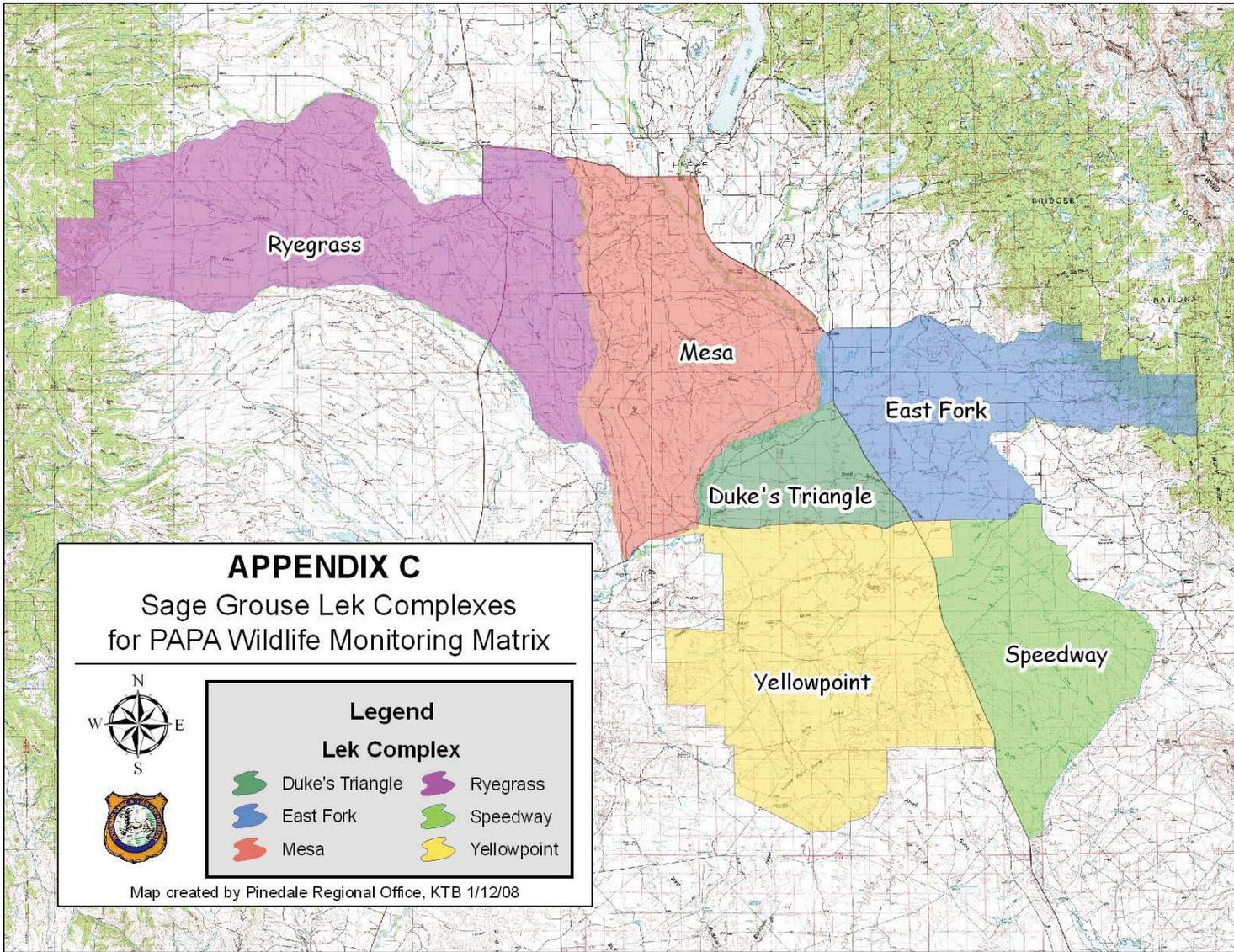
Pronghorn Monitoring Areas



Sage-grouse Monitoring Objectives

- Conduct lek surveys and report population trends
- Monitor female survival and nest success
- Monitor habitat selection during brood rearing
- Monitor noise levels at leks within PAPA area
- Monitor winter use to identify winter concentration



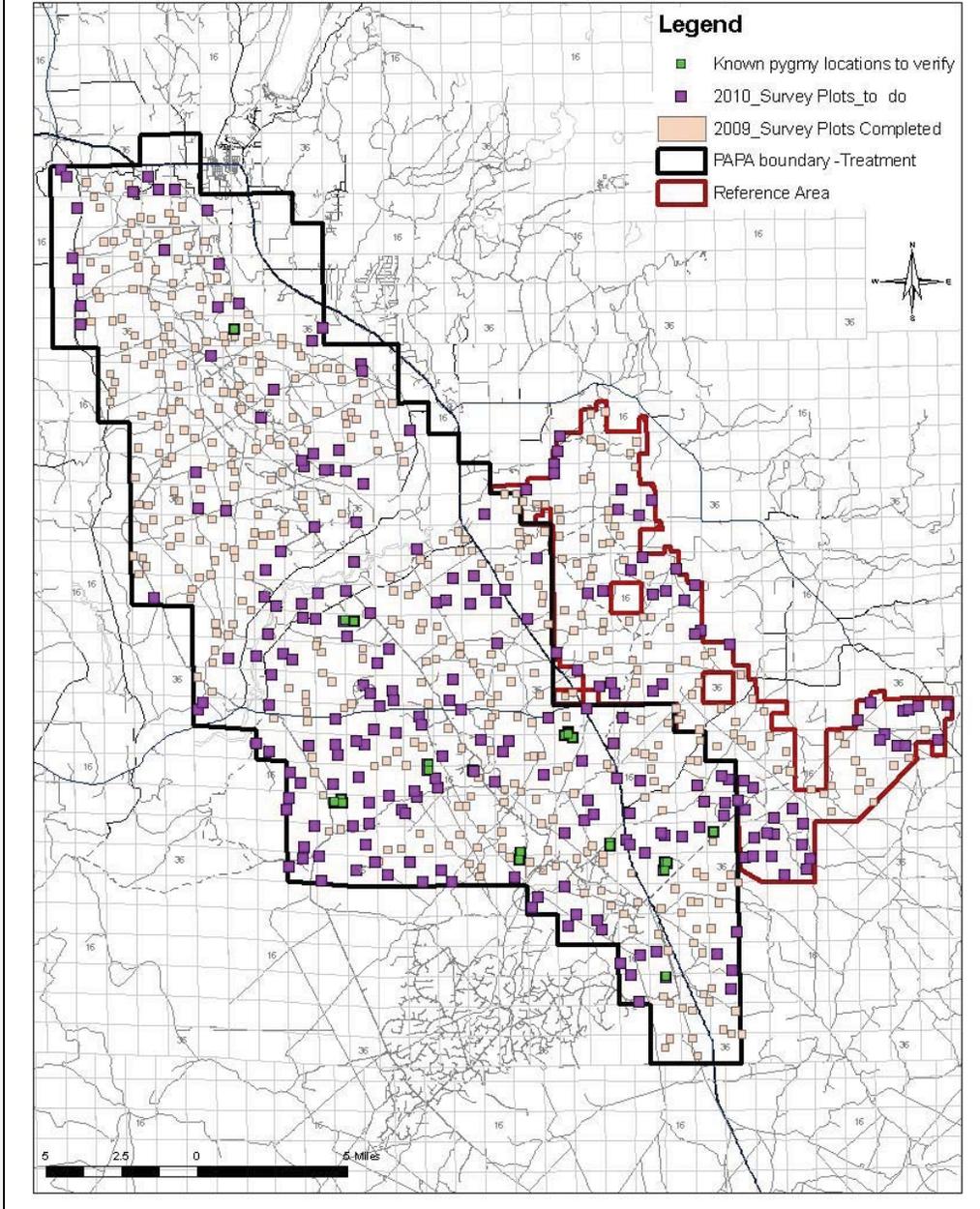


Pygmy Rabbit Monitoring Objectives

- Identify and map suitable pygmy rabbit habitat
- Conduct monitoring sufficient to identify three consecutive years of decline in presence or absence of pygmy rabbit populations or decline in numbers of individuals each year over three years



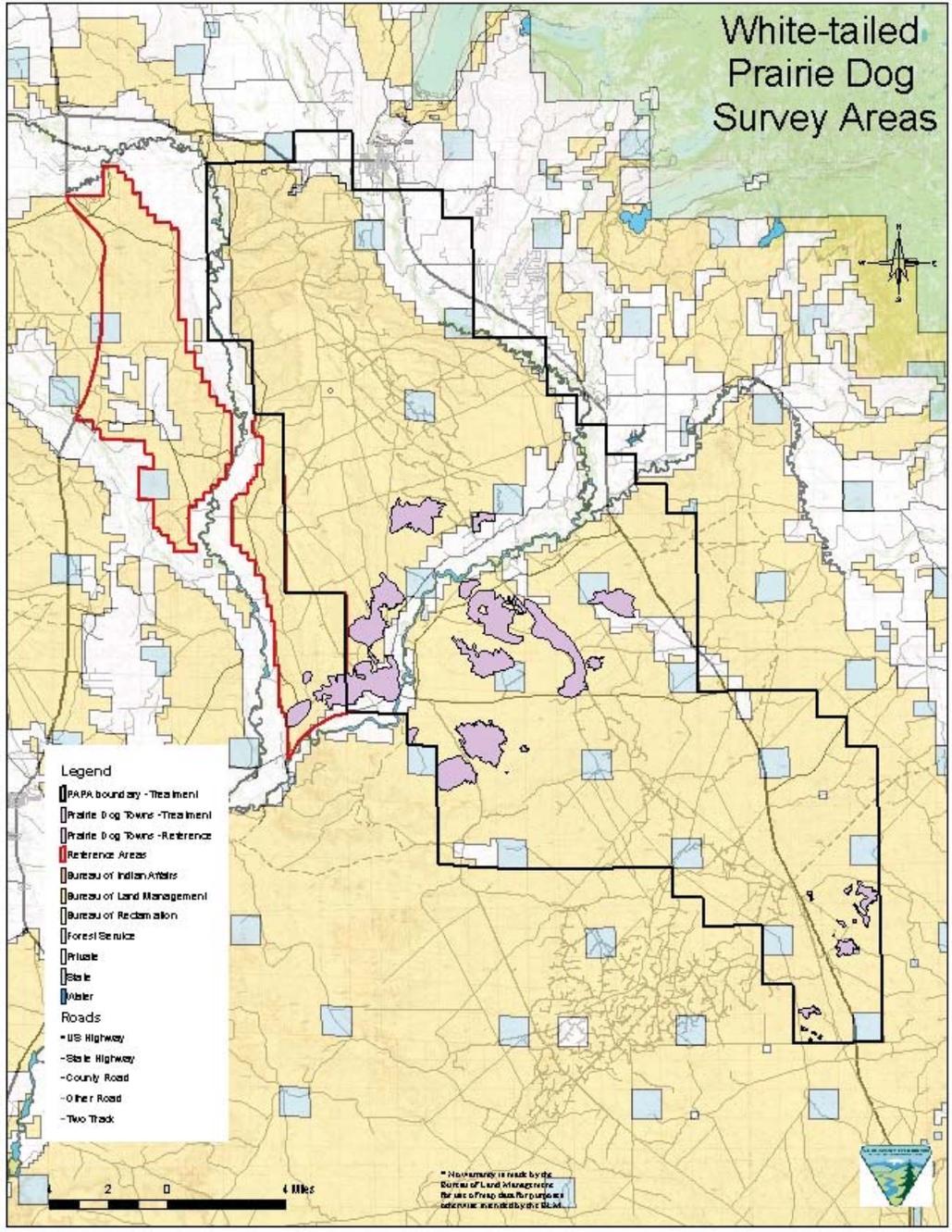
2009 and 2010 Pygmy Rabbit Survey Areas



White-tailed Prairie Dog Monitoring Objectives

- Map prairie dog towns within the PAPA and Reference areas
- Monitor long-term trend in occupancy rates
- Monitor long-term trend in active burrow density/prairie-dog numbers



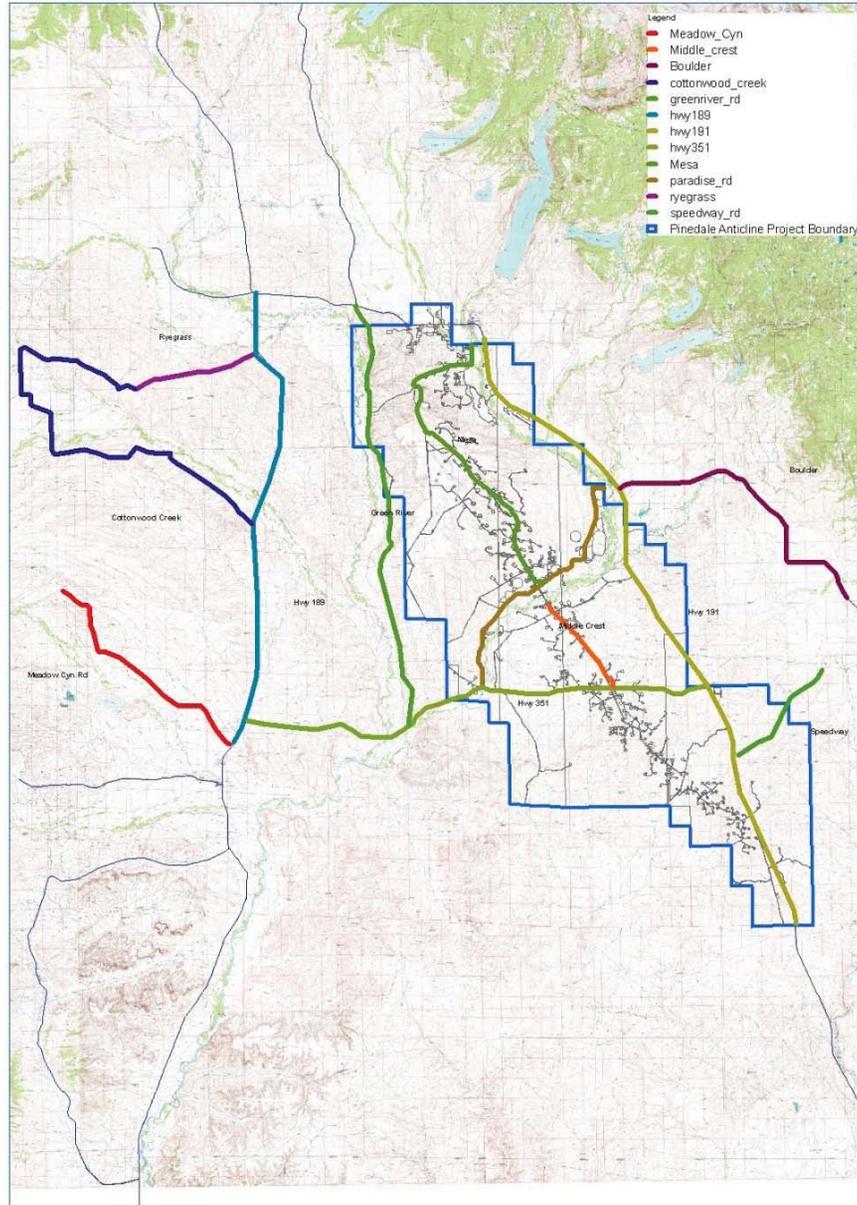


Snow/Traffic Monitoring Objectives

- Monitor traffic volumes within the PAPA development area.
- Sample snow depths at fixed locations throughout winter months (November – April) within the PAPA and associated reference areas
- Report data in GIS format to be utilized in other PAPA Monitoring and Mitigation Matrix wildlife analysis.



Traffic and Snow Monitoring Routes Project Area



Wildlife Monitoring Mitigation Matrix Appendix B

- The Matrix defines the parameters and thresholds for which monitoring is conducted on the five designated key species (mule deer, pronghorn, sage-grouse, pygmy rabbit, white-tailed prairie dog).
- The mitigation process utilizes performance-based measures to proactively react to emerging undesired changes, specifically declines in populations
- Adaptive management changes to the Matrix were made in 2010 based on the WY COOP review.



Wildlife Monitoring Mitigation Matrix Appendix B

University of Wyoming Fish & Wildlife COOP Unit Coordinated Third Party Review

- Initiation based on public comment
- Consisted of a panel of research biologists with extensive research experience
- Panel provided a thorough review of the PAPA monitoring plan
- BLM with recommendations from WGF made changes to the Matrix based on panel findings through Adaptive Management process
- Results found on the PAPA website :
<http://www.wy.blm.gov/jio-papo/papo/wildlife.htm>



Wildlife Monitoring Mitigation Matrix Appendix B

Species	Criteria	Method	Changes that Will Be Monitored	Specific Change Requiring Mitigation	Mitigation Responses
Mule Deer	Change in Mesa deer numbers	Current mule deer study, and use of WGFD data	Change in deer numbers in any year, or a cumulative change over all years, initially compared to average of 05/06 numbers (2856 deer)	15% decline in any year, or cumulatively over all years, compared to reference area (Sublette mule deer herd unit [average 05/06 herd unit population is 27,254], or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Avoidance distances		Average of any 2-year avoidance distance from well pads and roads, and a concurrent change in deer numbers compared to average of 05/06 numbers (2856 deer)	Average of 0.5 km change per year over 2 years, and a concurrent 15% decline in deer numbers in any year, compared to reference area (Sublette mule deer herd unit [average 05/06 herd unit population is 27,254], or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.

Avoidance Distance removed 2010 following Univ. Wy. COOP review



Wildlife Monitoring Mitigation Matrix Appendix B

Antelope	Change in Anticline antelope numbers	Present WCS antelope study; Present TRC project; and use of WGFD data	Change in antelope numbers in any year, or a cumulative change over all years, initially compared to first year of available antelope data	15% decline in any year, or cumulatively over all years, compared to reference area (Sublette antelope herd unit or other, mutually agreeable area)	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Size of habitat fragments used		Use by antelope in any year, initially compared to first year of available antelope habitat use data, and a concurrent change in antelope numbers compared to first year of available antelope data	10% decline in habitat availability for one year, and a concurrent 15% change in antelope numbers for that year, compared to reference area (Sublette antelope herd unit or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.



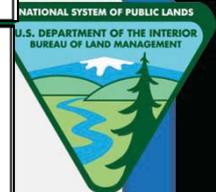
Fragmentation Parameter removed 2010 following Univ. Wyoming Coop Review



Wildlife Monitoring Mitigation Matrix Appendix B

Sage Grouse	Number of active leks in identified lek complexes	Lek counts according to protocol	Active use on 70% of total current leks; Active use on 70% of leks in each complex (the development area complexes include the Mesa, Duke's Triangle, and Yellow Point complexes) compared to 2007 data	30% decline in total number of active leks, or 30% decline in the number of leks in a single complex ¹	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
Sage Grouse (cont.)	Peak numbers of males attending lek complexes ¹	Lek counts according to protocol	Total average 2-year change in numbers of males attending development area lek complexes (the Mesa, Duke's Triangle, or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Average of 30% decline in numbers over 2 years compared to reference area ¹	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Nesting success and habitat selection	Current sage grouse study, WSPD data	Change in nesting success compared to reference areas, or change in nesting success and a concurrent change in habitat selection by nesting hens in relation to development disturbance	Average of 15% per year decline over 2 years in nesting success compared to reference area, or a 0.5 km increase in avoidance distance per year over 2 consecutive years and a concurrent change of an average of 15% per year decline over 2 years in nesting success compared to reference area	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Winter concentration area use	Monitoring according to protocol	Change in winter concentration area use compared to reference area (once initial data is available), and a concurrent change in the total average 2 year numbers of males attending development area lek complexes (the Mesa, Duke's Triangle or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Average of 15% per year decline in amount of winter habitat used over 2 years compared to reference areas and a concurrent average of 30% decline in numbers over 2 years compared to reference area	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
Sage Grouse (cont.)	Noise levels	Decibel monitoring from March 1-May 15 at lek sites	Noise levels demonstrated to impact peak lek use by male sage grouse and a concurrent change in the total average 2-year numbers of males attending development area lek complexes (the Mesa, Duke's Triangle, or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Decibel levels at the lek more than 10 dBA above background measured from the edge of the lek (2000 ROD, p.27), and a concurrent average of 30% decline in peak numbers of male birds over 2 years vs. reference area.	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.

Removed in 2010 following Univ. Wyoming Coop Review Recommendation



Wildlife Monitoring Mitigation Matrix Appendix B

Sensitive Species ²	Occurrence of species and change in numbers of each species	TRC data, existing and continued	3-year change in presence/absence of species, and in numbers of individuals of each species, compared to reference areas.	3 consecutive years of decline in presence or absence of a species, or an average of 15% decline in numbers of individuals each year over 3 years.	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
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2 Pygmy Rabbits and White-Tailed Prairie Dog



Wildlife Monitoring Mitigation Matrix Appendix B

When the Matrix is Triggered (Section B.2)

1/2. On-site

1. Protection of flank areas from disturbance (e.g., voluntary lease suspensions, lease buyouts, voluntary limits on area of delineation/development drilling) to assure continued habitat function of flank areas, and to provide areas for enhancement of habitat function.
2. Habitat enhancements of SEIS are (both core/crest and flanks) at an appropriate (initially 3:1) enhancement-to-disturbance acreage ratio.



Wildlife Monitoring Mitigation Matrix Appendix B

When the Matrix is Triggered (Section B.2)

3. On-site/off-site

1. Conservation Easements or property rights acquisitions to assure their continued habitat function, or provide an area for enhanced habitat function (e.g., maintenance of corridor and bottleneck passages, protection from development, establishment of forage reserves, habitat enhancements at an appropriate (initially 3:1) enhancement-to-disturbance acreage ratio).



Wildlife Monitoring Mitigation Matrix Appendix B

When the Matrix is Triggered (Section B.2)

4. Modification of Operations

1. Recommend, for consideration by Operators and BLM, adjustments of spatial arrangement and/or pace of ongoing development.



Wildlife Monitoring Mitigation Matrix Appendix B

- It will be several years before modification of operations as noted in Mitigation Response 4 will be considered.
- Priority for mitigation will be given to those habitats designated as most crucial or important.



Wildlife Monitoring Mitigation Matrix Appendix B

When the Matrix is Triggered: (section B.2)

- Mitigation process utilizes performance-based measures to proactively react to emerging undesired changes early enough to assure both effective mitigation responses and a fluid pace of development over the life of the project.
- Initial mitigation will utilize responses 1, 2, and 3.
- Certainty of adequate results will be through implementation of a mitigation response followed by monitoring and if results are not satisfactory repeating the process until desired result or exhaustion of responses.
- Multiple mitigation attempts, with monitoring, is required.



Reclamation Plan Appendix C

Operators are responsible for satisfactory and timely reclamation of the land surface disturbed by their operations (C-1, paragraph 1)

Reclamation standards established in “The Gold Book,” and specific criteria identified in the ROD (C-1, paragraph 2)

Three types of Reclamation

- Site Stabilization
- Interim
- Full Site Final



Reclamation Plan Appendix C

Site Stabilization

- Not actively drilling, but plan to reoccupy within 2 years

Interim Reclamation

- Locations where surface disturbing activities are not anticipated for the next 2 plus years, can include locations where all development is complete for the production phase of the pad

Full Site Final Reclamation

- The production phase is complete, and all infrastructure have been removed. Applies to well pads, and the associated ROWs, etc.



Reclamation Plan Appendix C

- Reclamation and monitoring plan within 1 year (i.e., PAPA Monitoring for Reclamation Success) (C-2, C.2, paragraph 1)
- Site specific reclamation plans with APDs, PODs, [or Sundry notices] (C-2, C.2, paragraph 2)



Adaptive Management Appendix E

- Uncertainties about how natural systems will react to human interventions
- Imperative that as much natural gas as possible be recovered from the PAPA
- Continue to strive to develop and use technologies to lessen impacts
- Uncertainties require a number of assumptions be used to predict the impacts
- Those predictions may or may not be partially or wholly correct.
- A significant off-site mitigation program will be necessary



Adaptive Management Appendix E

- The adaptive management process allows for changes in the management without further NEPA analysis, unless designated thresholds are reached.
- The speed of management response is increased.
- Steps are: implement decision, monitor impacts, evaluate data, develop modified mitigation or management recommendations, make adaptive management decision, repeat.



Adaptive Management Appendix E

Goals and Objectives for Adaptive Management

- Determine the effects of PAPA development on area resources
- Determine the effectiveness of the mitigation measures contained in this ROD.
- Suggest modification to mitigation measures to achieve the stated goals/objectives
- Assure oil and gas related BLM decisions regarding the PAPA are coordinated with non-oil-and-gas-related decisions
- Provide a rapid response to unnecessary and undue environmental degradation, should any occur
- Validate predictive models used in the SEIS and revise the models/projections as necessary based on field observations and monitoring



Adaptive Management Decision Process

Page 18 ROD:

- Based on annual planning meetings
- Utilize “Review Team” (BLM and other federal, state, and local agencies)
- Utilize the PAWG as an advisory group
- Decision of the Authorized Officer Completes the Process



Adaptive Management Decision Process

- Identification of an adaptive management opportunity/need is submitted
- AO evaluates merit and urgency of need
- Convenes review team (charter to make a recommendation)
 - Need
 - Urgency
 - Additional NEPA needed
- AO compiles recommendations and coordinates with public and PAWG
- Considering the public comments, AO prepares decision



CLARIFICATIONS ?





Discussion Question

- Reclamation, restoration, and treatment efforts are often aimed at enhancing or re-establishing various habitats. Projects may be done to provide mitigation both onsite and offsite. A reality of arid and semi-arid ecosystems is that they are drier and typically slow to respond to these efforts. This creates a challenge because wildlife species like sage-grouse have immediate needs for habitat and not several years down the road. In summary, there are often short term negative impacts to wildlife from these projects but more long-term benefits.
- *How would the RAC recommend that BLM manage or strategize for realistic time frames for vegetation response while still protecting existing habitats and managing ongoing activities across landscapes?*

