Appendix C

Lost Creek Project, 2010 Wildlife Monitoring Report

Lost Creek Project, 2011 Wildlife Monitoring Report

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Attachment B –Lost Creek Wildlife Species List Table, Incidental Wildlife Observations 2010

The Attachment B Table B-1 provides a summary of species that have the potential to occur within the Permit Area and those that are known to occur within the Permit Area. Those known to occur have been confirmed within the permit area during wildlife surveys completed between 2006 and 2010. New species documented in the Permit Area during 2010 included:

Northern Pocket Gopher
Wyoming Pocket Gopher
Chestnut Collared Longspur

Attachment C- Project Impact Analysis Area (PIAA) Renamed Density/Disturbance Calculation Tool (DDCT) Documents

1.0 Introduction

Lost Creek ISR, LLC (LC ISR, LLC) has completed extensive baseline wildlife surveys to evaluate existing wildlife resources in and adjacent to the Permit Area (LC ISR, LLC Appendix D9 WDEQ Application 2010). In addition, LC ISR, LLC has implemented protection measures as appropriate to the on-going exploration activities at the site, such as drilling restrictions based on location or timing for wildlife activities, and use of appropriate fencing around activity areas. LC ISR, LLC will continue a combination of protection measures and monitoring to improve the current understanding of in situ recovery (ISR) impacts on wildlife and minimize the impacts.

LC ISR, LLC recognizes that ISR activities have the potential to impact wildlife, including: loss of habitat; changes in habitat usage due to increased human presence, reductions in food sources, displacement to new areas; and collisions with structures and vehicles.

LC ISR, LLC developed a Wildlife Protection Plan and the Wildlife Monitoring Plan to prevent and minimize impacts to wildlife (LC ISR, LLC 2010). The Plan also included an extensive wildlife monitoring program designed to gather information regarding wildlife use of the Permit Area and surrounding habitats. The Plan was developed to be consistent with recommendations and requirements of the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), Wyoming Game and Fish Department (WGFD), and Wyoming Department of Environmental Quality, Land Quality Division (WDEQ-LQD). The results and conclusions from each year's wildlife protection and monitoring measures will be included in LC ISR, LLC's Annual Report to WDEQ-LQD, BLM, and the Nuclear Regulatory Commission (NRC).

Wildlife monitoring in and near the Permit Area will be completed on an annual basis through the life of the Project. Consultation with BLM, WGFD, and USFWS will be conducted as needed prior to completing any annual survey work. An annual monitoring report will be prepared and submitted to the WDEQ-LQD, BLM, and NRC each year. The report will include: survey methods; results; any trends; an assessment of protection measures implemented during the past year; recommendations for protection measures for the coming year; recommended modifications to monitoring or surveying; and any recommendations for additional species to be monitored (e.g., a newly listed species). The Annual Wildlife Monitoring Report, data and mapping will be formatted to meet WDEQ-LQD requirements. Only qualified wildlife biologists or ecologists completed the wildlife monitoring. This report summarizes the results of the 2010 Wildlife Monitoring Effort.

In addition to the specific annual monitoring for wildlife, LC ISR, LLC will document all known instances where Project activities may have impacted wildlife (such as wildlife/vehicle collisions on roads, or other mortality within the Permit Area). Any large die-offs or other evidence of possible wildlife exposure to toxic chemicals will be reported immediately to WDEQ-LQD (and other WDEQ divisions as necessary), BLM, USFWS, and WGFD. A record of wildlife mortality will be kept at the mine site and included in the Annual Report.

Monitoring and survey methods were designed to be consistent with standard protocol used by the WGFD (WGFD 2007), and also to follow monitoring requirements and recommendations

from WDEQ-LQD (Wildlife Monitoring Requirements for Surface Coal Mining Operations). Monitoring methods that were used in 2010 were described in detail in the LC ISR, LLC Wildlife Protection Plan and the Wildlife Monitoring Plan (LC ISR, LLC 2010).

Table 1A provides the wildlife monitoring schedule that was followed during 2010. The same wildlife monitoring schedule is planned for the project in 2011. Results of the 2010 Monitoring Effort are described in Section 2.0.

Table 1A. 2010 Wildlife monitoring schedule[1].

Species[2]	Purpose of Monitoring[2]	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Big Game	Winter habitat Use	1 Aerial Survey											
	Spring & Summer Habitat use	1 Ground Survey			1 Ground Survey		1 Ground Survey		1 Ground Survey				
Sage-Grouse	Lek Counts				3 Ground Surveys								
	Search for New Leks				Ground Survey 2010 & Every 3rd Year After 2010								
					Ground Survey 2010 & Each Year After 2010								
	Habitat Selection Survey	Aerial Tracking			Ground Tracking					Aerial Tracking			
	Measure Disturbance	Traffic			Axle Counters								
		Grazing & Energy Development	Review of Plans										
	Productivity	Brood Transects						Ground Survey					
		Wing Barrels								Hunting Season			
Raptors	Nest Location		1 Ground or Aerial Survey										
	Production Success					1+ ground or aerial survey[3]							
Lagomorphs	Prey Abundance						1 Ground Survey		1 Ground Survey				
Non-game Birds	Breeding Numbers						1 Ground Survey						
All	Occurrence	Incidental Observations											

[1]Details of the monitoring timing and protocols are described in section 2.0 of Attachment OP-6 of the WDEQ application (LC ISR, LLC. 2010).
[2]Species selection is based on observed wildlife within and near the Lost Creek Permit Area (Appendix D9 of WDEQ Application; LC ISR, LLC. 2010).
[3]At least one survey will be performed from mid-May through mid-June to locate new nests and check status of all known nests. Number and timing of other surveys will depend on whether nesting is observed.

2.0 Lost Creek 2010 Wildlife Monitoring Results and Discussion

Wildlife monitoring methods are outlined in detail in the Wildlife Protection Plan and Wildlife Monitoring Plan (LC ISR LLC 2010). Methods are briefly summarized below as appropriate. Methods are described in more detail for studies that varied from the 2010 Wildlife Protection Plan and Wildlife Monitoring Plan.

2.1 Big Game

2.1.1 Seasonal Distribution and Habitat Affinity

Based on current WGFD GIS mapping, the Permit Area is mapped as winter/yearlong range for pronghorn (*Antilocapra americana*). The Permit Area is outside of mapped range for mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), and moose (*Alces alces*). Both elk and mule deer have been observed on the site during baseline studies. The survey area for big game included the Permit Area and a surrounding 2-mile buffer.

Big game surveys were conducted at the Lost Creek project area on the following dates: February 19, 2010; March 28, 2010; June 3, 2010; August 23, 2010.

Table 2.1A summarizes the results of the big game surveys. Attachment A, Figure 2.1A shows the locations of big game observations.

Table 2.1A. Summary of big game counts conducted during 2010 in the Lost Creek project area.

Survey Date	Survey Time	Pronghorn		Elk	
		Male	Female	Male	Female
02/19/10	1000-1530 hr	5	3	0	0
03/28/10	1000-1530 hr	22	51	0	0
06/03/10 06/04/10	1100-1530 hr	8	23	0	3 7
08/23/10	1200-1530 hr	1	2 (2 fawns)	0	0

Pronghorn use appeared to be highest during the late winter and early spring. Summer use was higher in June. The June survey was completed just prior to fawning. Few pronghorn were observed on the site during late summer. Pronghorn use appears to be spread throughout the site. Pronghorn were observed using the stock tank located along Battle Springs Draw (in Section 22 just south of the main access road) several times during the summer and fall periods (observations made while completing other survey work). Pronghorn habitat use was highest in the upland big sagebrush vegetation type.

Elk use was only recorded during the June period. However, other elk herds were observed nearby (although outside of the Permit Area and 2-mile buffer big game study area) in late May and early June. Elk have also been observed within the Permit area (2006, 2007, 2009) during late May. Evidence of elk use (pellet groups) was observed within lowland sagebrush zones within the Permit Area. This use appears to occur occasionally during the winter and early spring periods.

No mule deer were observed within the big game survey area in 2010.

2.1.2 Climate Information

No big game winter concentrations or winter mortality were noted during 2010. Climate data for the winter period is summarized below. Snow depth data was not available.

Table 2.1B. Climate data for Rawlins, Wyoming, from December 2009 through March 2010 (NCDC 2010).

Month	Average Temperature (F)	Maximum Temperature (F)	Minimum Temperature (F)	Total Precipitation (in.)
December	16.2	41	-11.9	0.12
January	21.9	43	-2.7	0.02
February	22.5	44.1	-8	0.14
March	33.8	62.1	-4	0.68

2.1.3 Range Conversion

The entire Permit Area is within winter/yearlong pronghorn range; no other mapped big game ranges are present. Range conversion during 2010 was very limited within the Permit Area. A small area of disturbance was associated with ongoing exploration activities within the proposed Permit Area. Exploration drilling was completed during 2010 within the Lost Creek South area. Disturbance associated with these activities was very small (less than 10 acres). Nearly all disturbed areas have already been reseeded.

2.1.4 Mortality and Concentration Buildups

There were no observed concentrations of pronghorn or potential migration blocks (fences, snow drifts along roads, or other blocks) observed during 2010. There were no instances of concentrated or large-scale big game mortality observed during 2010.

2.2 Sage-grouse/Upland Birds

Greater sage-grouse (*Centrocercus urophasianus;* hereafter sage-grouse) monitoring protocols were designed to assess the effects of ISR activities on: sage-grouse populations, seasonal habitat selection, and productivity within the Sage-grouse (SG) Monitoring Areas (Attachment A, Figure 2.2A study areas). Selection of study area boundaries was described in the 2010 Wildlife Monitoring and Wildlife Protection Plan (LC ISR, LLC 2010). The 2010 Large SG Monitoring Area (outlined in pink) was delineated to maximize the probability that reference leks were included within the monitoring area. Reference leks are considered to be leks within or near Core Area boundaries (outlined in green) which are not influenced by ISR activities, major highways, or other anthropogenic activities except livestock grazing and public recreation. The Small SG Monitoring Area (outlined in blue) was delineated to conservatively establish the area where nesting and early brood-rearing females may be influenced by ISR activities on the Lost Creek lease.

LC ISR, LLC used lek search and lek count protocols to assess potential impacts of ISR activities on sage-grouse populations. The objective of lek counts was to track male breeding population size within the SG Monitoring Areas through the life of the Project. The objective of lek searches was to determine if new leks become active within the SG Monitoring Areas during the life of the Project. Lek counts were conducted following protocol outlined by the WGFD Sage-grouse Technical Committee, and lek searches were conducted from the ground following protocol outlined in Connelly et al. (2003).

To determine the potential effects of ISR activities on habitat selection, LC ISR, LLC will use seasonal habitat selection data collected from radio-equipped individuals to model the seasonal habitats existing within the Small SG Monitoring Area. The objectives of these models are to quantify the amount of habitat that may conservatively be assumed to be functionally influenced by ISR activities on a seasonal basis (e.g., nesting, early brood-rearing, summering, and wintering habitats).

LC ISR, LLC used brood survey routes and wing surveys to assess potential impacts of ISR activities on sage-grouse productivity (e.g., juvenile recruitment). Because suitable summering habitats are not abundant throughout the potential impact area (e.g., the Small SG Monitoring Area), surveys were designed to monitor summer habitats where females potentially influenced by activity during the breeding, nesting, and/or early brood-rearing seasons chose to summer. These selected summer habitats were established from movement patterns of radio-equipped individuals.

This comprehensive sage-grouse monitoring plan is designed to accomplish definitive monitoring of the effects of ISR activities on populations. Monitoring will lead to and guide mitigation actions. However, it is a cost-intensive, long-term commitment and is timed to establish baseline conditions. Should a situation arise which prohibits or significantly delays LC ISR, LLC's activities (before or after regulatory approvals for the Project are issued), the commitment may be curtailed and may be limited to only annual lek counts within the Small SG Monitoring Area or within the total Affected Area (Figure 4.0A) as established from a *Density/Disturbance Calculation Tool* (DDCT) analysis (formerly PIAA); see

http://psc.state.wy.us/htdocs/Dwnload/SageGrouseExecOrder2010-4.pdf; Wyoming State Governor's executive order 2010-4 and Attachment C) analysis conducted by LC ISR, LLC (see section 4.0 *Modifications for 2011 Wildlife Monitoring, Protection Measures* in this report for further discussion on 2011 modifications to field protocol). LC ISR, LLC will inform WGFD, BLM, WDEQ-LQD, and NRC should this monitoring change be necessary.

2.2.1 Populations

2.2.1.1 Lek Counts

Lek count data will be the primary data used to assess the population-level effects of developing the Lost Creek uranium deposits. The lek monitoring methods are therefore as comprehensive as possible. The objective of lek count monitoring is to track through the life of the project, as inclusively as possible, male breeding populations on leks potentially influenced by ISR activities, concurrent with monitoring leks not influenced by such activities, but similar in other respects.

Counts in 2010 were conducted at all known leks within the SG Monitoring Areas starting with a 2010 baseline list of known leks (Table 2.2A). The 2010 counts also included new leks that were found during 2010. The 2010 baseline list was established from existing data (e.g., the WGFD sage-grouse database) and a comprehensive lek search of the SG Monitoring Areas conducted in April 2010. The list of known leks will be updated on a three-year cycle based on lek search flight results (Section 2.2.1.2). LC ISR, LLC coordinated 2010 monitoring efforts with the BLM and WGFD to avoid duplicative efforts that could result in undue disturbance of the leks. Lek count methods followed standard BLM and WGFD methods as described in the 2010 Wildlife Monitoring and Wildlife Protection Plan (LC ISR, LLC 2010).

Table 2.2A. Sage-grouse lek count data summary in project SG Monitoring Areas.

Lek Name	Early	Count 1	Count 2	Count 3	Count 4	Peak Males
			DATE -♂-♀-U TIME			
Arapahoe		4/11-36-12-3 0635	4/20-38-1-0 0625	4/27-16-0-0 0655		38
Bare Ring Butte		4/13-33-4-3 0630	4/21-55-2-0 0616	4/28-43-2-0 0558		55
Bull Springs*	4/9-12	4/16-21	4/17-18	4/26-22	5/8-14	22
Chain Lakes Rim*		4/13-49	4/21-29	4/22-40	4/29-36	49
Chicken Spring*		4/9-93	4/16-84 4/17-111	4/26-101 4/27-87	5/8-49	111
Crooked Well		4/15-0-0-0 0640	4/21-0-0-0 0635	5/5-0-0-0 0537		0
Cyclone Rim		4/16-85-32-0 0645	4/27-37-23-0 0555	5/5-46-1-0 0620		85
Discover		4/13-15-4-0 0655	4/21-12-2-0 0653	4/28-0-0-0 0630	5/7-14-0-2 0615	15

Table 2.2A. Sage-grouse lek count data summary in project SG Monitoring Areas.

Lek Name	Early	Count 1	Count 2	Count 3	Count 4	Peak Males
			DATE -♂-♀-U TIME			
Discover East		4/13-0-0-0 0705	4/21-0-0-0 0705	4/28-0-0-0 0620	5/7-0-0-0 0620	0
Discover South		4/13-4-5-0 0710	4/21-11-0-0 0655	4/28-16-1-1 0555	5/7-19-2-0 0555	19
Eagles Nest	3/31-6-0-0 0730	4/9-7-8-0 0655	4/14-6-2-0 0650	4/22-0-0-0 0640		7
Eagles Nest Draw		4/13-19-11-0 0645	4/21-42-6-0 0645	4/29-26-0-5 0600		42
Eagles Nest Fence*		4/12-51	4/19-59	4/26-23	5/7-3	59
Eagles Nest Reservoir		4/11-0-0-0 0729	4/20-0-0-0 0700	4/2 0-0-0 0630		0
East Alkali		4/15-14-20-0 0620	4/20-13-0-0 0625	4/27-13-0-0 0625	5/5-13-0-0 0615	14
East Antelope	3/30-17-2-1 0730	4/13-20-0-2 0730	4/2-29-1-0 0710	4/29-21-1-1 0630		29
Green Ridge		4/14-45-4-0 0640	4/22-43-5-0 0635	4/2 46-4-0 0551		46
Hadsell Crossing		4/11-42-12-0 0707	4/20-10-0-0 0645	4/27-15-2-0 0625		42
Hadsell Road*		4/9-0	4/19-0	4/26-0	5/7-0	0
Harrier	3/30-37-4-1 0645	4/10-35-8-0 0630	4/20-20-4-0 0615	4/21-42-0-0 0640		42
Larsen North Well*		4/9-20	4/16-5 4/17-26	4/26-3 4/27-0	5/8-0	26
Little Osborne	3/30-0-0-0 0715	4/10-0-0-0 0705	4/20-0-0-0 0645	4/28-0-0-0 0650		0
Lost Alkali		4/15-0-0-0 0615	4/20-0-0-0 0630	4/27-0-0-0 0615	5/5-0-0-0 0625	0
Lost Arapahoe		4/20-16-1- 00648	4/27-8-0- 00600	5/5-24-0- 00645		24
Lost Creek		4/20-0-0-0 0700	4/27-0-0-0 0635	5/5-0-0-0 0615		0
Lost Creek Basin		4/15-32-6-0 0705	4/20-65-2-3 0615	4/27-8-0-0 0650	5/5-32-0-0 0600	65
Minex West	3/31-4-2-0 0645	4/9-10-2-0 0628	4/14-11-2-0 0620	4/28-7-0-0 0640		11
Monument Lake*	3/13-8	4/13-5	4/21-0 4/22-5	4/29-5		8
Mud Lake*	NC	NC	NC	NC	NC	NC
Mud Lake* North		4/8-33-19-22		5/5-34-4		34
Mud Springs*		4/10-40				40
Osborne Draw	3/30-0-0-0 0700	4/10-0-0-0 0640	4/20-0-0-0 0700	4/28-0-0-0 0700		0
Prospects		4/14-36-11-0 0617	4/22-34-10-0 0555	4/29- 31-6-0 0623		36
Prospects South		4/14-0-0-0 0605	4/15-0-0-0 0655	4/22-0-0-0 0610	4/2 0-0-0 0638	0
Red Creek Well	3/31-4-0-0 0810	4/9- 32-5-0 0720	4/14/-35-2-0 0635	4/22-24-1-0 0615		35

Table 2.2A. Sage-grouse lek count data summary in project SG Monitoring Areas.

Lek Name	Early	Count 1	Count 2	Count 3	Count 4	Peak Males
			DATE -♂-♀-U TIME			
Ruby Knolls* North	NC	NC	NC	NC	NC	NC
Ruby Knolls South*	3/21-39	4/19-65				65
Ruby Knolls West[1]		4/21-25				31
Sand Gully		4/13-15-4-0 0620	4/21-11-4-0 0620	4/2- 8-0-0 0605		15
SK Well	3/31-0-0-0 0720	4/9- 0-0-0 0645	4/14-0-0-0 0640	4/22-0-0-0 0700		0
Smiley Springs		4/12-43-6-0 0700	4/14-19-2-0 0825	4/22-38-4-0 0620	5/5-41-1-0 0550	43
Sooner		4/14-12-7-0 0700	4/15-16-11-0 0602	4/21-13-9-0 0600	5/5-12-3-0 0609	16
Sooner Oil		4/14-0-0-0 0655	4/15-0-0-0 0620	4/21-0-0-0 0615	5/5-0-0-0 0558	0
Sourdough Mine[1]		3/13-18	4/21-12			18
Southland Well		4/9-40 4/10-49	4/16-22 4/17-46	4/26-37 4/27-40	5/8-33	49
Stewart Creek*		3/22-43	4/9-50	4/16- 614/17-64	4/26- 314/27- 685/8-39	68
Stinking Springs		4/16-54-8-0 0640	4/26-30-2-0 0610	5/4-21-0-0 0610		54
Stinking Springs North		4/16-6-1-0 0705	4/26-5-0-0 0620	5/4-2-0-0 0600		6
Stratton		4/8-21-26		5/5-39-3		39
Stratton Camp		4/21-22-0-0 0630	4/28-20-2-0 0650	5/6-0-0-0 0600	5/7-26-0-0 0550	26
Stratton Lake		4/12-0-0-0 0800	4/14-0-0-0 0730	4/22-0-0-0 0650		0
Texas Oil*		4/12-0	4/19-0	4/26-0	5/7-0	0
Upper Osborne*		4/9-14				14
White Water		4/13-0-0-0 0630	4/22-0-0-0 0630	4/30-0-0-0 0550		0

*Incomplete count data (Data Pending)

2.2.1.2 Lek Searches

Breeding sage-grouse may be displaced by some ISR activities and thereby occupy other active leks or form new leks farther from those activities. Thus, periodic lek searches will be required to document new leks and thereby accurately assess the population-level response of sage-grouse to ISR activities.

Ground-based lek searches were conducted throughout the Large SG Monitoring Area in spring

2010. Areas within 0.6 miles of known leks were searched during lek count procedures to document the existence of previously unknown satellite leks; the remainder of the monitoring area was systematically searched by 3 biologists between April 6 and April 18, 2010. Ground searches were conducted by vehicles from 0.5 hours prior to sunrise, to 1.5 hours after sunrise. Strutting sage-grouse were located by sight and sound. The ground at all potential leks was searched once the birds had left the site for evidence of consistent use (e.g., fecal droppings and feathers). Areas that needed additional effort were searched for sage-grouse with trained pointing dogs during non-crepuscular periods. These efforts were focused on finding groups of males, thereby spatially focusing subsequent morning searches.

LC ISR, LLC will conduct lek searches of the SG Monitoring Areas as amended (see Section 4.0 in this report) from fixed-wing aircraft every third year from 2010 (e.g., establishment of lek location baseline) through the life of the project.

Results

Table 2.2B. New sage-grouse leks found during lek searches in south-central Wyoming, April 2010.

Lek Name[1]	UTME	UTMN	Zone
Discover South[2]	259204	4667207	13
Stratton Camp[3]	267602	4654900	13
Stinking Springs North[4]	735005	4692372	12
Cyclone Rim[5]	735688	4679517	12

[1]Lek names were established as part of this report and are not yet adopted by WGFD.
[2]Lek is located about 0.5 miles south of the known Discover lek.
[3]Lek is located south of Chain Lakes near the old Stratton Sheep Camp.
[4]Small lek, located about 0.6 miles north of the known Stinking Springs lek.
[5]Large new lek, located near the east end of Cyclone Ridge.

Table 2.2C. Baseline sage-grouse leks (54 leks) in south-central Wyoming to be included in future monitoring: results of counts of the maximum number of males, 2006-10.

	Maximum Males Counted					Impact
Lek Name	2006	2007	2008	2009	2010	Status[1,2]
Arapahoe	134	109	91	29	38	Reference
Bare Ring Butte		125	76	75	55	Reference
Bull Springs	25	16	11	16	22	Reference
Chain Lakes Rim	65	61	46	33	49	Reference
Chicken Spring	184	181	146	135	111	Reference
Crooked Well[3]	0	4	0	0	0	Affected
Cyclone Rim					85	Reference
Discover	69	37	104	22	15	Affected
Discover East	22	12	5	0	0	Affected
Discover South					19	Affected
Eagles Nest	23	17	0	14	7	Reference
Eagles Nest Draw	57	22	52	47	42	Affected
Eagles Nest Fence	146	132	108	66	59	Reference
Eagles Nest Reservoir					0	Affected
East Alkali	47	35		8	14	Reference
East Antelope	58	64	19	39	29	Reference
Green Ridge	63	87	58	56	46	Affected
Hadsell Crossing	24	53	43	10	42	Reference
Hadsell Road	0	0	0	0	0	Reference
Harrier	80	79	67	77	42	Reference
Larsen North Well	42	34	20	29	26	Reference
Little Osborne					0	Affected
Lost Alkali	0	0		0	0	Reference
Lost Arapahoe	93	60	0	42	24	Reference
Lost Creek	0	0		0	0	Reference
Lost Creek Basin	110	69		9	65	Reference
Minex West	22	24	13	10	11	Affected
Monument Lake	23	20	9	8	8	Reference
Mud Lake	0	0	0	0	NC	Reference
Mud Lake North	38	34	25	35	NC	Reference
Mud Springs	29	0	22	15	40	Reference
Osborne Draw		0		0	0	Reference
Prospects	64	68	66	52	36	Affected
Prospects South		10	9	2	0	Affected
Red Creek Well	80	79	49	57	35	Reference
Ruby Knolls North		0			NC	Reference
Ruby Knolls South	43	47	19	53	65	Reference
Ruby Knolls West	29	22	21	21	25	Reference
Sand Gully	126	108	72	36	15	Affected
SK Well	0		0	0	0	Reference
Smiley Springs	100	91	57	58	43	Reference
Sooner	34	37	28	23	16	Affected
Sooner Oil	0	0	0	3	0	Affected
Sourdough Mine	26	22	22		18	Reference
Southland Well	81	69	57	54	49	Affected
Stewart Creek	68	59	50	55	68	Reference
Stinking Springs	92	11			54	Reference
Stinking Springs North					6	Reference
Stratton	72	60	36	36	NC	Reference
Stratton Camp					26	Reference
Stratton Lake	0		0	0	0	Reference
Texas Oil	0	0	0	0	0	Reference
Upper Osborne	37	72	61	66	14	Reference
White Water					0	Reference

[1] Reference leks are those within the Large SG Monitoring area but not within the Total Affected Area (see Section 4.0 in this report).
[2] Affected leks are those within the Total Affected Area (see Section 4.0 in this report).
[3] Crooked Well was designated as "U" in the WGFD sage-grouse database for 2007; this lek is either unoccupied or undetermined based on WGFD definitions; this lek was therefore removed from analyses.

2.2.1.3 Analysis of Lek Data

LC ISR, LLC is interested in investigating the effects of the Lost Creek Project on sage-grouse populations, and as such, needs to account for other potential impacts to populations, particularly other energy development, grazing, and traffic. Given the size of the Large SG Monitoring Area, natural factors influencing populations at large spatial scales (e.g., weather) should be standardized across the area. The measures that will be taken to identify other potential impacts and the subsequent data analysis methods are described below.

Energy Development - Energy Development - Anthropogenic energy development data will be compiled within the SG Monitoring Areas plus a 6-km buffer around the Large SG Monitoring area. The 6-km buffer region is included to ensure that the potential cumulative effects of anthropogenic activity not associated with Lost Creek are accounted for during analyses. Research has established that lek occupation by male sage-grouse may be negatively influenced

by natural gas development within 6 km of the lek (see Naugle et al. 2010); therefore, the 6-km buffer ensures that we are taking into account potential impacts to the chosen sample of leks that may occur outside the Large SG Monitoring area boundary. These data will be updated annually to reflect the conditions encountered by sage-grouse during each breeding season. All energy developments (e.g., uranium, gas, oil) will be mapped in a GIS.

ISR activities within this area will be quantified over a distinct spatial area. Due to the nature of ISR, mapping of mine units or groups of wells within mine units, rather than single well locations, is more representative of ISR activities (mine units or groups of wells within mine units are referred to as 'ISR polygons' in the data analysis). Gas and oil development will be mapped to individual well pads. Development data will be compiled from publicly available records and will be spatially verified in the field. Undeveloped gas and oil leases within the SG Monitoring Areas exist; if these leases are developed, any lek within 6-km of a pad being drilled during the breeding season (March 15 – May 1), or within 3-km of a producing pad, will be monitored but removed from the subsequent data analyses (3- and 6-km impact distances of gas or oil development are estimated in Holloran 2005).

Grazing - LC ISR, LLC will use BLM grazing records to determine if livestock management in any particular grazing allotment differs dramatically; this assessment will be made subjectively. If LC ISR, LLC finds such a lease, any lek where at least 20% of a 5-km buffer around that lek includes that grazing allotment will be removed from analyses (the 20% is from Connelly et al. 2000, and the 5-km buffer is from Holloran and Anderson 2005).

Traffic - Traffic will be quantified on all improved surface roads within the monitoring area, using pneumatic axle counters. Axle counter data will be recorded at least weekly during the breeding season; all counters will be checked the day following a snow storm to ensure plowing has not damaged or pushed the counter tubing from roadway. Although traffic volume changes will be directly related to the Lost Creek Project, to assess the effects of traffic on breeding sage-grouse, LC ISR, LLC will need to standardize for activities associated with uranium recovery. LC ISR, LLC will remove any lek within 6-km of developed uranium polygons (Lost Creek plus other companies), and investigate annual changes in the number of males (response variable) on the remaining leks in terms of distance to the closest point along an improved surface road and traffic levels (predictor variables).

Models assessing the effects of traffic will be used to estimate distance to a road with a given level of traffic where impacts to grouse activity are minimized. These estimates will be used to identify leks greater than 6-km from the Lost Creek Permit Area (e.g., potential control leks) that are influenced by traffic and, therefore, need to be removed from analysis of the impacts of ISR activities.

Lek Discussion - The maximum number of males counted on known leks throughout the SG monitoring areas cumulatively decreased 9% between 2009 and 2010, which is less than statewide declines of 20% during the same time period (statewide information is from the WGFD sage-grouse database and is an estimated decline of all leks counted both in 2009 and 2010). Population trends estimated as the slope of the line through annual counts on leks throughout the SG monitoring areas cumulatively suggest populations decreased 15% on average

annually throughout the monitoring areas over the last 5 years (2006-2010). Leks within 4 miles of the Lost Creek lease area boundaries decreased on average 20% annually, as compared to leks >4 miles from the lease boundary and within the Large SG Monitoring Area that decreased on average 14% annually over the last 5 years (see Table 2.2C).

2010 lek searches established the baseline number of leks within the SG monitoring areas as 54 (see Table 2.2C and Figure 2.2A).

Anthropogenic attributes of the landscape described above are currently being compiled. These data are required prior to implementing lek count analysis methods as described in the 2010 Wildlife Monitoring and Wildlife Protection Plan (LC ISR, LLC 2010).

2.2.2 Habitat Selection

Because of potential difficulty maintaining a sample of radio-equipped birds near energy development through the life of the project, for the purposes of designing the monitoring program LC ISR, LLC has assumed that uranium extraction in the Lost Creek Permit Area will have an influence on sage-grouse similar to the influence of natural gas development. Radio-equipped females captured from leks surrounding proposed development are being used to establish seasonal habitats occurring within what has been assumed will be the zone of influence (e.g., the Small SG Monitoring Area) around the Lost Creek Permit Area.

2.2.2.1 Trapping

Sage-grouse fieldwork was initiated in April 2010 with the capture and radio-tagging of 36 female sage-grouse from 9 leks situated in or near the Small SG Monitoring Area. We radio-tracked an additional 11 females trapped in 2008-09 on leks situated in the southeastern portions of the Large SG Monitoring Area for a research project being conducted through the University of Wyoming (Figure 2.2B). We captured female grouse on and near leks by spot-lighting and hoop-netting (Giesen et al. 1982, Wakkinen et al. 1992), and we classified each female captured as a yearling (first breeding season) or adult (≥second breeding season) based on the shape of the outermost wing primaries (Eng 1955). Radio transmitters were secured to females with a PVC-covered wire necklace (Advanced Telemetry Systems Inc. [ATS], Isanti, MN, USA). Transmitters weighed 19.5 g, had a battery life expectancy of 530 days, and were equipped with motion-sensors (i.e., radio-transmitter pulse rate changed to indicate mortality).

2.2.2.2. Nesting Habitat Selection

We used hand-held receivers and 3-element Yagi antennas (ATS) to monitor radio-equipped females at least twice weekly through pre-laying (April) and nesting (May-June). Nests of radio-equipped birds were located by circling the signal source until females could be directly observed. Locations near nests were marked with GPS to facilitate relocation of the site following females' departure from nesting areas.

Twenty sage-grouse nests were documented from radio-equipped individuals (Figure 2.2C).

2.2.2.3 Early Brood-Rearing Habitat Selection

We located females that nested successfully at least twice between hatch and 14 days post-hatch; this period was considered early brood-rearing due to chick reliance on insects during this stage (Johnson and Boyce 1990).

Eleven early brood-rearing locations from 7 individual radio-equipped females were documented (Figure 2.2C).

2.2.2.4 Mid Brood-Rearing Habitat Selection

Females maintaining broods through early brood-rearing were located at least bi-weekly between 14 days post-hatch and July 15; these locations were considered mid brood-rearing.

Ten mid brood-rearing locations from 6 individual radio-equipped females were documented (Figure 2.2C).

2.2.2.5 Late Brood-Rearing Habitat Selection

Females maintaining broods through mid-brood-rearing were located at least bi-weekly between July 15 and August 31; these locations were considered late brood-rearing.

Seventeen late brood-rearing locations from 11 individual radio-equipped females were documented (Figure 2.2C).

2.2.2.6 Barren Female Spring and Barren Female Summer Habitat Selection

Barren (i.e., non-nesting or non-brooding) females were located at least monthly between nest or brood loss and July 15; these locations were considered barren female spring locations. Barren females were located at least monthly between July 15 and August 31; these locations were considered barren female summer locations.

Ninety-five barren female spring locations from 31 individual radio-equipped females, and 40 barren female summer locations from 21 individual radio-equipped females were documented (Figure 2.2D).

2.2.2.7 Fall and Winter Habitat Selection

Fall and winter habitat selection for brood and unsuccessful females was documented from fixed-wing aircraft (Sky Aviation, Dubois, WY, USA). Flights were conducted at least bi-monthly. Fall was established as September 1 to November 30; winter was established as

December 1 to March 31.

Eighty-two fall locations from 36 individual radio-equipped females were documented (Figure 2.2E).

Fifty-seven winter locations from 30 individual radio-equipped females were documented (Figure 2.2F).

2.2.3 Demographics

Demographic results are summarized in Table 2.2D at the end of this section.

2.2.3.1 Nest Propensity

Nesting propensity was estimated as the number of females initiating a nest divided by the total number of females intensively monitored throughout the entire nesting season. We did not include females found for the first time after 19 May in nesting propensity estimates (19 May represented the latest date of incubation initiation based on mean latest hatch date and 26 days to incubate a clutch [Schroeder et al. 1999]). The date of nest establishment was the first day females were documented on a nest. A variance estimate (i.e., standard error) for overall nesting propensity will be established using annual variation.

2.2.3.2 Nest Success

After nest identification, incubating females were monitored from a distance of ≥ 60 m to minimize chances of human-induced nest predation or nest abandonment. Nest fate (successful or unsuccessful) was assigned when radio monitoring indicated the female had left the area. Nests were identified as successful if ≥1 egg hatched, indicated by presence of detached eggshell membranes (Wallestad and Pyrah 1974). The area around depredated nests was searched for hair, scat, tracks, or other signs left by the predatory species, and condition of the nest area and eggshell fragments were noted. Sargeant et al. (1998) describe nest conditions following depredation by several species; we used their descriptions to assist in nest predator identification.

Apparent nest success was estimated as the number of successfully hatched nests divided by the number of confirmed nesting attempts. Apparent nest success probability estimates were adjusted following Mayfield (1975). For this adjustment, we estimated length of the laying and incubation period at 32.5 days (Schroeder et al. 1999). A standard error estimate for apparent nest success was established using annual variation; standard error estimates for adjusted nest success were calculated following Hensler and Nichols (1981). Because of small sample sizes, re-nests were not considered independently and were grouped with initial nests for nest success estimates. Because we typically identified a nest following the initiation of incubation (i.e., following clutch completion) and we potentially missed nests destroyed during the egg-laying or early incubation stages (females classified as non-nesters), apparent nesting propensity was a minimum and apparent nest success could be overestimated.

2.2.3.3 Early Brood-Rearing Chick Survival

Chick existence during the early brooding stages (i.e., hatch through 2 weeks post-hatch) was based on either visual confirmation of chick(s) or the reaction of females to the presence of a potential predator (i.e., the researcher; Schroeder et al. 1999). Early brood success rates were estimated by dividing the number of females with chicks 2 weeks post-hatch by the total number of successfully hatching females.

2.2.3.4 Chick Production

During the late brooding stage we conducted spotlight surveys on consecutive nights 35 and 36 days post-hatch; fledge estimates were obtained during these spotlight surveys, and were an estimate of the number of chicks produced per brood. We relocated females found without live chicks during any brooding stage (e.g., early, mid, or late) 2 to 4 days following the initial location to confirm brood loss.

Fledge rates (chicks per brood) were estimated by dividing the total number of chicks produced by the total number of females with ≥1 chick at time of spotlight survey; females that lost their entire brood during any brooding stage were not included in chick per brood estimates. Annual population productivity was estimated as the total number of chicks fledged divided by the total number of females known alive on August 1. Standard error estimates for early and late brood-rearing success will be established using annual variation. The fate of a brood was unknown if the brooding female was killed or could not be located during any brooding stage; thus, these individuals were discounted when estimating apparent success during brooding stages.

Late brood-rearing and barren female summer locations from radio-equipped birds were used to identify areas where birds using nesting or early brood-rearing habitats closely associated with the Lost Creek Permit Area concentrate during the summer. Brood-rearing transects were located based on this telemetry data. Eight permanent walking transects 1000-m in length were established in each of these areas. Attachment A, Figure 2.2G shows the locations, start and stop points, dominant vegetation, and maps of these transects. Transects were surveyed twice during a one-week period in late July from sunrise to two hours after sunrise to ensure feeding times were captured in monitoring efforts. All grouse observed were counted and classified (adult male, adult female, young of the year). These 2010 established transects will be surveyed annually through the life of the Project. Data collected from these efforts will be compared by total grouse use by sex and numbers of chicks per female. Table 2.2E summarizes the results of the brood transects.

LC ISR, LLC used wing-barrel information to further investigate annual differences in productivity relative to ISR activities. Wings collected from barrels situated near the project area (see Figure 2.2H) will be compared as the number of chicks per female in the harvest to a group of barrels situated farther from the project area but in the same general region.

Wing data are currently being compiled.

2.2.3.5 Adult Survival

Annual survival was estimated for females from 1 April through March. All females were located twice weekly between 1 April and hatch (~15 June) or 3 weeks post-nest failure. Brood females were located weekly from hatch through August. Survival was assessed visually during these periods. We monitored unsuccessful females from long-range distance weekly from 3 weeks post-nest loss through June, and bi-weekly from July 1 through August; motion sensors were used to evaluate survival of unsuccessful females during these stages. Survival was estimated from 1 September through March for brood and unsuccessful females from fixed-wing aircraft (Sky Aviation, Dubois, WY, USA). Flights were conducted at least bi-monthly and motion sensors were used to evaluate whether individuals were dead or alive.

Female annual survival (April-March) estimates and standard errors, and monthly survival estimates and standard errors combined into seasonal periods were estimated using the staggered entry Kaplan-Meier estimator (Pollock et al. 1989). The seasonal periods investigated included spring (April and June), summer (July and August), fall (September through December), and winter (January through March). Months included in the analysis consisted of all months with survival information; any month with no survival information was censored (i.e., no telemetry flight was conducted). Additionally, birds that were not found during any monthly period were censored.

Table 2.2D. Female sage-grouse demographic results from radio-equipped individuals in south-central Wyoming, 2010 (Lost Creek update, April 1, 2011).

	April 1, 2011	
	Numbers	Percentages
Total Females Radio-monitored	47	
Nesting Propensity[A]	15/22	68.2%
Nesting Success (apparent)[B]	8/20	40.0%
Nesting Success (adjusted)[C]		23.0% (4.0 [SE])
Early Brood Success (apparent)[D]	6/10	60.0%
Late Brood Success (apparent)[E]	4/4	100%
Number of Females Known to Fledge Chicks	7	
Total Number of Chicks Fledged[F]	27	
Average Brood Size[G]	3.86	
Number of Chicks per Female[H]	0.95	
Seasonal Survival[J]		
Spring (Apr-June)		79.5% (61-98 [95%CI])
Summer (July-Aug)		96.8% (73-100 [95%CI])
Fall (Sept-Nov)		97.1% (71-100 [95%CI])
Winter (Dec-Mar)		78.3% (45-100 [95%CI])
Annual (Apr-Mar)		56.9% (39-75 [95%CI])

[A] Number of females initiating a nest divided by total number females surviving nesting season; excludes females located after 5/19/10.

[B] Number of successfully hatched nests divided by total number of nests with known fate; includes renests.

[C] Estimated following Mayfield 1975 and Hensler and Nichols 1981; includes renests (Mayfield, H. F. 1975. Suggestions for calculating nest success. Wilson Bulletin 87:456-466; Hensler, G. L., and J. D. Nichols. 1981. The Mayfield method of estimating nesting success: a model, estimators and simulation results. Wilson Bulletin 93:42-53).

[D] Number of females with chicks 2 weeks post-hatch divided by total number of successful nests; excludes missing and non-checked (landowner access denied) females.

[E] Number of females fledging chicks (based on spotlight surveys) divided by total number of successful early brooding females; excludes missing and non-checked (landowner access denied) females.

[F] Based on spotlight surveys conducted 35 and 36 days post-hatch.

[G] Total chicks fledged divided by number of females known to fledge chicks.

[H] Total chicks fledged divided by number of females known alive August 1.

[J] Kaplan-Meier estimator (Pollock, K. H., S. R. Winterstein, C. M. Bunck, and P. D. Curtis. 1989. Survival analysis in telemetry studies: The staggered entry design. Journal of Wildlife Management 53:7-15).

Table 2.2E. Lost Creek sage-grouse brood survey results.

Date	Transect ID	Start Time	End Time	Males	Females	Young of Year	Unknown
07/29/10	Crooks #1 [1]	06:00	06:22	3	4	3	7
07/29/10	Crooks #2	06:49	07:07	0	4	0	0
07/29/10	A&M #1 [2]	08:00	08:15	0	4	2	0
07/29/10	A&M #2	08:25	08:45	1	3	0	0
07/30/10	Lost Creek #1 [3]	06:05	06:28	0	10	4	0
07/30/10	Lost Creek #2	06:56	07:15	2	3	0	0
08/03/10	Stewart Creek #1	06:28	06:47	0	2	2	0
08/03/10	Stewart Creek #2	07:12	07:31	0	0	0	0
08/04/10	A&M #2	06:06	06:22	0	0	0	0
08/04/10	A&M #1	06:38	06:51	0	0	0	0
08/04/10	Crooks #2	07:28	07:45	0	5	0	0
08/04/10	Crooks #1	08:18	08:36	9	6	6	1
08/05/10	Lost Creek #2	06:15	06:35	0	0	0	0
08/05/10	Lost Creek #1	07:07	07:27	0	0	0	0
08/06/10	Stewart Creek #2	06:17	06:36	0	1	0	0
08/06/10	Stewart Creek #1	06:57	07:17	0	1	0	0

[1] 8 unknowns flushed within 200 meters of south end of transect at 0605 hrs.
[2] 7 females were observed along reservoir shoreline 100 meters west of west end of transect on 7/26 at approximately 1300hrs
[3] 3 females were observed towards the south end of transect on 7/29 at approximately 1800 hrs.

2.3 Raptors

2.3.1 Nest Status and Production Success

Four nesting raptor surveys were completed on the permit area and surrounding 1-mile radius in 2010. These included: one early February survey looking for signs of golden eagle (*Aquila chrysaetos*) and great-horned owl (*Bubo virginianus*) nesting and courtship; one late March survey to locate any great-horned owl or golden eagle nests; one late April survey to locate active raptor nests (all species), and one late June survey to locate any new nests and to determine nest success. During 2010 all nest surveys were completed from the ground. Nest checks were as brief as possible and conducted in ways to avoid flushing incubating raptors.

Table 2.3A summarizes the results of the 2010 nesting raptor survey for Lost Creek. Nest locations are shown on Attachment A, Figure 2.3A. No golden eagles or great-horned owl nests or breeding activity were found during the February and March surveys. The April and June surveys documented 4 active ferruginous hawk (*Buteo regalis)* nests within or near the 1-mile of the permit area boundary (note: 3 nests are just outside the 1-mile boundary). The ferruginous hawk is a BLM sensitive species and Migratory Bird of High Federal Interest (MBHFI).

All active nests are located on nesting platforms. Nest FH24930201 is located on a new transmission line post located along an existing transmission line that runs along the west edge of the permit area. Activity was not observed on this nest in 2009. Nests AFH25921004, FH25922801, and FH25923201 were also active in 2009. Nest FH25921601 is an inactive nest that is located in a large sagebrush. This nest has not been active within the last 4 years and is almost gone.

Table 2.3A. Lost Creek raptor nest locations.

Nest ID #	Species	PLSS Location	UTM Location	Nest Status	Nest Substrate	2010 Nest Fate	Notes
AFH25921004	Ferruginous Hawk	T25N R92W NWSE Sec. 10	0268595E 4670503N	Active	Artificial Nest Structure	2 fledged	Within 1-mile buffer
FH25921601	Ferruginous Hawk	T25N R92W SESW Sec. 16	0266480E 4668397N	Inactive, Dilapidated	Sagebrush	---	Old stick nest, in Permit Area
FH25922801	Ferruginous Hawk	T25N R92W SENE Sec. 28	0267066E 4665882N	Active	Artificial Nest Structure	1 fledged	Just outside 1-mile buffer
FH25923201	Ferruginous Hawk	T25N R92W SWNW Sec. 32	0264483E 4664481N	Active	Artificial Nest Structure	2 fledged	Just outside 1-mile buffer
FH24930201	Ferruginous Hawk	T25N R92W SWNW Sec. 2	0260861E 4663028N	Active	Artificial Nest Structure on New T-Line Post	2 fledged	Just outside 1-mile buffer

2.3.2 Measures of Disturbance

Attachment A, Figures 2.3A and 2.3B show the locations of active raptor nests within the study area. The nearest known human activity observed during the breeding season (March 1 to July 31st) is also shown on Figure 2.3B. Lost Creek ISR, LLC did not complete any drilling or exploration activity during the spring or early summer raptor nesting period on the Permit Area or other nearby exploration areas. The closest known nearby human disturbance was associated with activities at the existing Sweetwater Uranium mill and local BLM and county roads.

2.3.3 Prey Abundance

2.3.3.1 Lagomorphs

Jackrabbit and Desert Cottontail Surveys - Desert cottontail (*Sylvilagus audubonii*) and white-tailed jackrabbit (*Lepus townsendii*) populations were evaluated using spotlight surveys completed within native habitat in the Permit Area. Surveys were completed in the early evening (after nightfall) using a 1,000,000-candlepower spotlight. One survey was completed in June and another survey was completed in late August of 2010. Three transects were established along approximately 1.5 miles of road within the Permit Area. Attachment A, Figure 2.3C shows the transect locations. These transects will continue to be used in annual wildlife monitoring surveys. Table 2.3B summarizes the results of the surveys.

Table 2.3B. 2010 Lagomorph spotlight survey results summary (Lost Creek Permit Area).

Transect	Date	Results and Comments
#1	6/3	4 White-tailed Jackrabbits
#2	6/3	4 White-tailed Jackrabbits
#3	6/3	3 White-tailed Jackrabbits, 1 Cottontail
#1	8/25	7 White-tailed Jackrabbits
#2	8/25	8 White-tailed Jackrabbits
#3	8/25	4 White-tailed Jackrabbits, 2 Cottontail

Pygmy Rabbit Surveys - Surveys for the pygmy rabbit (*Brachylagus idahoensis*), a BLM sensitive species, were completed during the fall of 2010. Survey methods followed BLM guidelines (Ulmschneider 2004). Four 0.5-mile long survey transects were completed in the Lost Creek disturbance area. The survey transects were chosen based on vegetation mapping, aerial photos, and on the ground conditions. Transects were located within areas of thicker lowland sagebrush cover in swales and ravines. Meandering transects were walked in these corridors and transect routes were recorded by GPS.

Surveys were conducted on October 11 and 12, 2010. Indicators of pygmy rabbit presence included tracks, pellets, burrows, and rabbit observations. All burrow locations were located by GPS and recorded (UTMs, NAD83, zone 13). Where several active burrows were present in the same area (one burrow complex) one GPS reading was taken for the complex. Data were recorded on standard data forms, and photographs were taken to illustrate representative habitat.

A total of 43 locations of burrows, other indicators, or possible indicators of pygmy rabbits were recorded. Some burrow locations were part of larger burrow complexes with several burrows located in the same sagebrush patch. One pygmy rabbit was sighted during the surveys. Table 2.3C provides a summary of burrow locations and burrow status and Attachment A, Figure 2.3C shows the locations of transects, burrows, and other indicators that were identified during the

survey effort.

Table 2.3C. Pygmy rabbit transect results summary (Lost Creek Permit Area).

Transect	UTME	UTMN	Status[1]
1	266410	4668310	C+OP/START T1
2	266419	4668331	FP
3	266425	4668342	B+FP
4	266431	4668355	FP
5	266446	4668372	B+FP
6	266496	4668423	VISUAL
7	266503	4668436	B+OP
8	266520	4998470	FP
9	266665	4668824	END T1
1	264014	4668356	START T2
2	263829	4668275	B+FP
3	263790	4668241	FP
4	263778	4668227	FP
5	263756	4668501	B+FP
6	263698	4668109	FP
7	263700	4668097	B+FP
8	263685	4668085	FP
9	263672	4667950	FP
10	263715	4667918	FP
11	263738	4667893	FP /END T2
1	263283	4668713	START T3
2	263342	4668679	FP
3	263382	4668637	FP
4	263377	4668579	B+FP
5	263373	4668567	B+FP
6	263368	4668555	B+OP
7	263380	4668429	FP
8	263370	4668317	FP
9	263386	4668313	FP
10	263513	4668063	FP /END T3
1	261455	4667890	START T4
2	261460	4667916	FP
3	261493	4668001	FP
4	261505	4668022	B+FP
5	261527	4668079	FP
6	261574	4668131	UB
7	261581	4668167	B+FP
8	261567	4668277	UB
9	261507	4668550	UB
10	261494	4668558	FP
11	261474	4668568	FP
12	261389	4668599	UB
13	261277	4668699	FP
14	261200	4668749	END T4

[1] B=burrow; FP=fresh pellets only; B+FB=burrow and fresh pellets; B+OP=burrow and old pellets; UB=unused burrow; C+OP=collapsed burrow and old pellets.

Pygmy rabbits are restricted to lowland sagebrush habitat areas within the Lost Creek Permit Area. Survey results were similar to those from an earlier pygmy rabbit survey completed within the Permit Area in 2006. The 2006 survey also found lowland sagebrush habitats within the Permit Area occupied by pygmy rabbits.

2.3.3.2 Small Mammals

Surveys for other small mammals are not proposed at this time and were not completed during 2010, except as noted below for the Wyoming pocket gopher and above for the pygmy rabbit.

2.4 Migratory Birds of High Federal Interest (MBHFI)

Migratory Birds of High Federal Interest (MBHFI) are species identified by the Wyoming Field Office of the USFWS in the Wyoming Bird Conservation Plan as having high conservation interest due to potential or known population declines (USFWS 2002). Nesting non-game bird surveys were conducted in representative vegetation/habitat types (upland and lowland sagebrush habitats) within the Permit Area. Surveys followed techniques recommended by the WDEQ (WDEQ-LQD 1994). Two transects were established in each vegetation type of the Permit Area. Transects were 1,000-meters in length (2,000-meters per habitat type). The two vegetation types in the Permit Area are Upland Big Sagebrush (Upland SB) and Lowland Big Sagebrush (Lowland SB). Surveys were completed in the peak of the nesting season during the 1st week of June (surveys were completed on 6/3 and 6/4). Surveys were completed from 0.5 hours before sunrise to 9:30 am. All birds (including non-game and non-MBHFI birds) observed or heard while walking the transects were recorded. Transect start and stop points were located by GPS. The same transects will be completed annually as part of the project wildlife monitoring. Transect locations are shown on Attachment A, Figure 2.4A. These transects will continue to be used in future annual monitoring efforts.

Table 2.4A. MBHFI 2010 transect results, Lost Creek Permit Area.

Species Observed	Species Status[1]	Lowland SB, Transect #1, No. Birds	Lowland SB, Transect #2, No. Birds	Upland SB, Transect #1, No. Birds	Upland SB, Transect #2, No. Birds
Brewer's Sparrow (*Spizella breweri*)	MBHFI, BLM, BCC	11	12	2	2
Sage Sparrow (*Amphispiza belli*)	MBHFI, BLM	5	3	1	1
Vesper Sparrow (*Pooecetes gramineus*)	MBHFI		1		
Sage Thrasher (*Oreoscoptes montanus*)	MBHFI. BLM	3	1		
Loggerhead Shrike (*Lanius ludovicianus*)	MBHFI, BLM, BCC	1			
Horned Lark (*Eremophila alpestris*)	-	5	3	7	6

Table 2.4A. MBHFI 2010 transect results, Lost Creek Permit Area.

Species Observed	Species Status[1]	Lowland SB, Transect #1, No. Birds	Lowland SB, Transect #2, No. Birds	Upland SB, Transect #1, No. Birds	Upland SB, Transect #2, No. Birds
Total # Birds	-	**24**	**20**	**10**	**9**

[1]MBHFI- Migratory Bird of High Federal Interest; BLM-BLM Sensitive Species; BCC - Birds of Conservation Concern species identified by the USFWS as those migratory non-game birds that without additional conservation actions are likely to become candidates for listing under the Endangered Species Act.

Because the survey was completed during the peak of the breeding season it is assumed that all of these species are nesting on the site. The most common breeding birds within the lowland sagebrush habitat were Brewer's sparrow, sage sparrow, and sage thrasher. In upland sagebrush habitat the horned lark was the most common breeding bird.

Other MBHFI that were observed within the Permit Area during 2010 included: ferruginous hawk (see Section 2.3), and one sighting of a chestnut-collared longspur (incidental sighting along Battle Springs Draw).

2.5 Federally Listed Threatened and Endangered Species

No Federally listed species (species listed as threatened or endangered) were observed within or near the Permit Area during 2010.

The greater sage-grouse has recently been classified as a Candidate Species for Federal Listing. Sage-grouse studies completed during 2010 are summarized in Section 2.2.

The Wyoming pocket gopher was petitioned to be listed in 2010. The USFWS found that the species did not qualify for listing in 2010. Wyoming pocket gopher surveys completed on the site are summarized in Section 2.6.

2.6 Non-Game Mammals

Specific monitoring surveys of non-game mammals are not proposed to be completed on an annual basis. Incidental observations of non-game mammals will be made while completing other wildlife surveys. These incidental observations will be summarized in a table in the Annual Report.

2.6.1 Wyoming Pocket Gopher Surveys

During the summer of 2010 surveys were completed on the Lost Creek Permit Area for the Wyoming Pocket Gopher (*Thomomys clusius*), within the proposed disturbance area for the Lost Creek Project. The Wyoming pocket gopher (WPG) is a BLM and FS sensitive species, a State imperiled species (Wyoming Natural Diversity Database [WNDD] G2/S2 rank) and was petitioned to be listed as a Threatened or Endangered Species. The U.S. Fish and Wildlife Service (USFWS) recently determined that Federal listing for the species was unwarranted. The

species has a very limited/isolated range that overlaps with the northern pocket gopher (*Thomomys talpoides*) and Idaho pocket gopher (*Thomomys idahoensis*). Predictive models show the Lost Creek Permit Area is within potential habitat areas (WNDD 2010). The BLM Rawlins office requested that surveys for the Wyoming pocket gopher be completed to support data gathering for the Environmental Impact Statement (EIS) being prepared for the project.

2.6.1.1 Methods

LWR completed transects within the disturbance zone of the permit area (approximately 330 acres) searching for pocket gopher mounds. Transects were completed in late August 2010. A visual search of the entire disturbance zone was completed while doing transects. Pocket gopher mounds are distinct from other mammal diggings in that they are pushed out from underground and generally have no external entrances. Once a gopher mound was observed, a 100-m radius search was completed to determine the center, size, and extent of the gopher “complex”. The complex was assigned a number, GPS located, photographed, and the number of fresh and old mounds was tallied. All transect data were recorded on the standard BLM/WNDD transect data form.

Trapping was completed in mid-September 2010. Traps were set for at least 3-4 nights in each active complex. The number of traps per complex varied according to the activity level of the complex. Typically 3-6 traps were placed within each complex.

Sherman live traps were used for the trapping. The traps were placed by digging down into lateral tunnels only near mounds with fresh gopher activity. Traps were set flush to the tunnel opening. If possible, traps were set going both directions along a tunnel. Traps were covered with black plastic trash bags. At least 5-6 inches of dirt was placed on top of the trash bags. Traps were baited with carrots and cilantro, and polyester bedding material was added to each trap. Set traps were covered by excavated soil to mimic tunnel conditions and to insulate captured animals.

2.6.1.2 Results

A total of 27 active (shown as F-D in Table 2.6A) and 23 inactive (shown as W-M in Table 2.6A) rodent complexes were located within the survey area while completing transects.

Table 2.6A. Wyoming pocket gopher survey results.

Complex No.	Way Point No.	Easting	Northing	F-D Mound Count[1]	W-M Mound Count[1]	Trapped	Catch[2]
1	18	263312	4668148	7	3		
2	20	263107	4668093	16	7	Yes	1 WPG
3	21	263040	4668065	14	14		
4	22	262923	4667994	12	7	Yes	1 WPG
5	23	262830	4667965	10	7	Yes	3 NGHM
6	26	262843	4667765	12	4		
7	27	263013	4667765	9	5	Yes	1 WPG
7.1	47	262745	4667735	5	4	Yes	1 NPG, 1 NGHM
8	28	262574	4668086	7	5		
9	29	262628	4667797	5	9	Yes	1 WPG
10	30	262644	4667624	3	5	Yes	1 WPG
11	31	262444	4667834	6	10	Yes	NONE
12	32	262414	4667954	3	2		
13	33	262129	4667942	4	6		
14	34	262019	4667835	8	2	Yes	1 WPG
15	35	262108	4667652	0	7		
16	36	262209	4667771	0	8		
17	37	265406	4668338	9	4	Yes	1 WPG
18	38	265461	4668278	4	3		
19	39	265492	4668488	6	8		
20	40	265573	4668545	3	4		
21	41	265194	4668388	4	6		
22	42	264832	4668568	4	8		
23	43	264822	4668301	4	6	Yes	NONE
24	44	264912	4668323	3	5	Yes	1 WPG
25	45	264850	4668104	7	7		
26	46	264637	4668497	5	4		
28	48	261262	4665519	0	7		
29	49	261226	4665671	0	7		
30	50	261411	4665612	0	5	Yes	1 WPG
31	51	261349	4668886	0	10		
32	52	261375	4668789	0	5		
33	53	261369	4668680	0	9		
34	54	261254	4668702	0	8		
35	55	263539	4668723	1	24	Yes	1 NPG
36	56	263781	4669211	0	15		
37	57	263346	4669121	0	7		
38	58	260974	4668337	0	5		
39	46A	263984	4668547	4	6	Yes	NONE
40	59	262946	4668527	0	11		
41	60	266259	4668295	0	6		
42	61	267318	4668252	0	11		
43	62	262278	4668449	0	4		
44	63	262520	4668450	4	0		
45	64	262361	4668493	0	8		
46	65	262292	4668473	0	12		
47	66	262132	4668466	0	6		
48	67	261636	4668451	0	5		
49	68	261197	4668460	6	5		

[1]F-D= Fresh or days old mounds; W-M=Weeks or months old mounds
[2]WPG= Wyoming Pocket Gopher; NPG= Northern Pocket Gopher; NGHM= Northern Grasshopper Mouse (*Onychomys leucogaster*)

Table 2.6A summarizes location and trapping information for the 49 WPG complexes located in the survey area. Fifteen complexes were trapped during the period of September 27 to October 1. Based on consultation with the BLM, we trapped the complexes that showed the best characteristics for Wyoming pocket gophers. Trapping was stopped in a complex if a Wyoming pocket gopher or northern pocket gopher was captured. Nine Wyoming pocket gophers, 2 northern pocket gophers, and 4 northern grasshopper mice were captured during the trapping effort.

All captured Wyoming pocket gophers, northern pocket gophers, and northern grasshopper mice were returned into the burrows where they were captured. There was no capture mortality.

Attachment A, Figure 2.6A shows the locations of Wyoming pocket gopher captures and burrow complexes. Wyoming pocket gophers were located throughout the Lost Creek disturbance area where active complexes were located. Based on surrounding habitat conditions it can be expected that Wyoming pocket gophers also occur in similar sagebrush habitats surrounding the Permit Area. Wyoming pocket gophers on site were located within very small open areas surrounded by sagebrush. After completing many transects it became apparent that the majority of the complexes could be located by looking for very small grassy openings within the sagebrush plant community. Based on 2010 surveys it can be assumed that Wyoming pocket gophers may be present within suitable habitat throughout the entire Permit Area.

Northern grasshopper mice were found living within several Wyoming pocket gopher burrow complexes. Based on visual observance of many small open tunnels within complexes it is likely that northern grasshopper mice are present in a majority of the Wyoming pocket gopher complexes.

2.7 Non-Game Birds

Specific surveys for non-game birds were not completed during 2010 except as noted for nesting raptors and MBHFI. During MBHFI surveys all birds observed or heard were recorded. In addition, incidental observations of non-game birds not previously observed on the site during past studies were made while completing other wildlife surveys. These incidental observations are summarized in Attachment B, Table B1.

2.8 Reptiles and Amphibians

Specific surveys for the Great Basin spadefoot toad (*Spea intermontana*) were completed within the Permit Area during the spring and early summer of 2010. The Great Basin spadefoot toad is a BLM Sensitive species.

Four auditory surveys for spadefoot toads were completed during the period of May through July. Surveys were completed in the evening and continued until after dark. Surveys were completed by driving area roads, stopping at 0.5-mile intervals, and listening for amphibian vocalizations. Survey routes were established to cover the permit area and also cover the best potential breeding habitat (intermittent streams, stock ponds, potential wetlands) within the Permit Area. Standard survey routes were established within the Permit Area. These included:

- The Lost Creek east/west road
- Battle Springs and Stratton Draws (including Crooked Well Reservoir and existing stock pond along Battle Springs Draw)
- Other potential wet areas or areas with occasional standing water

Attachment A, Figure 2.8A shows the spadefoot toad survey routes that were completed in 2010. Table 2.8A summarizes the survey dates, times and results.

Table 2.8A. Great Basin spadefoot toad, 2010 survey results summary (Lost Creek Permit Area).

Date	Start Time	Stop Time	Results
5/6	7:30pm	10:00pm	No amphibians heard.
5/20	7:30pm	10:00pm	No amphibians heard.
6/3	7:45pm	10:30pm	No amphibians heard.
7/8	7:20pm	10:00pm	No amphibians heard.

No observations of Great Basin spadefoot toads were made within the Permit Area during the spring/summer of 2010. Dry conditions during the survey period were not ideal for locating breeding toads. However, toads were also not located within perennial wet areas associated with the existing stock pond. The last survey was completed approximately 3 days after a heavy thunderstorm. Standing water was present within several areas of the Permit Area. No spadefoot toad vocalizations were heard.

Incidental observations of reptiles were made while completing other wildlife surveys. These incidental observations are summarized in Attachment B, Table B-1. The only reptile noted during incidental observations was the greater short-horned lizard (*Phrynosoma hernandesi*). This species was located 11 times in a number of locales within the Permit Area. No amphibians were observed within the Permit Area during 2010.

3.0 Evaluation of Wildlife Protection Measures Utilized and Wildlife Mortality in 2010

Table 3.0A summarizes the timing restrictions used during 2010 to protect sage-grouse and raptors.

Table 3.0A. Surface activity restrictions for protection of wildlife in the Lost Creek permit area.

Species	Exclusion Period		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Sage-grouse	Occupied Leks	No surface disturbance or occupancy within ¼-mile of lek.												
		No human activity between 6 pm and 9 am from March 1st through May 20th within ¼-mile of lek.												
	Active Lek in Suitable Nesting Habitat	No surface disturbance or other disruptive activity from March 1st through July 15th within 2 miles of lek.												
Raptors	Avoid disturbance within 1-mile nest buffer from February 1st to July 31st.													

Notes:
(1) Includes species, observed at the site, for which timing restrictions are in place per the Rawlins BLM 2007 Draft Resource Management Plan (RMP). If additional species, listed in the RMP, are observed, then BLM will be consulted to determine applicable timing and distance restrictions for those species.
(2) The timing and distance restrictions are based on the most conservative alternative in the Draft RMP. If the Final RMP includes different restrictions, those will be adopted after consultation with the BLM.

Additional wildlife protection measures utilized in 2010 included:

- Restoration/reseeding of the small disturbed areas associated with exploration wells
- Speed limits for personnel working on the site
- Other appropriate measures as outlined in the Wildlife Protection and Monitoring Plan (LC, ISR, LLC 2010).

Note: Because the project has not been constructed, not all of the wildlife protection and monitoring measures outlined in the Wildlife Protection and Monitoring Plan were followed in 2010. Only those measures that dealt with species monitoring, as outlined in Section 2.0 above, were completed. Only protection measures dealing with exploration activities were followed in 2010 because no mining activities have been started.

There were no instances of wildlife-related poisoning, large scale die-offs, or other large scale mortality during 2010.

4.0 Modifications for 2011 Wildlife Monitoring, Protection Measures

The wildlife monitoring methods and protocols and wildlife protection measures established in the Wildlife Protection Plan and the Wildlife Monitoring Plan (LC ISR, LLC 2010) will continue to be followed during 2011 (including timing restriction shown in Table 3.0A). The monitoring schedule shown in Table 1.0A will be followed during 2011. The following discusses recommendations for additional protection measures; recommended modifications to monitoring or surveying; and any recommendations for additional species to be monitored (e.g., a newly listed species) for 2011.

Sage-grouse: We will follow the field protocol implemented in 2010 (LC ISR, LLC 2010) at least through 2011. The radio-transmitters deployed in 2010 have a battery life-expectancy of 2 years. Thus, females radio-tracked in 2010 will continue to be “on the air” through 2011. Radio-transmitters retrieved from mortalities will be redeployed during spring, 2011.

LC ISR, LLC conducted a *Project Impact Analysis Area* (PIAA) analysis for Ur-Energy’s Lost Creek lease following procedures outlined by the Wyoming State Governor’s Sage-grouse Implementation Team (SGIT). On March 28, 2011, the SGIT submitted a new draft Executive Order with the PIAA renamed to *Density/Disturbance Calculation Tool* (DDCT) and the new terminology has been incorporated into this report. The SGIT also approved a Manual for implementing the DDCT. The DDCT analysis included in this report was rerun utilizing the Manual procedure and was approved by the WGFD (Attachment C) on March 3, 2011. This analysis established a Total Affected Area as all area within 4 miles of the total disturbance footprint proposed on Lost Creek leases (see Figure 4.0A). We recommend modifying the boundaries of the Small SG Study Area to match the Total Affected Area boundaries. This change will not change field protocol other than Eagles Nest Fence lek will be included in spring 2011 capture efforts (see Figures 2.2B and 4.0A).

The Wyoming State Governor's executive order 2010-4 mandated using a 3-year running average of lek counts during any 5-year period to establish trends in population sizes to compare between Affected and Reference areas. The current draft Executive Order awaiting release as of April 2011, continues to mandate the 3-year running average. Lek counts do not provide the data necessary to accurately track populations given small numbers of leks (see Beck and Braun 1980); however, over larger spatial areas lek counts can be used as a good indicator of population trends (see Connelly et al. 2003). Because of the potential bias associated with lek count indices, LC ISR, LLC will implement the following steps to track population size within Reference and Affected areas: (1) combine counts on leks within 0.6 miles of one another as these are probably a main lek with satellites; (2) generate a 3-year running average by lek with at least 3 years of counts from 2006; (3) add the 3-year averages to generate an estimated population by Reference and Affected by year; (4) graph these population estimates through time and visually assess whether the population trend lines are diverging; (5) if lines appear to be diverging, calculate the slope of each line across 3-year averages (e.g., a slope estimate is calculated each year from the 2 points proceeding the year in question and the point for the year in question); and (6) use the differences through time of the slope to quantify differences in population trends for Affected and Reference populations. The calculation of a 3-year average given missing data points over a 5-year period would occur as follows: the 3-year average for the year with missing data would be equal to the estimate from the proceeding year; the 3-year average for the year after the missing data (if that year has data) would be calculated from that year and the proceeding 2 years (of 3) with data. If more than 2 data points are missing for a lek during a given 5-year period, then that lek should not be considered in the analysis; we discuss techniques for possibly including these leks in future analyses below. We do not recommend analyzing trends in average lek sizes by population for 2 reasons: (1) this statistic would be generated as an average of an average, thus compounding any errors; and (2) the DDCT analysis is interested in investigating impacts to the trends in populations in the Affected area relative to a Reference area, not trends in lek size.

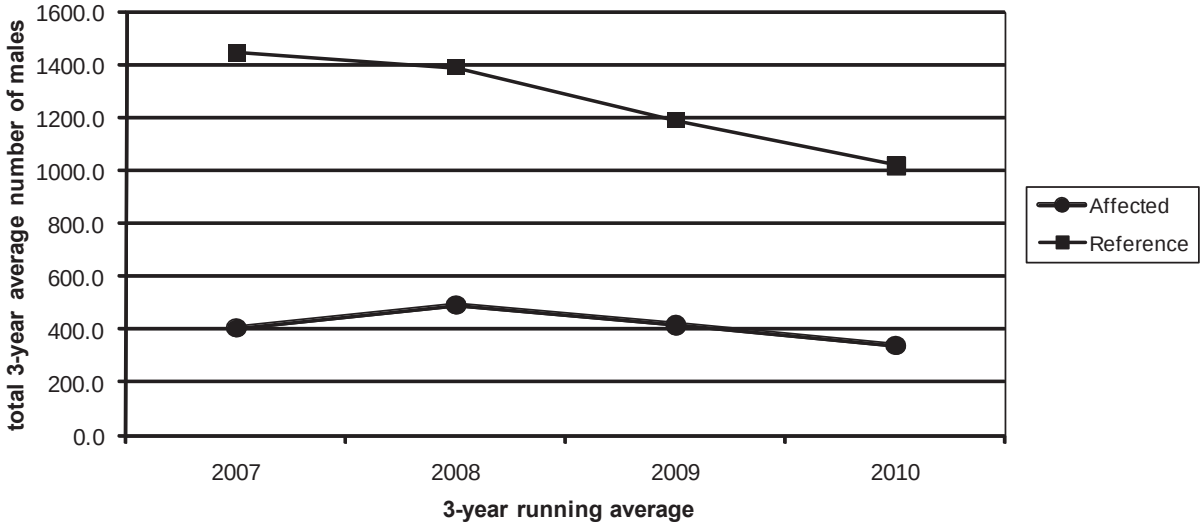
Lek monitoring on the DDCT Area established by LC ISR, LLC has 2 issues that are currently apparent: (1) the number of leks counted from 2006 changes annually (see Table 2.2C) and at least 2 relatively substantial leks (Cyclone Rim and Stratton Camp; see Table 2.2B) were discovered in 2010; and (2) the activities associated with developing the Lost Creek Lease will shift spatially through time, thus the Total Affected Area may shift to include leks that are currently considered reference or vice-versa. We recommend that in these situations, the analysis be re-initiated given 5 years of data for these leks (either the newly discovered leks, or the leks shifting category). This could be accomplished retroactively for the situation where leks shift from Reference to Affected (or vice-versa). To accomplish this for the newly discovered leks, the analysis will have to be initiated from 2010 starting in 2014.

As an example of the process, we will use the data presented in Table 2.2C; NOTE that we added data from 2004 and 2005 from the WGFD sage-grouse database to complete this example. Table 4.0A establishes the 3-year running averages from 2007 for the leks where these estimates could be generated; a graphical representation of these count estimates is included in Figure 4.0B.

Table 4.0A: 3-year running averages by Affected and Reference leks for the DDCT Area established by LC ISR, LLC. Missing data points are highlighted in grey. Note that leks included in this example (46 leks) are those listed in Table 2.2C with at least 3 counts from 2006.

									3-year running average			
Lek Name	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Status[12]**	**2007**	**2008**	**2009**	**2010**
Discover/Discover East/Discover South	28	28	91	49	109	22	34	Affected	56.0	83.0	60.0	55.0
Eagles Nest Draw	0	0	57	22	52	47	42	Affected	26.3	43.7	40.3	47.0
Green Ridge	42	34	63	87	58	56	46	Affected	61.3	69.3	67.0	53.3
Minex West	11	18	22	24	13	10	11	Affected	21.3	19.7	15.7	11.3
Prospects/Prospects South	22	37	64	78	75	54	36	Affected	59.7	72.3	69.0	55.0
Sand Gully	14	14	126	108	72	36	15	Affected	82.7	102.0	72.0	41.0
Sooner/Sooner Oil	12	17	34	37	28	26	16	Affected	29.3	33.0	30.3	23.3
Southland Well	40	57	81	69	57	54	49	Affected	69.0	69.0	60.0	53.3
Crooked Well	0	0	0	4	0	0	0	Affected	1.3	1.3	1.3	0.0
Arapahoe	71	103	134	109	91	29	38	Reference	115.3	111.3	76.3	52.7
Bull Springs	23	33	25	16	11	16	22	Reference	24.7	17.3	14.3	16.3
Chain Lakes Rim	29	47	65	61	46	33	49	Reference	57.7	57.3	46.7	42.7
Chicken Spring	94	190	184	181	146	135	111	Reference	185.0	170.3	154.0	130.7
Eagles Nest	4	24	23	17	0	14	7	Reference	21.3	13.3	10.3	7.0
Eagles Nest Fence	45	59	146	132	108	66	59	Reference	112.3	128.7	102.0	77.7
East Alkali	0	37	47	35		8	14	Reference	39.7	39.7	30.0	19.0
East Antelope	30	31	58	64	19	39	29	Reference	51.0	47.0	40.7	29.0
Hadsell Crossing	38	48	24	53	43	10	42	Reference	41.7	40.0	35.3	31.7
Hadsell Road	0	0	0	0	0	0	0	Reference	0.0	0.0	0.0	0.0
Harrier	47	68	80	79	67	77	42	Reference	75.7	75.3	74.3	62.0
Larsen North Well	10	30	42	34	20	29	26	Reference	35.3	32.0	27.7	25.0
Lost Alkali	0	0	0	0		0	0	Reference	0.0	0.0	0.0	0.0
Lost Arapahoe	30	46	93	60	0	42	24	Reference	66.3	51.0	34.0	22.0
Lost Creek	0	0	0	0		0	0	Reference	0.0	0.0	0.0	0.0
Lost Creek Basin	0	71	110	69		9	65	Reference	83.3	83.3	62.7	47.7
Monument Lake	14	16	23	20	9	8	8	Reference	19.7	17.3	12.3	8.3
Mud Lake	0		0	0	0	0		Reference	0.0	0.0	0.0	0.0
Mud Lake North	9		38	34	25	35		Reference	27.0	32.3	31.3	31.3
Mud Springs	0		29	0	22	15	40	Reference	9.7	17.0	12.3	25.7
Red Creek Well	20	85	80	79	49	57	35	Reference	81.3	69.3	61.7	47.0
Ruby Knolls South	18	33	43	47	19	53	65	Reference	41.0	36.3	39.7	45.7
Ruby Knolls West	13	34	29	22	21	21	25	Reference	28.3	24.0	21.3	22.3
SK Well	0	0	0		0	0	0	Reference	0.0	0.0	0.0	0.0
Smiley Springs	43	94	100	91	57	58	43	Reference	95.0	82.7	68.7	52.7
Sourdough Mine	7	20	26	22	22		18	Reference	22.7	23.3	23.3	20.7
Stewart Creek	36	56	68	59	50	55	68	Reference	61.0	59.0	54.7	57.7
Stinking Springs/Stinking Springs North		34	92	11			60	Reference	45.7	45.7	45.7	54.3
Stratton	26		72	60	36	36		Reference	52.7	56.0	44.0	44.0
Stratton Lake	0	0	0		0	0	0	Reference	0.0	0.0	0.0	0.0
Texas Oil	0	0	0	0	0	0	0	Reference	0.0	0.0	0.0	0.0
Upper Osborne	27	45	37	72	61	66	14	Reference	51.3	56.7	66.3	47.0
									2007	**2008**	**2009**	**2010**
							Sums	Affected	407.0	493.3	415.7	339.3
								Reference	1444.7	1386.3	1189.7	1020.0

Figure 4.0B. Graph of 3-year average population trends of Affected and Reference leks for the DDCT Area established by LC ISR, LLC; numbers represent summed averages by year (see *Sums* columns in Table 4.0A above). Note that the lines are not diverging, thus slopes of the lines were not calculated.



Wyoming Pocket Gophers: Additional surveys for Wyoming pocket gophers should not be required for 2011 (unless specifically required by a reviewing agency). Surveys completed in 2010 documented the species within the Permit Area and disturbance areas.

Great Basin Spadefoot Toad: Surveys completed during 2010 did not locate this species. However, dry weather conditions were not ideal for locating this species. Surveys will be completed again during the spring and summer 2011, following the protocol in this report.

Project Construction and Mining: Because the project has not received final agency approvals and has not been constructed, not all of the wildlife protection and monitoring measures outlined in the Wildlife Protection and Monitoring Plan were followed in 2010. Only those measures that dealt with species monitoring as outlined in Section 2.0 above, timing restriction for wildlife protection related to exploration and drilling, and minor restoration/reclamation for drill sites were completed. Once the project has been approved and construction begins all measures outlined in the Wildlife Protection and Monitoring Plan will be followed.

Additional Agency Requirements: Additional requirements for wildlife monitoring, surveys, or protection measures could result from ongoing agency reviews and permit approvals. In addition, requirements for additional wildlife protection stipulations could result from changes in species status or regulatory requirements. Lost Creek ISR, LLC will change or adapt the wildlife monitoring, survey and protection measures as needed to meet the changing permit and regulatory environment. All changes will be summarized in the 2011 annual wildlife monitoring report.

5.0 References

Beck, T. D. I., and C. E. Braun. 1980. The strutting ground count: variation, traditionalism, management needs. Proceedings of the Western Association of Fish and Wildlife Agencies 60:558–566.

Connelly, J.W., K.P. Reese, and M.A. Schroeder. 2003. Monitoring of greater sage grouse habitats and populations. College of Natural Resources Experiment Station publication No. 979, University of Idaho, Moscow, ID, USA.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:1-19.

Eng, R. L. 1955. A method for obtaining sage grouse age and sex ratios from wings. Journal of Wildlife Management 19:267-272.

Giesen, K.M., T.J. Schoenberg, and C.E Braun. 1982. Methods for trapping Sage Grouse in Colorado. Wildlife Society Bulletin 10:224-231.

Hensler, G.L., and J.D. Nichols. 1981. The Mayfield method of estimating nesting success: a model, estimators and simulation results. Wilson Bulletin 93:42-53.

Holloran, M.J. 2005. Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming. PhD Dissertation, University of Wyoming, Laramie, WY, USA.

Holloran, M.J., and S.H. Anderson. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.

Johnson, G.D., and M.S. Boyce. 1990. Feeding trials with insects in the diet of sage grouse chicks. Journal of Wildlife Management 54:89-91.

LC ISR, LLC. 2010. Lost Creek Lost Creek Project WDEQ-LQD Permit to Mine Application, Original Dec 07; Rev 6 Feb10; Attachment OP-6 Wildlife Protection and Wildlife Monitoring Plan.

Mayfield, H. 1975. Suggestions for calculating nest success. Wilson Bulletin 87:456–466.

Naugle, D.E., K.E. Doherty, B.L. Walker, M.J. Holloran, and H.E. Copeland. 2010. Energy development and greater sage-grouse. Studies in Avian Biology: *In Press*.

(NCDC) National Climatic Data Center Climate Data Online. 2010. http://www7.ncdc.noaa.gov/CDO/cdoselect.cmd Downloaded Mon Dec 13 2010.

Pollock, K.H., S.R. Winterstein, C.M. Bunck, and P.D. Curtis. 1989. Survival analysis in

telemetry studies: the staggered entry design. Journal of Wildlife Management. 53: 7-15.

Sargeant, A. B., M. A. Sovada, and R. J. Greenwood. 1998. Interpreting evidence of depredation of duck nests in the prairie pothole region. U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, ND and Ducks Unlimited, Inc., Memphis, TN. 72pp.

Schroeder, M. A., J. R. Young, and C. E. Braun. 1999. Sage grouse (*Centrocereus urophasianus*). No. 425 *in* A. Poole and F. Gill, editors. The birds of North America. The Birds of North America, Inc., Philadelphia, Pennsylvania, USA.

Ulmschneider, H., D. Hays, R. Hadley, J. Rachlow, T. Forbes, J. Himes, E. Sequin, M. Haworth, T. Katzner, A. Kozlowski, R. Rauscher and P. Lauridson. 2004. Surveying for pygmy rabbits (*Brachylagus idahoensis*). 4th draft. Bureau of Land Management, Boise, Idaho. 20 pp. plus appendices.

Wakkinen, W. L., K. P. Reese, J. W. Connelly, and R. A Fischer. 1992. An improved spotlighting technique for capturing sage grouse. Wildlife Society Bulletin 20: 425-426.

Wallestad, R.O., and Pyrah, D. 1974. Movement and nesting of Sage Grouse hens in central Montana. Journal of Wildlife Management 38:630-633.

Wyoming Game and Fish Department. 2007. Handbook of Biological Techniques

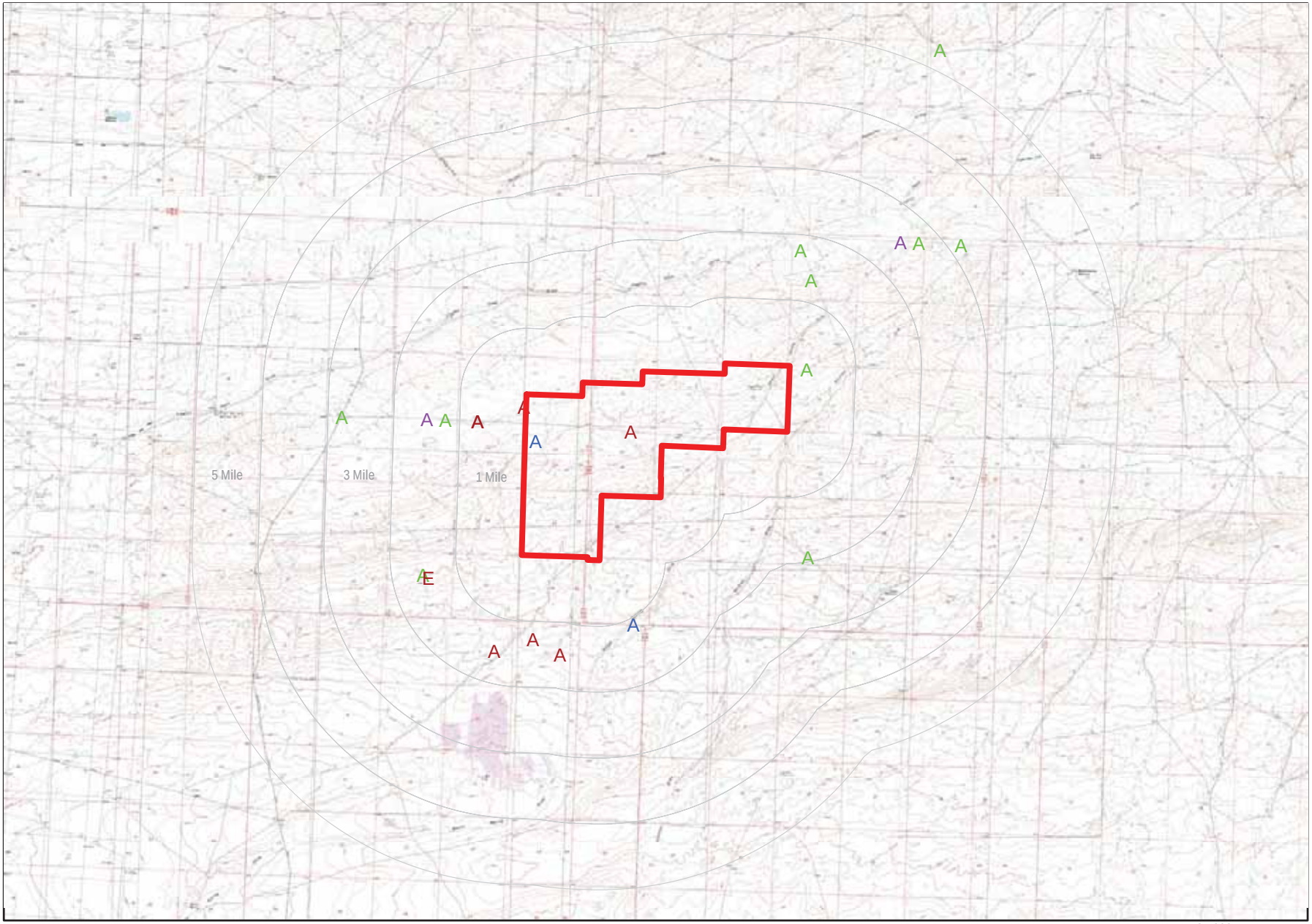
(WDEQ-LQD) Wyoming Department of Environmental Quality, Land Quality Division. 1994. Guideline No. 5- Wildlife. Cheyenne (WY). Available from: http://deq.state.wy.us/lqd/guidelns/Guideline5.pdf

(WNDD) Wyoming Natural Diversity Database 2010. POCKET GOPHER SURVEYS IN SOUTHWESTERN WYOMING DRAFT PROJECT REPORT. Prepared by: Hannah Griscom, Zoologist; Doug Keinath, Senior Zoologist; Mark Andersen, GIS Specialist. Wyoming Natural Diversity Database University of Wyoming, Laramie, Wyoming 82071.

U.S. Fish and Wildlife Service. 2002. Migratory birds of high Federal interest in Wyoming, Coal Mine List. Wyoming Field Office, Cheyenne WY.

Lost Creek Project, 2010 Wildlife Monitoring Report

Attachment A
Figures

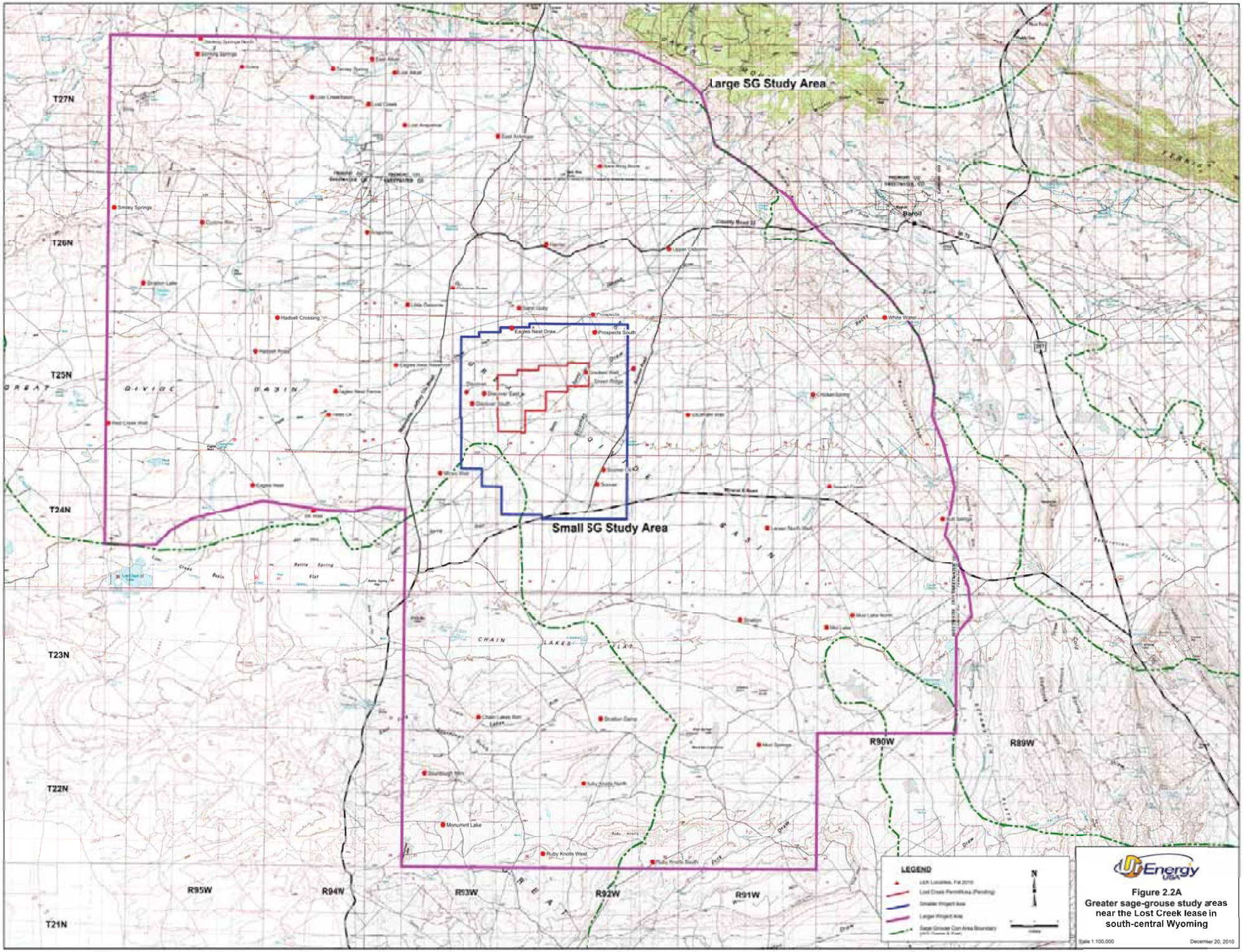


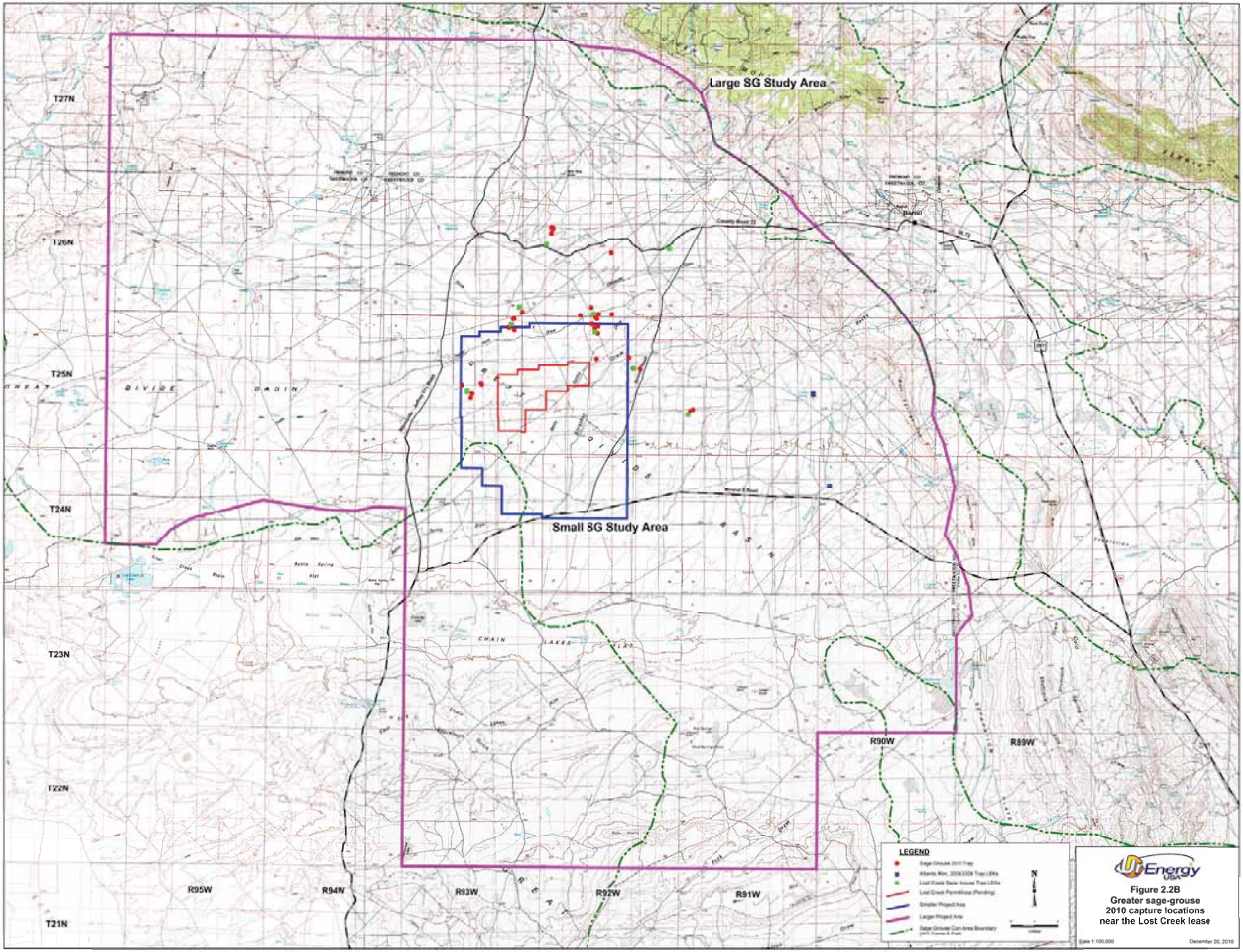
Survey observations of Antelope (A) and Elk (E)

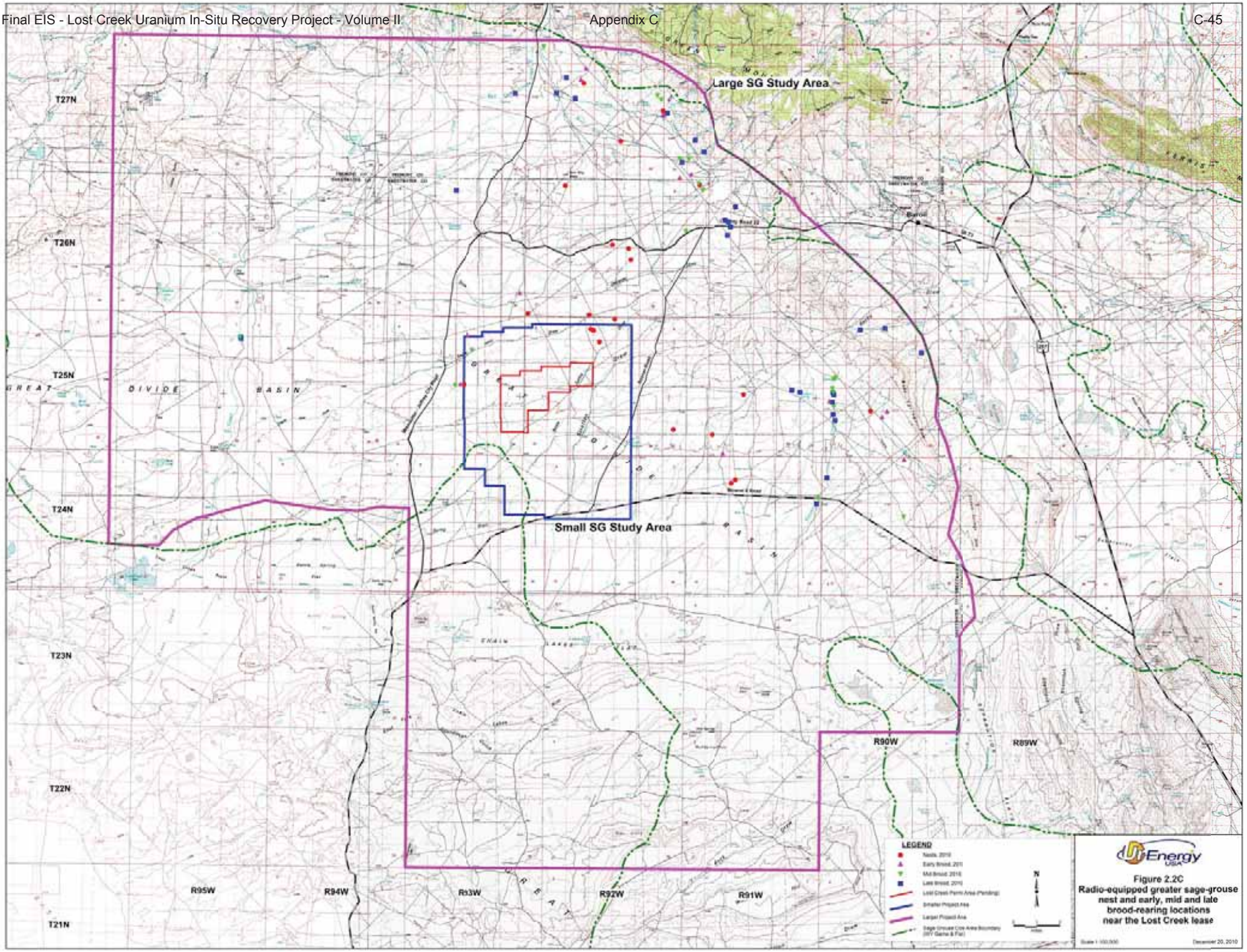
Mid-February Survey
Late March Survey
Early June Survey
Late August Survey

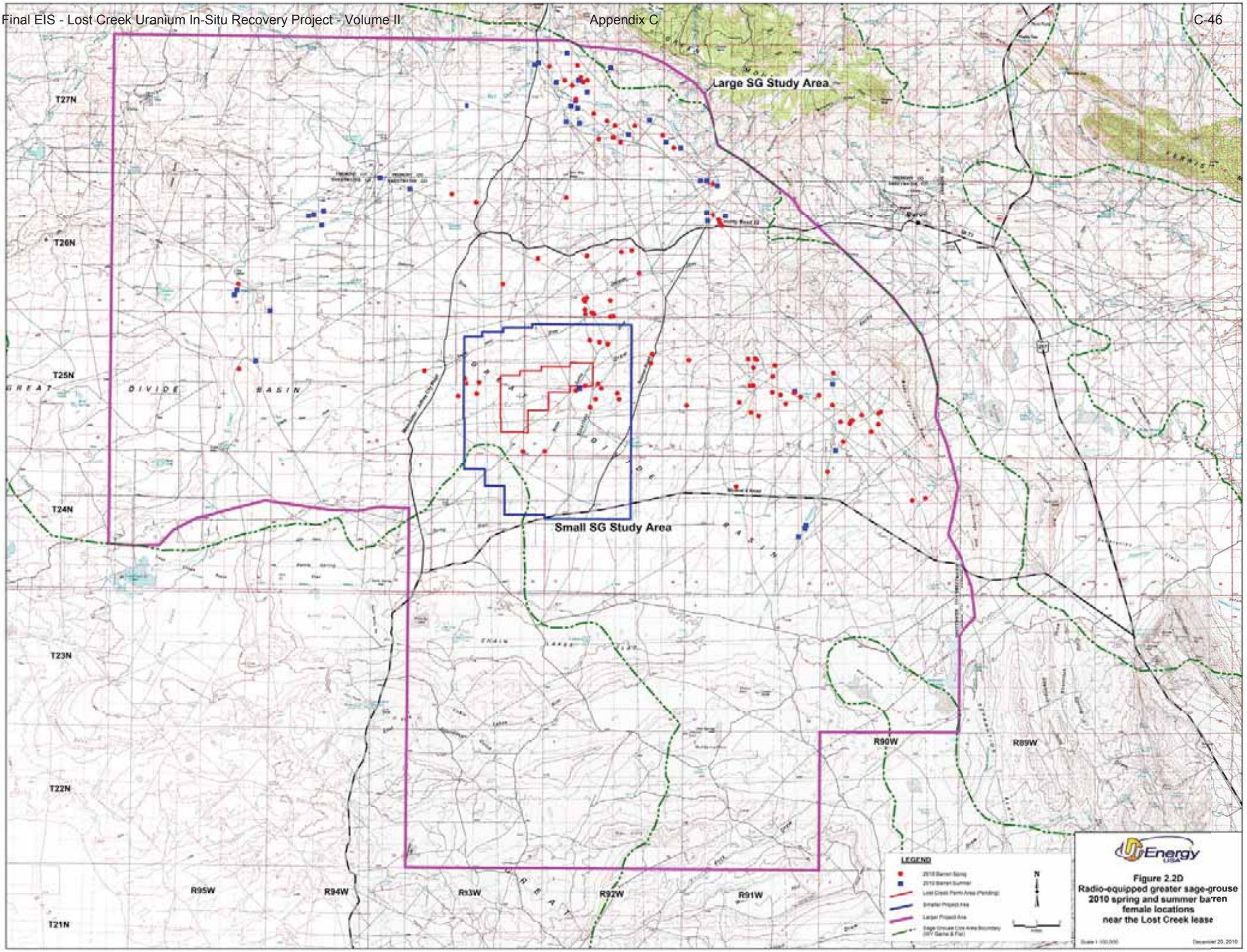
1:135,000
0 1 2 3
Miles

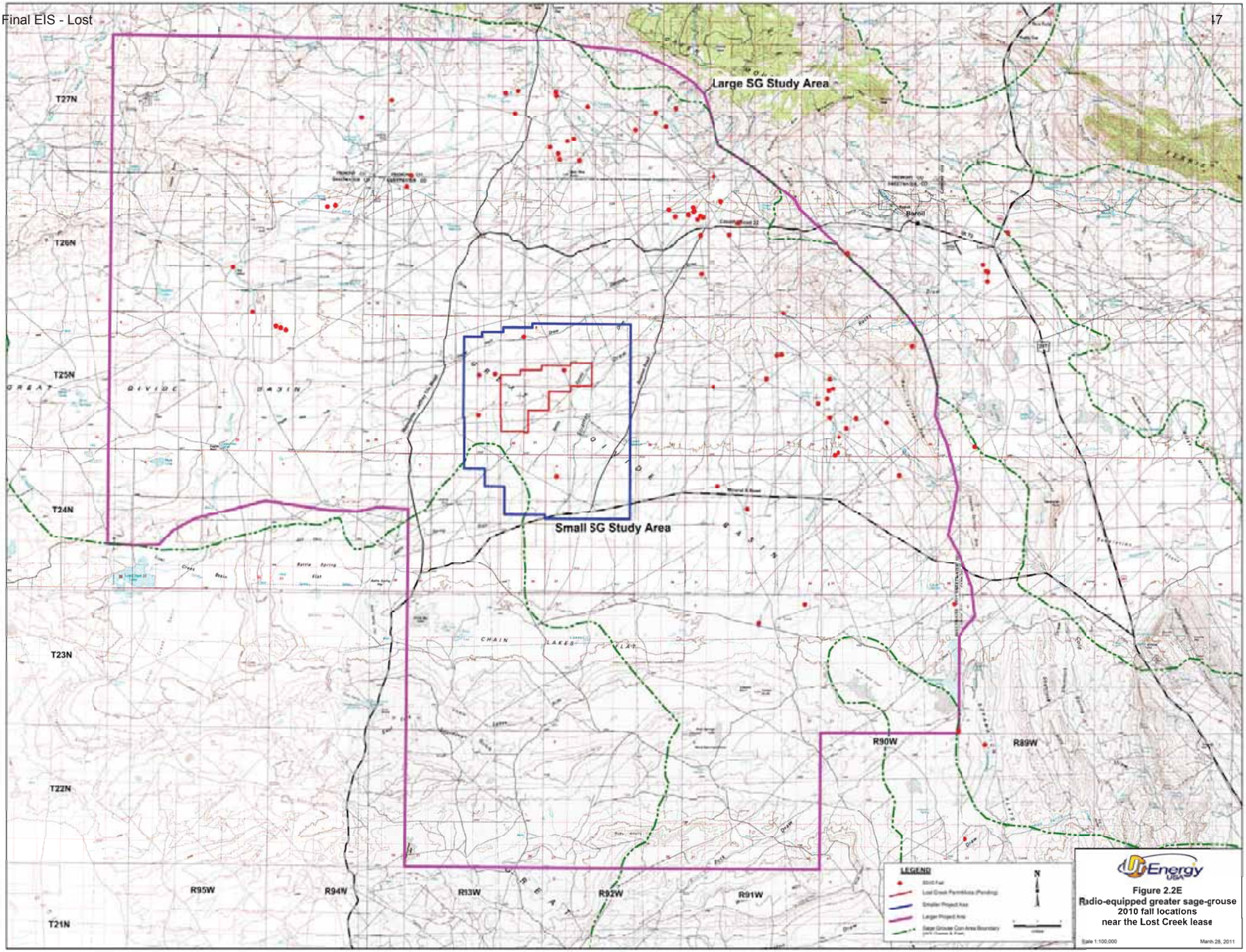
Figure 2.1A
LOST CREEK
Big Game Survey 2010


Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
Baroil
Eagles Nest Draw
Prospects South
Monument Lake
Ruby Knolls West
LEGEND
N
Figure 2.2A
Greater sage-grouse study areas near the Lost Creek lease in south-central Wyoming
Scale 1:100,000
December 20, 2010


Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
Baroil
DIVIDE
BASIN
CHAIN
LAKES
FLAT
LEGEND
N
Figure 2.2B
Greater sage-grouse
2010 capture locations
near the Lost Creek lease
Scale 1:100,000
December 20, 2010


Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
GREAT DIVIDE BASIN
LEGEND
Nests, 2010
Early Brood, 2010
Mid Brood, 2010
Late Brood, 2010
Lost Creek Permit Area (Pending)
Smaller Project Area
Larger Project Area
Sage Grouse Core Area Boundary (WY Game & Fish)
N
Energy USA
Figure 2.2C
Radio-equipped greater sage-grouse nest and early, mid and late brood-rearing locations near the Lost Creek lease
Scale 1:100,000
December 20, 2010


Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
GREAT DIVIDE BASIN
LEGEND
N
Energy USA
Figure 2.2D
Radio-equipped greater sage-grouse
2010 spring and summer barren
female locations
near the Lost Creek lease
December 20, 2010


Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
GREAT DIVIDE BASIN
CHAIN LAKES VALLEY
Baroil
LEGEND
Lost Creek Permitted (Pending)
Smaller Project Area
Larger Project Area
Sage Grouse Core Area Boundary
N
UrEnergy USA
Figure 2.2E
Radio-equipped greater sage-grouse
2010 fall locations
near the Lost Creek lease
Scale 1:100,000
March 28, 2011

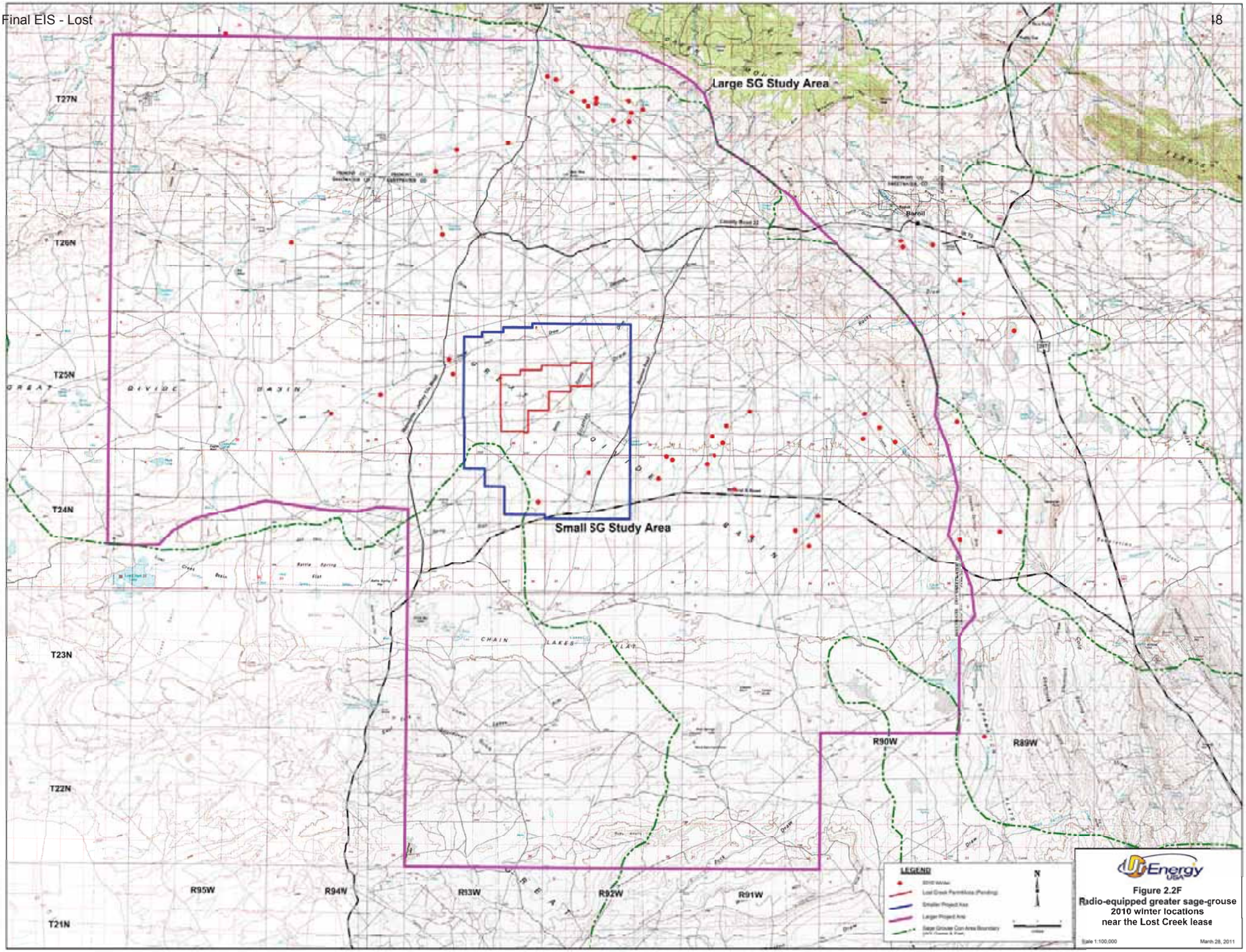
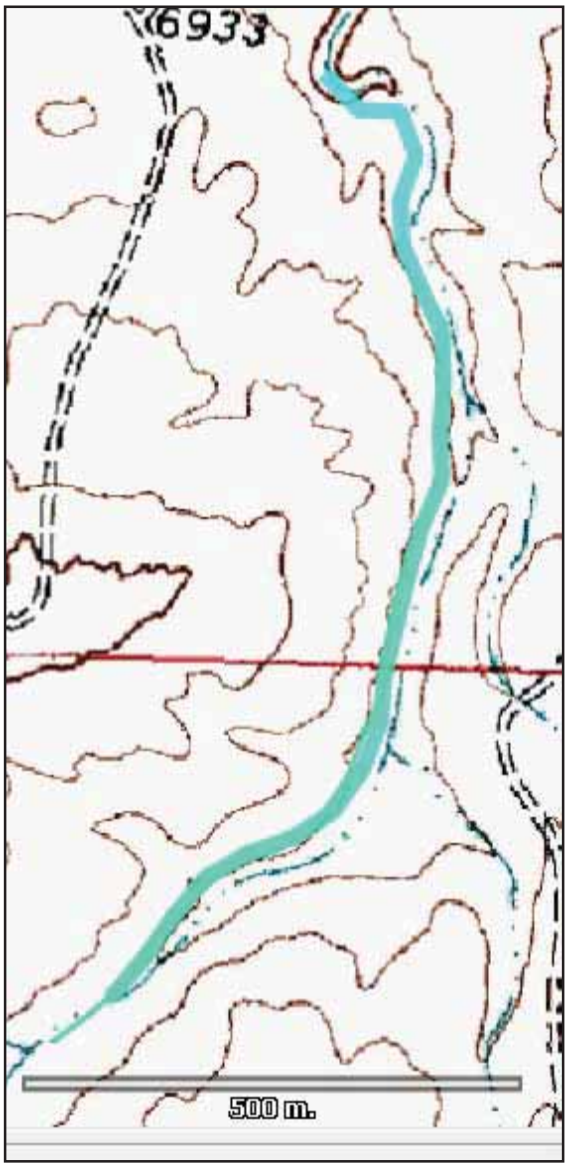

Large SG Study Area
Small SG Study Area
T27N
T26N
T25N
T24N
T23N
T22N
T21N
R95W
R94W
R93W
R92W
R91W
R90W
R89W
GREAT DIVIDE BASIN
CHAIN LAKES VALLEY
Baroil
LEGEND
N
Energy USA
Figure 2.2F
Radio-equipped greater sage-grouse
2010 winter locations
near the Lost Creek lease
Scale 1:100,000
March 28, 2011

Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 1 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Crooks Creek #1		**USGS Quad** Crooks Peak	
Bank Side / Direction Left / West		**Legal Description** NE1/4 Sec 20, SE1/4 Sec17 T27N, R92W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	265468	4687245	Straight down slope from buck-rail fence
Start/End Point	265680	4688202	Upstream end of lower willow patch
Dominant Vegetation	Hordeum brachyantherum, Carex nebrascensis, Agrostis stolonifera, Poa pratensis, Cirsium canescens		
Notes	Transect walking path stays in sage fringe above channel. Transect crosses buck-rail fence. Some broad areas in bottom (100 meters wide). Transect can be approached from two track road several hundred meters below lower end of transect		

Maps



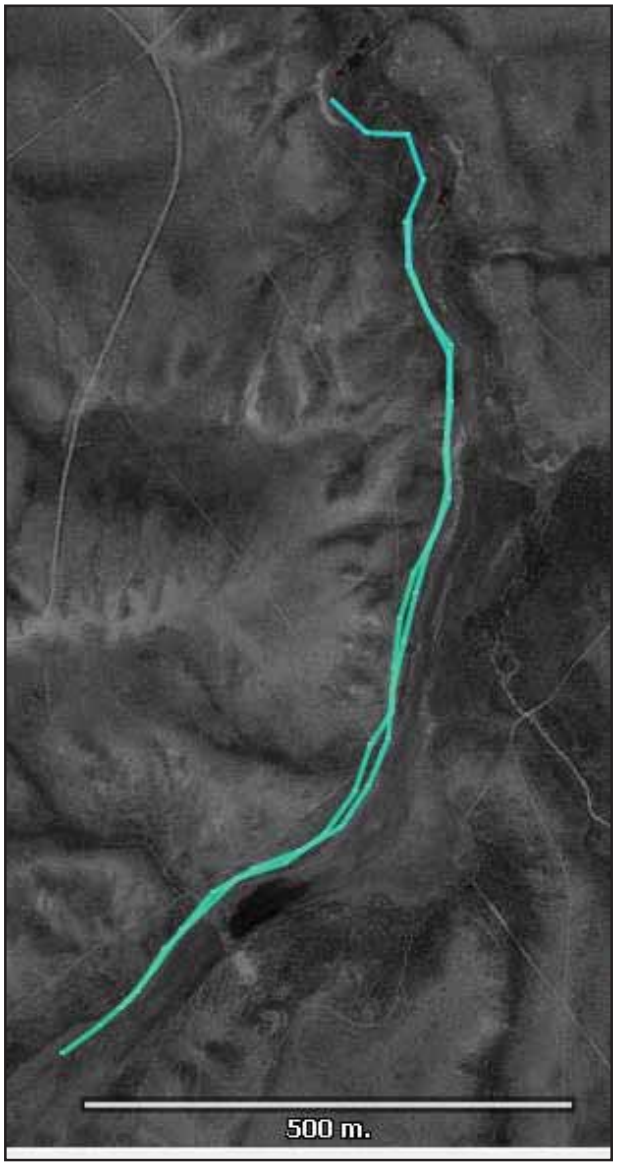


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 2 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Crooks Creek #2		**USGS QUAD** Crooks Peak, Wyoming	
Bank Side / Direction Right / North		**Legal Description** NE1/4 Sec17, NW1/4 Sec16, T26N, R92W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	266523	4688391	Straight down slope yellow steel post in sage
Start/End Point	265659	468870	Barbed wire fence line crossing creek
Dominant Vegetation	Carex nebrascensis, Poa pratensis, Salix sp.		
Notes	Transect walking path stays in sage fringe above channel. Transect can be approached from lesser two track road branching off main two track		

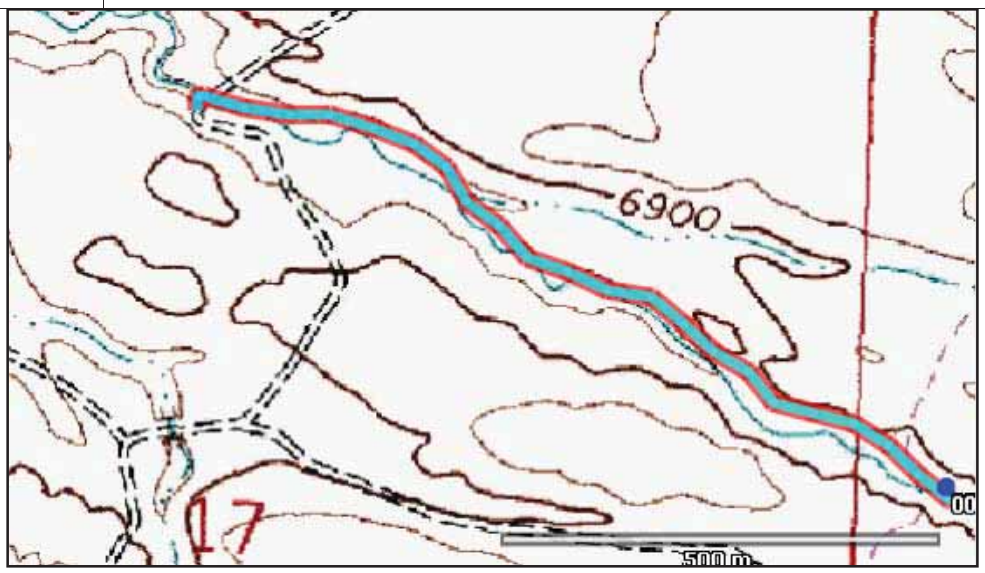
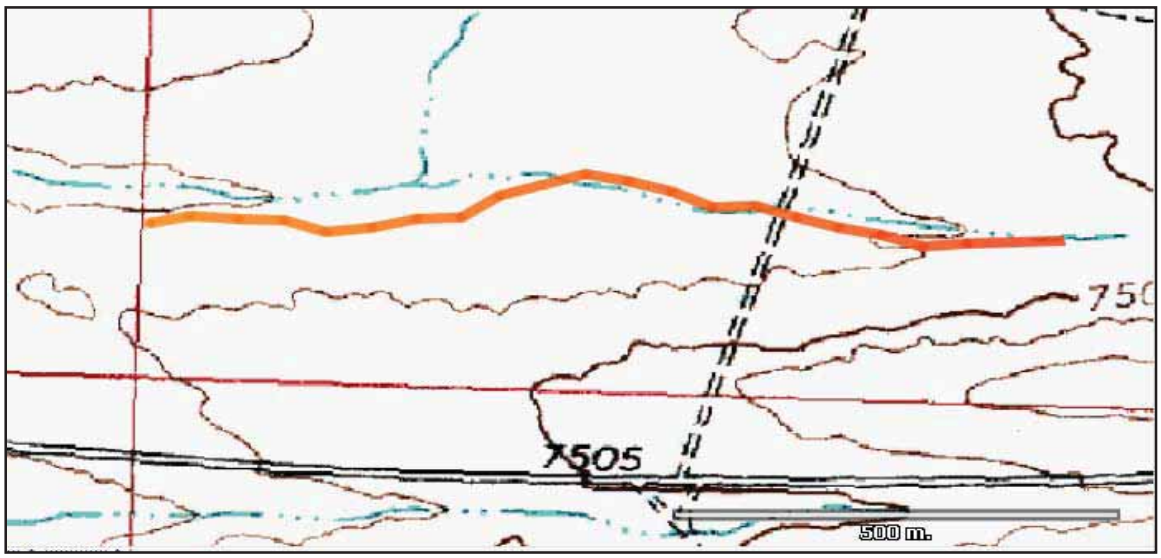


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 3 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID A&M Reservoir #1			**USGS QUAD** Hadsell Spring
Bank Side/ Direction Left/South		**Legal Description** SW1/4 Sec10, T26N, R91W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	277396	4679362	First dam above reservior
Start/End Point	278446	4679331	Rock pile at beginning of creek
Dominant Vegetation	Juncus balticus, Carex nebrascensis, Poa pratensis, Epilobium sp.		
Notes	Riparian area is narrow and grouse occupying both sides of channel would likely be flushed		

Maps



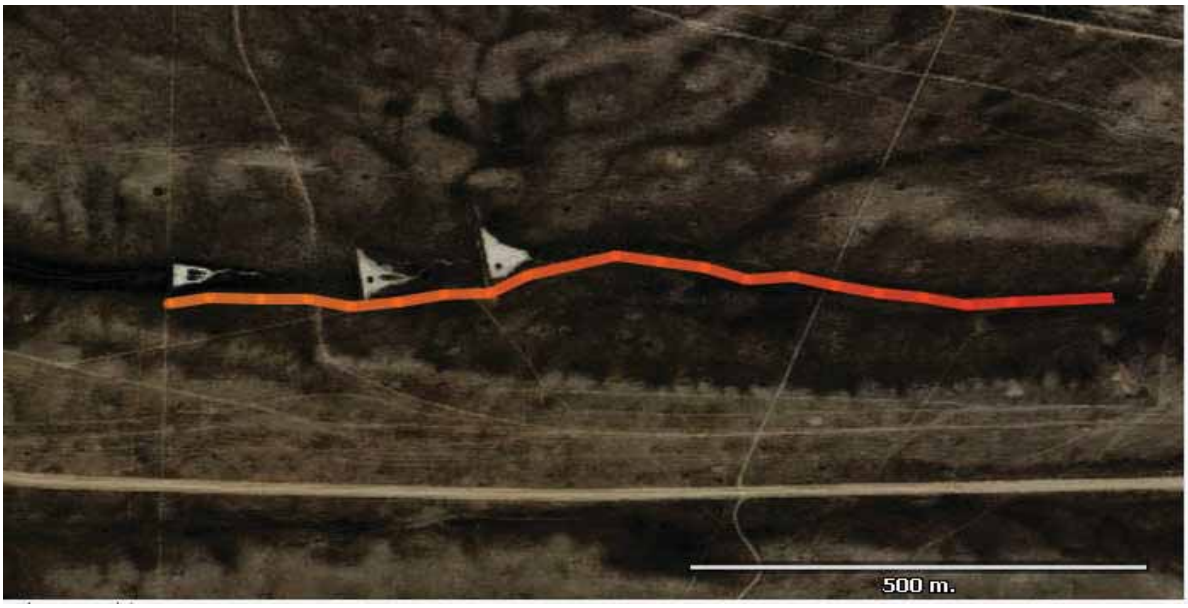


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 4 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID A&M Reservoir #2			**USGS Quad** Hadsell Spring
Bank Side / Direction Right / South		**Legal Description** SE1/4 Sec10, SW1/4 Sec11, T26N, R91W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	278760	4679529	Fence line
Start/End Point	279772	4679181	Small lone willow on left bank
Dominant Vegetation	Carex nebrascensis, Poa pratensis, Agrostis stolonifera, Lupinus sp.		
Notes	Riparian area is narrow and grouse occupying both sides of channel would likely be flushed		

Maps

Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 5 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Lost Creek #1			**USGS Quad** Osborne Draw
Bank Side / Direction Right / West		**Legal Description** NE1/4 Sec 1, T27N, R95W and SE1/4 Sec36, T27N, R95W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	739057	4673700	Stop on road at / and walk straight to creek
Start/End Point	738531	4672887	Tall white/red mud cliff on left bank
Dominant Vegetation	Poa pratensis, Carex nebrascensis, Agrostis stolonifera, Thermopsis divaricarpa		
Notes	Transect walking path stays in sage fringe above channel.		

Maps

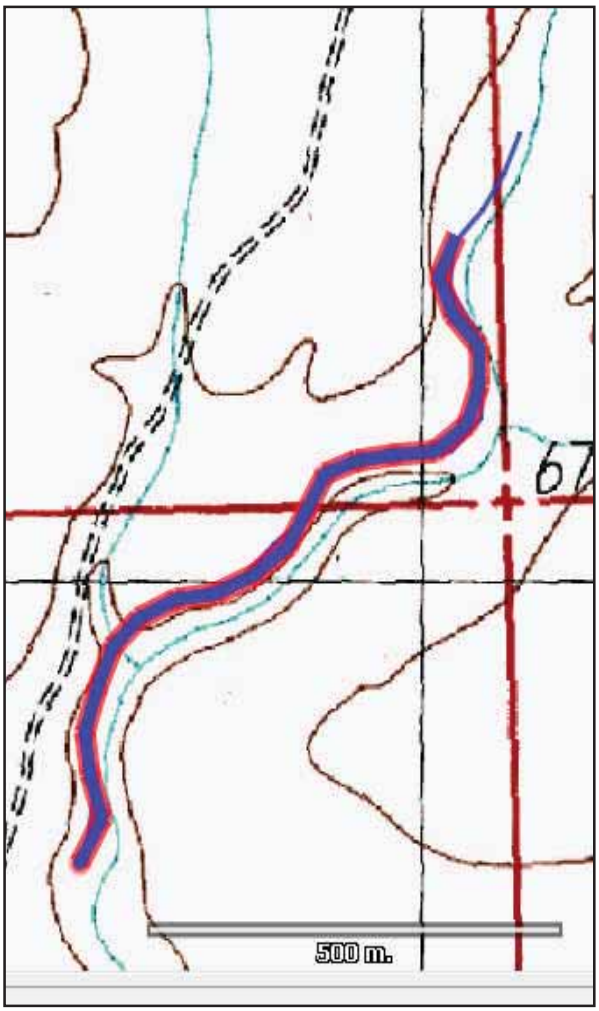


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 6 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Lost Creek #2			**USGS Quad** Osborne Draw
Bank Side / Direction Right / West		**Legal Description** SE1/4Sec 25, T26N, R95W and SW1/4 Sec30, T26N, R94W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	738492	4675582	Where two track road intersects creek
Start/End Point	739267	4674969	Mail BLM road at culvert
Dominant Vegetation	Carex nebrascensis, Agrostis stoloniofera, Eleocharis palustris, Junucus balticus, unknown composite		
Notes	Transect walking path stays in sage fringe above channel.		

Maps

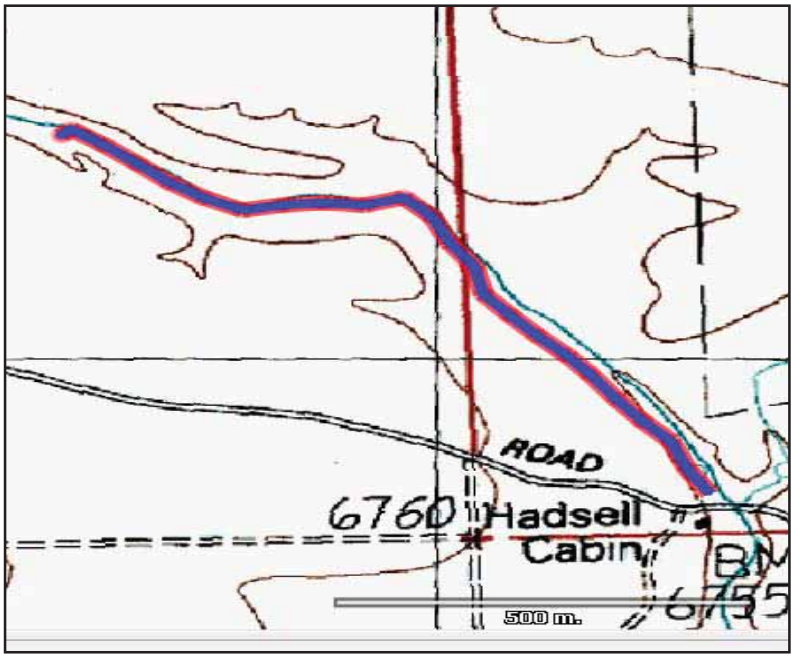


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 7 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Stewart Creek #1			**USGS Quad** Bull Springs and Baroil
Bank Side / Direction Right / West		**Legal Description** NW1/4 Sec29, T25N, R90W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	284162	4666307	Just below dam
Start/End Point	284281	4665194	Very close to two track road
Dominant Vegetation	Carex nebrascensis, Agrostis stolonifera		
Notes	Transect walking path stays in sage fringe above channel.		

Maps

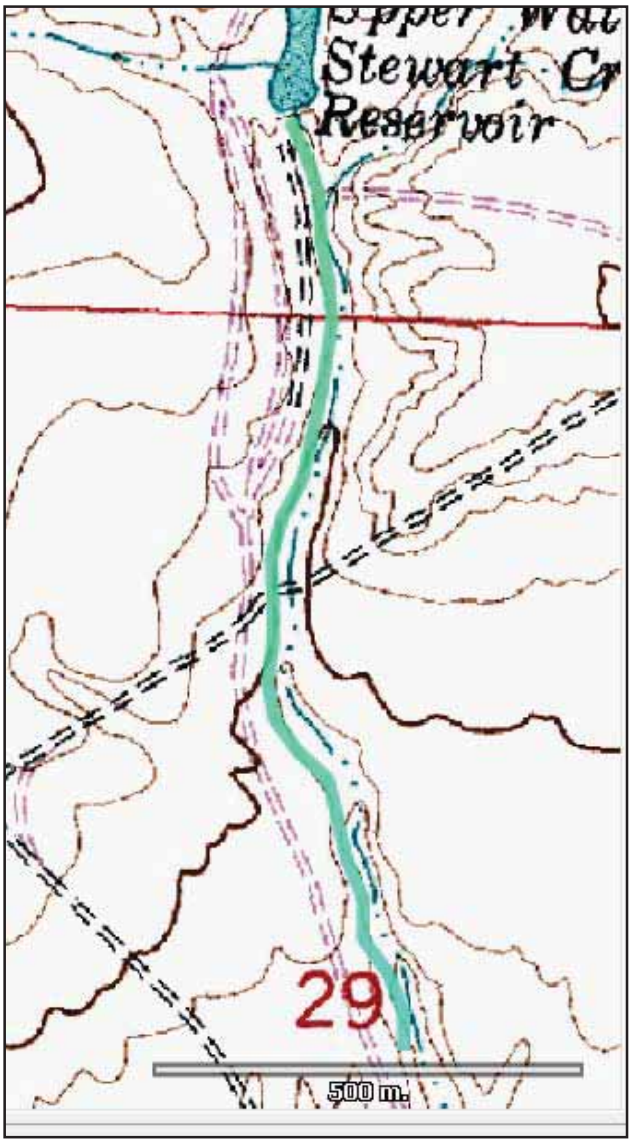
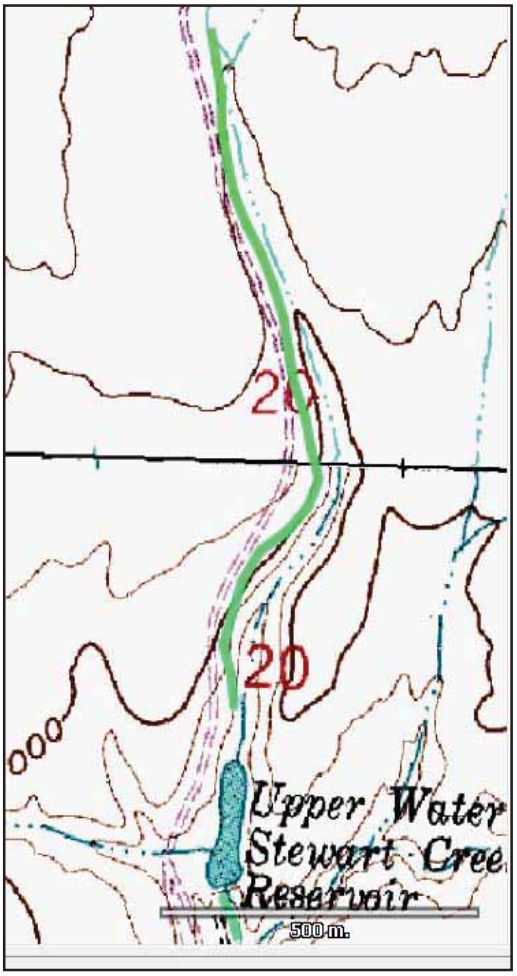


Figure 2.2G. Sage-Grouse Brood Rearing Transects (Page 8 of 8)

Lost Creek Sage Grouse Brood Survey 2010			
Transect ID Stewart Creek #2			**USGS Quad** Bull Springs and Baroil
Bank Side / Direction Right / west		**Legal Description** NW1/4 Sec20, T25N, R92W	
NAD 83	**East**	**North**	**Comments**
Start/End Point	284165	4666592	Single tee-post just above tailwater of reservoir and just below a four tee-post exclusion cage in riparian area
Start/End Point	284129	4667583	At the end of the moist riparian area where rabbit brush narrows into channel
Dominant Vegetation	Carex nebrascensis, Agrostis stolonifera		
Notes	Transect walking path stays in sage fringe above channel. Some broad areas in riparian bottom (100 meters wide).		

Maps



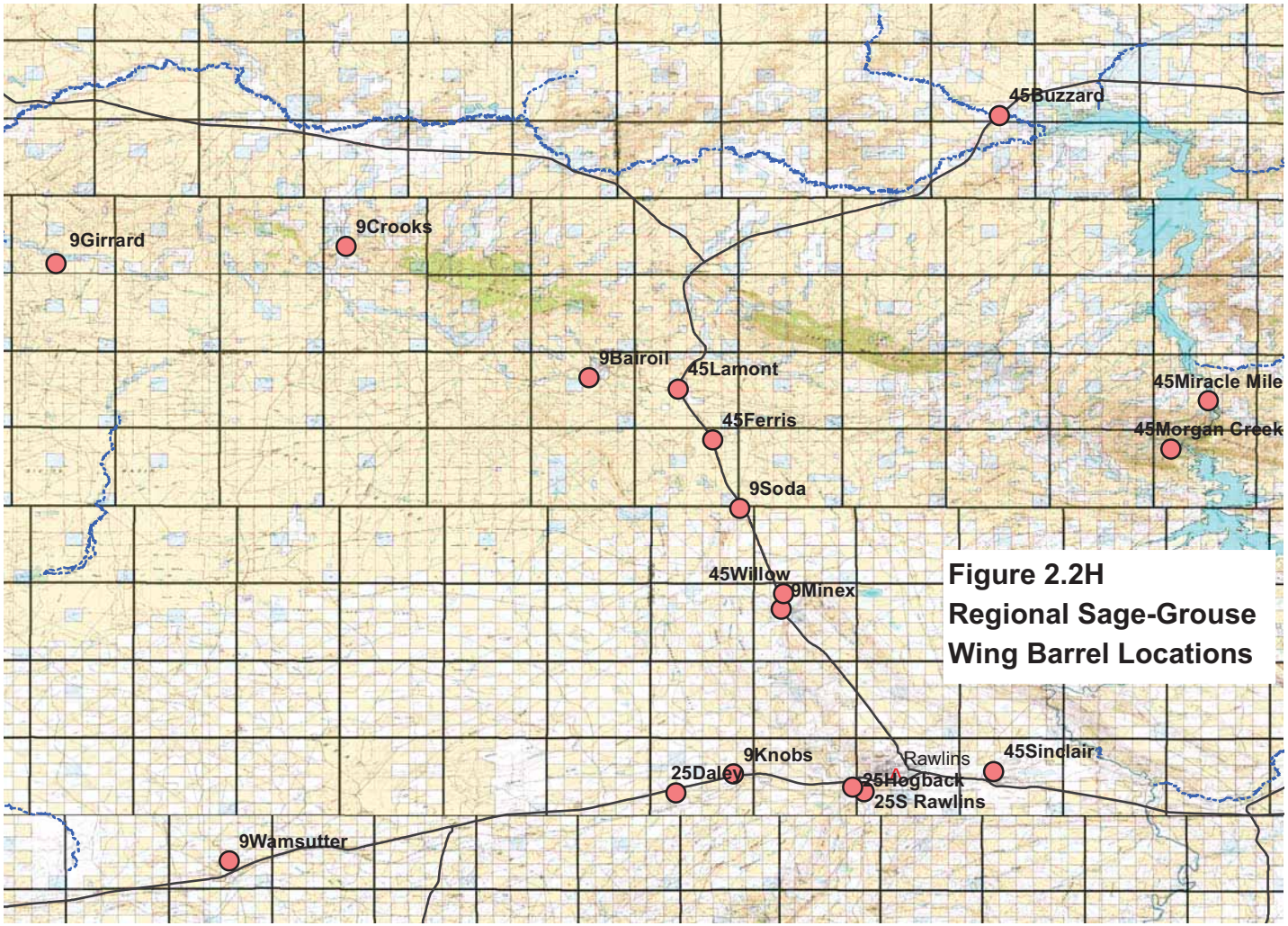
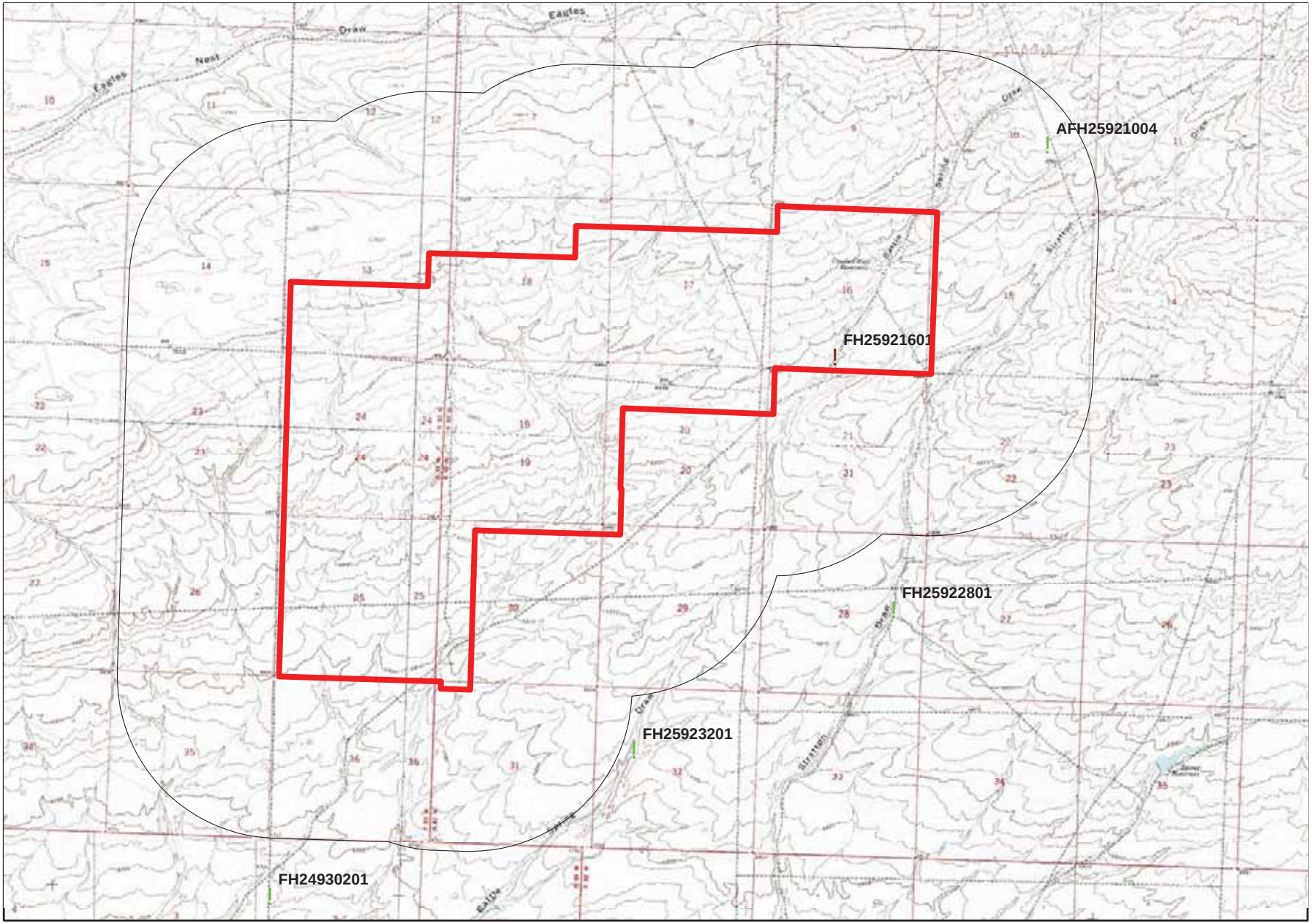


Figure 2.2H
Regional Sage-Grouse Wing Barrel Locations



Lost Creek Permit Boundary

Raptor Nests

NestStatus

! Active **Ferruginous Hawk Nests**

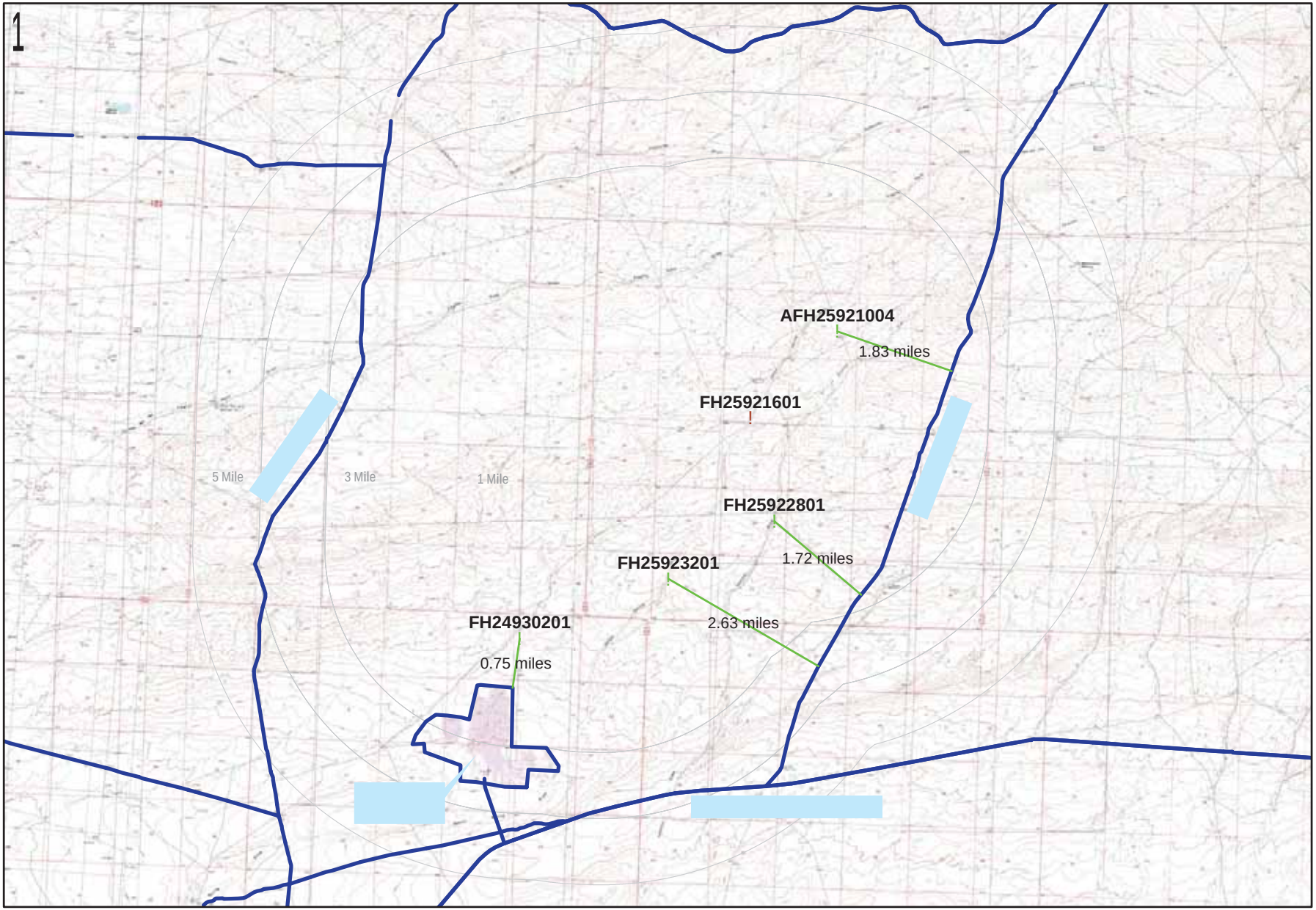
! Inactive/Dilapidated

0 1:55,000 1
Miles

Figure 2.3A

LOST CREEK

Raptor Survey 2010



Lost Creek Permit Boundary

Disturbance Features Analyzed

NestStatus

! Active

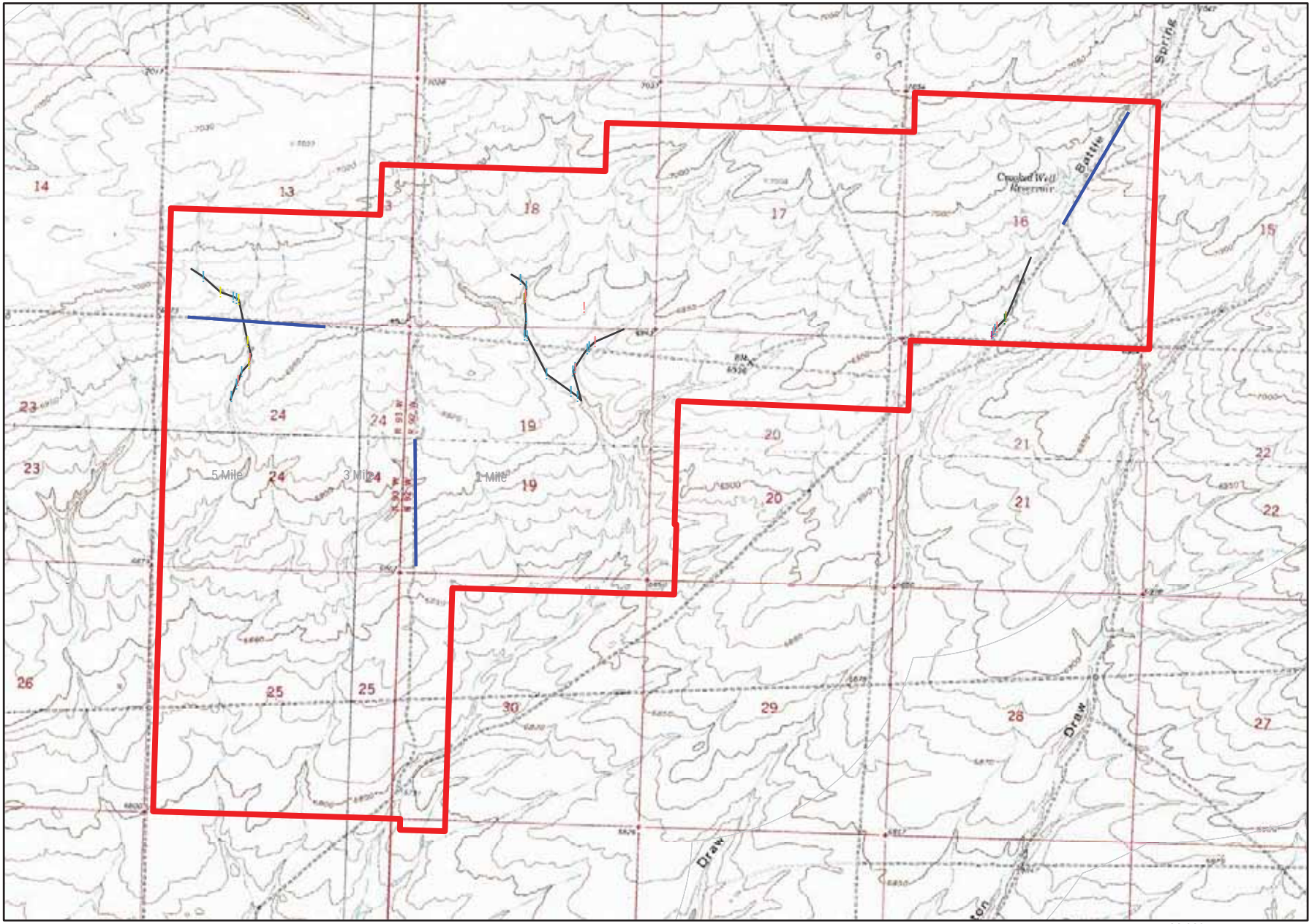
! Inactive/Dilapidated

1:135,000

0 1 2 3

Miles

Figure 2.3B LOST CREEK
Active Raptor Nests
Measure of Nearest Disturbance
Breeding and Nesting Season 2010



Transect

Pygmy Rabbit

- B+FP
- B+OP
- C+OP
- FP
- UB
- VISUAL

Lagomorph Spotlight Survey Transects

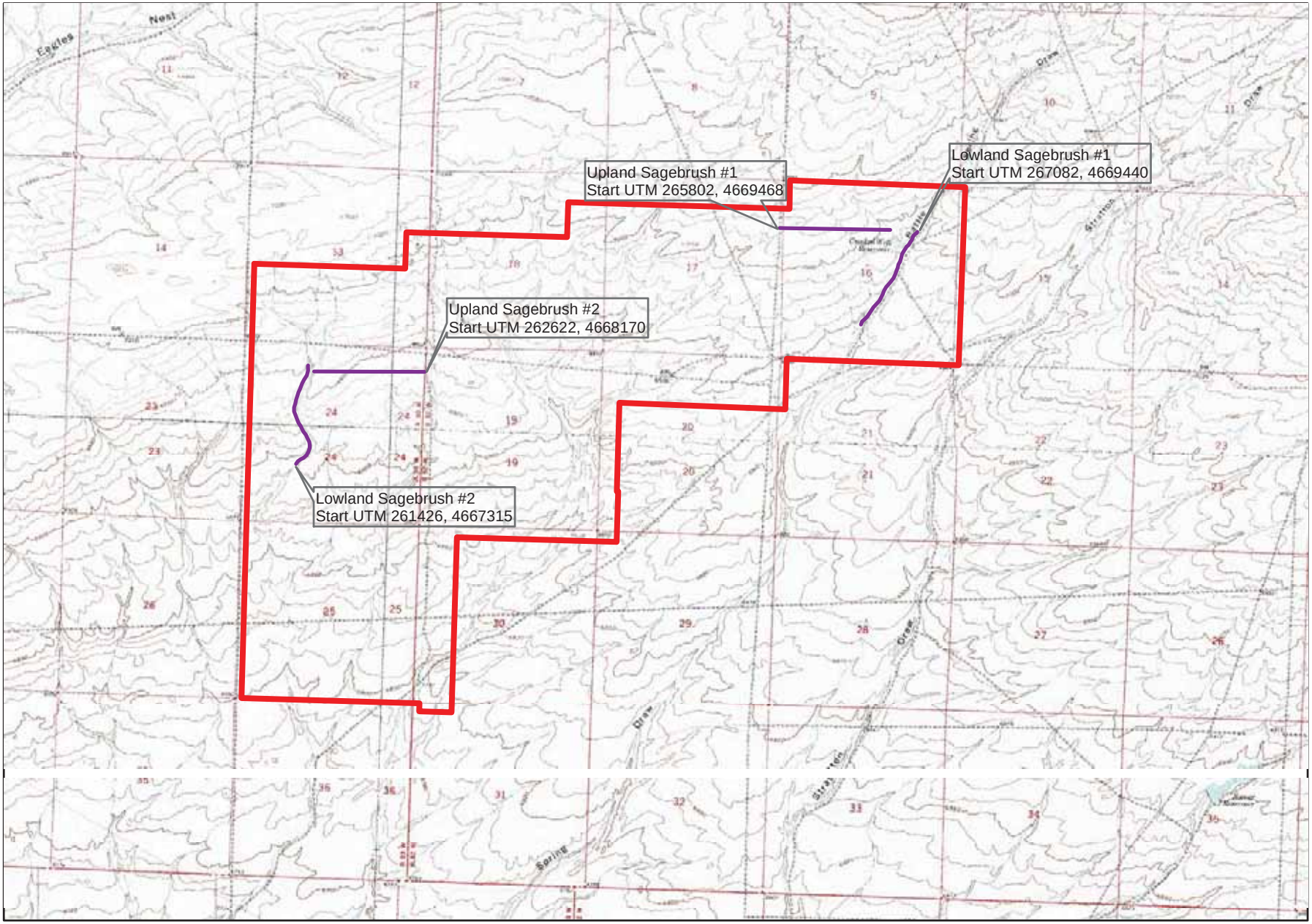
1:36,000

0 1 Miles

Figure 2.3C

LOST CREEK

Pygmy Rabbit Survey 2010



Lost Creek Permit Boundary

SurveyTransects

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Miles

Figure 2.4A LOST CREEK
Migratory Birds of High Federal Interest
Survey Transects 2010

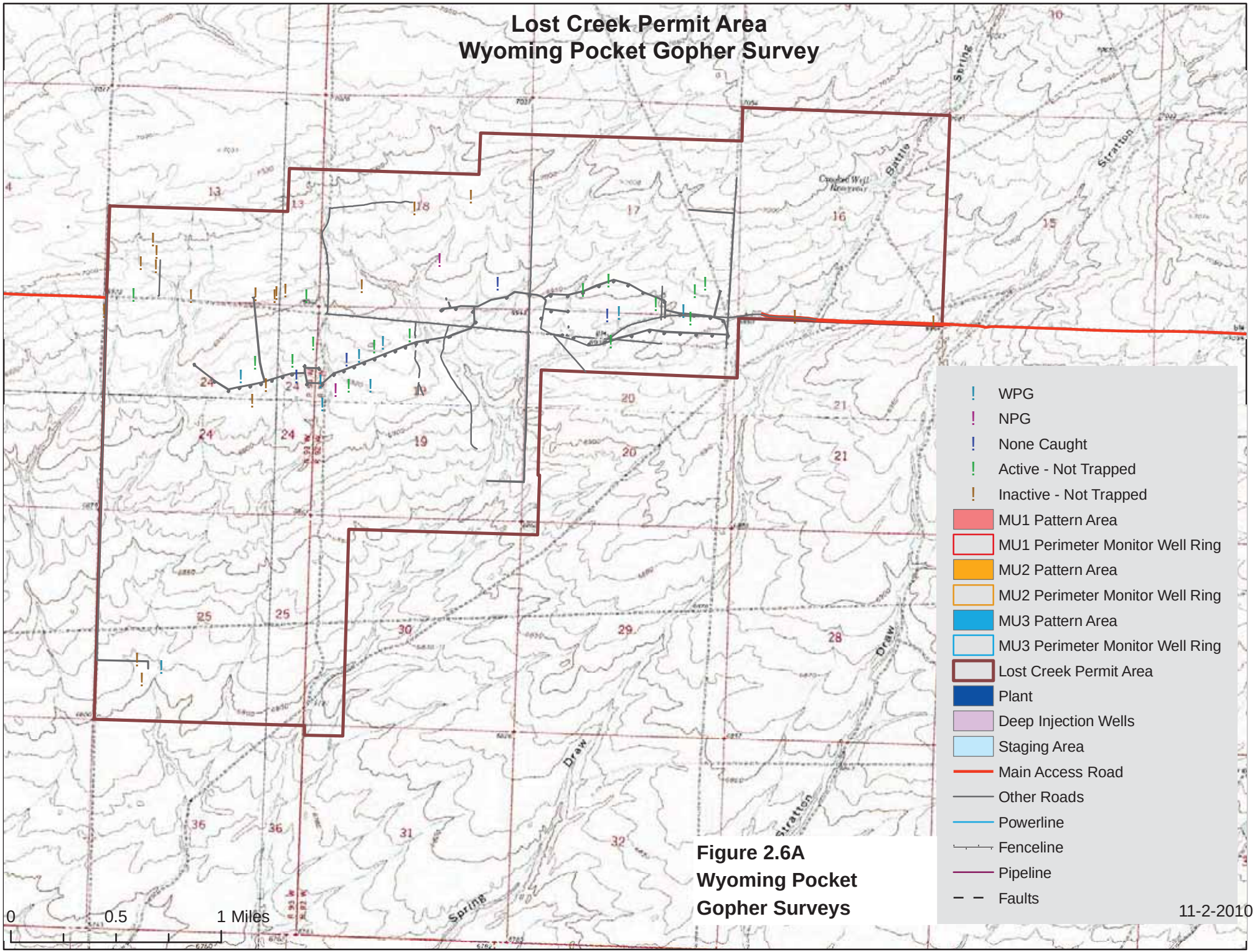
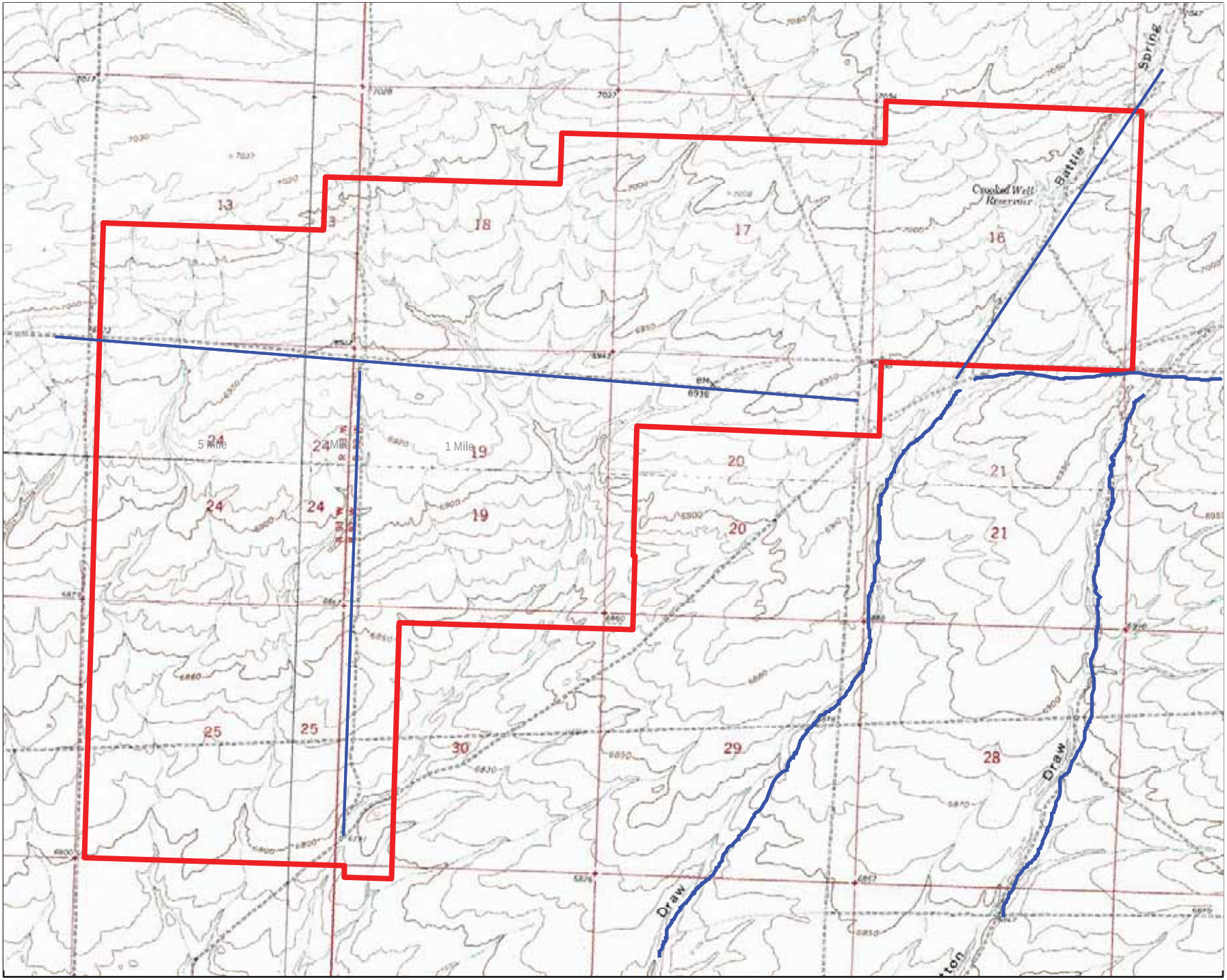


Figure 2.6A
Wyoming Pocket Gopher Surveys



Driving Transects

Figure 2.8A. Great Basin Spadefoot Toad, Survey Routes

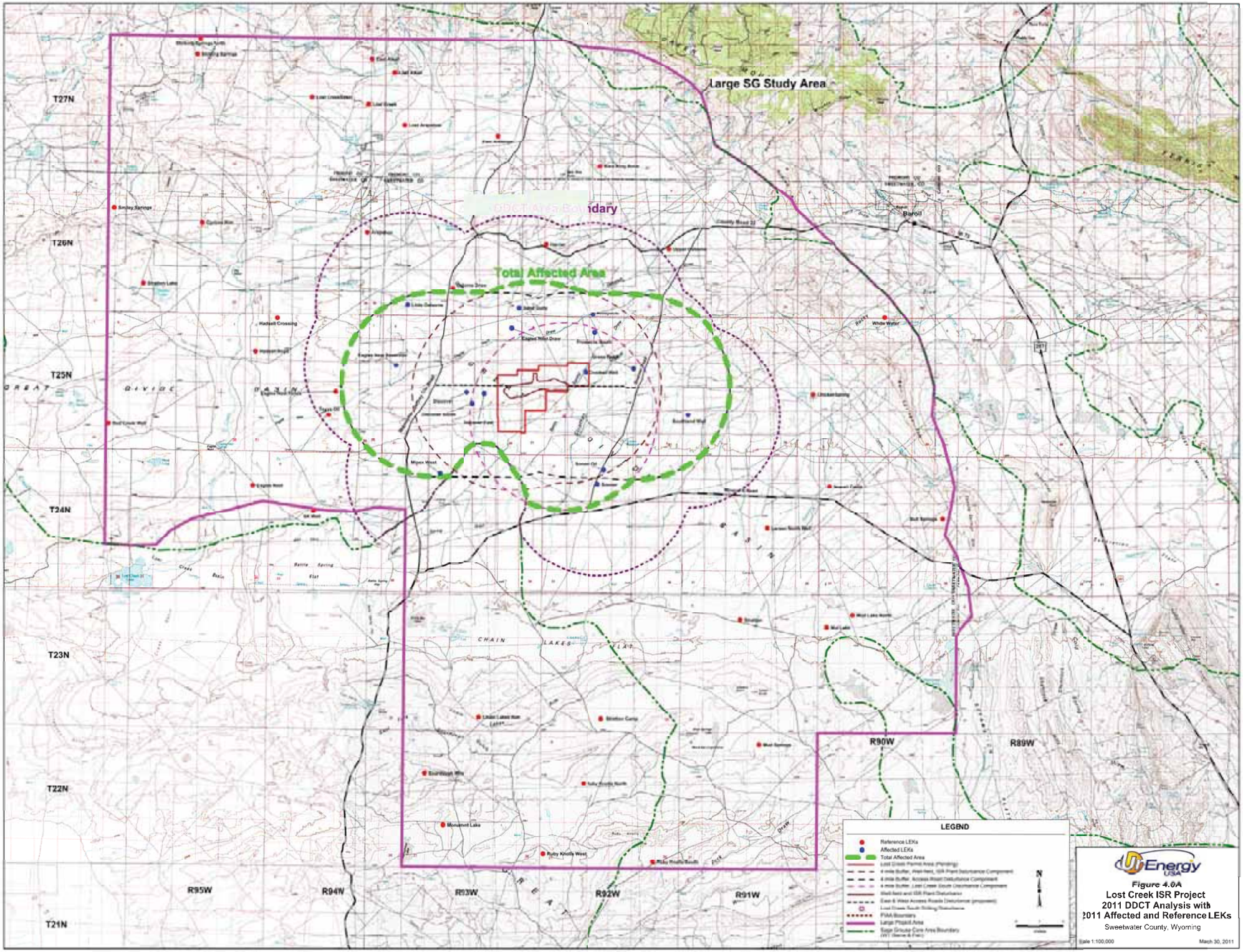


Figure 4.0A
Lost Creek ISR Project
2011 DDCT Analysis with
2011 Affected and Reference LEKs
Sweetwater County, Wyoming