

Annual Report of Surveys for Historic Sage-Grouse Leks on the Idaho National Laboratory Site

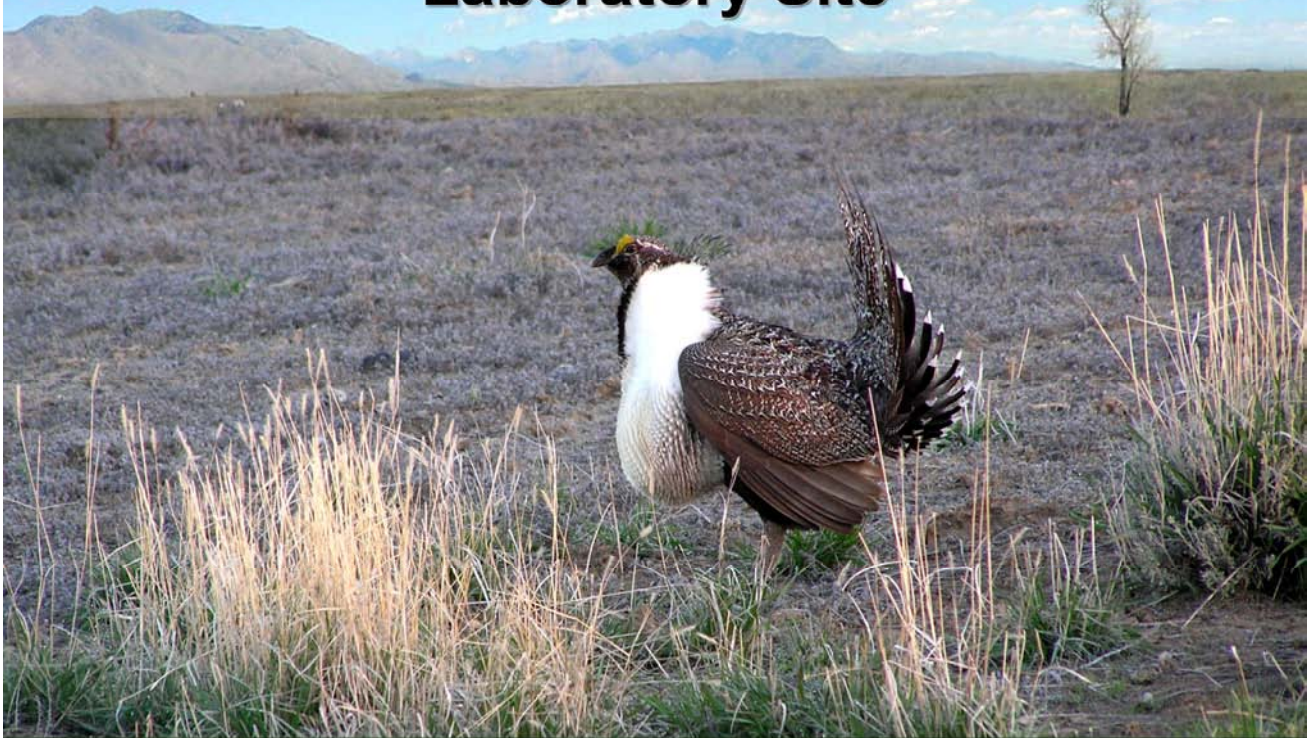


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March 2011



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1. INTRODUCTION

Populations of greater sage-grouse (*Centrocercus urophasianus*) have experienced distribution-wide declines over the past several decades (Connelly and Braun 1997, Connelly et al. 2000, Connelly et al. 2004, Garton et al. 2010). These reductions are correlated with extensive degradation and loss of sagebrush (*Artemisia* spp.) habitat upon which sage-grouse are highly dependent (Connelly et al. 2004, Knick and Connelly 2010, Knick et al. 2010). As a result, greater sage-grouse have been petitioned multiple times since 1999 for protection under the Endangered Species Act (ESA) of 1973 (Connelly et al. 2004). In March 2010, the U.S. Fish and Wildlife Service classified the greater sage-grouse as a candidate species. Although warranted for protection under the ESA, these birds were precluded from listing due to concerns regarding higher priority species.

In Idaho, the number of sage-grouse is relatively high on the Upper Snake River Plain compared with other locations within the state; yet these southeastern Idaho populations have also declined in recent decades (Garton et al. 2010). The Upper Snake Local Working Group (2009; hereafter USLWG) reported an average of 40-50% decline in sage-grouse populations based on long-term averages of lek route data. Populations, however, in this region appear to be stable since 1996 (USLWG 2009).

A large proportion of relatively undisturbed sagebrush habitat is located on the Idaho National Laboratory (INL) Site, 2,316 km² of land located in the Upper Snake River Plain of southeast Idaho that is administered by the United States Department of Energy (DOE). In 1975, the INL Site was designated a National Environmental Research Park (Reynolds et al. 1986). Between 1978 and 1980, Connelly (1980) used both fixed-wing aircraft and four-wheel drive vehicles to identify 59 sage-grouse leks located on or near the INL Site (then called the Idaho National Engineering Laboratory or INEL). Based on lek census data, Connelly (1980) determined that sage-grouse populations across the INL Site were stable or increasing at that time.

To properly manage greater sage-grouse populations in southeast Idaho, it is essential that populations are monitored so that appropriate corrective action can occur if this species begins to decline. After the work of Connelly (1980), little monitoring of sage-grouse populations on the INL Site occurred until 1995 when DOE-funded contractors began surveying two lek routes near the southeastern and southwestern borders of the Site. These lek routes have since been monitored annually. In addition, the Idaho Department of Fish and Game (IDF&G) has monitored a lek route along the northern border of the INL Site for several years. Prior to 2009, 26 sage-grouse leks were known to be active on the INL Site (i.e., birds had been seen at these locations for multiple years during the last decade; Figure 1). In addition, 61 leks were documented either by Connelly (1980) or the IDF&G that were potentially active, but for which the current status was unknown.

Because the only reliable data for estimating long-term population trends for this species is information on lek attendance, activity, and distribution (Connelly et al. 2004), our objective is to conduct a multi-year survey of historic leks that were previously identified by the IDF&G and Connelly (1980) to determine if those sites are still used by sage-grouse. Herein, we report results from the first two years of lek surveys that were conducted during spring 2009 and 2010.



2. METHODS

Lek surveys were conducted on and adjacent to the INL Site in Bingham, Butte, Clark, and Jefferson counties of southeast Idaho (Figure 1), the habitat and topography of which have been described elsewhere (Connelly et al. 1988). For travel and logistical purposes, most historic lek sites were arbitrarily grouped into 15 zones with 2-7 sites per zone (Figure 1). The largest zone comprised the area around the National Security Test Range (NSTR). Surveys were conducted at leks in the area surrounding NSTR twice during spring 2010, and surveys were conducted at historic leks H 1 and 2 on four occasions in 2010, because these leks were part of sampling that occurred in conjunction with other activities (i.e., environmental assessment of the multipurpose haul road). Greater details of these surveys are provided elsewhere (Whiting and Bybee 2010, Whiting et al. 2010). Although 61 historic sites were documented, we surveyed only 57 because the remainder had either been displaced by human activity or a known active lek was in close proximity. For example, two of these sites, north of zone M (Figure 1), are located in what is now a large gravel pit. An active lek is already known to occur in the gravel pit, and so these two sites were not included in the survey. A historic site south of zone M was also not included because it is located in a large clearing near a known active lek. One historic site in the southwest corner of the INL Site (labeled T1/T12) was not included in a zone because it is located on a road and was easily monitored while driving between zones.

We plotted historic lek coordinates in ArcGIS and then transferred those coordinates to a hand-held GPS unit that was later used to find the precise location of the leks on the INL Site. During each visit to a lek site, the following data were collected: date, time, wind speed, temperature, percent cloud cover, estimated area of the lek, and the number and sex of grouse observed. Because the probability of observing grouse on a lek decreases 90 minutes after sunrise (Jenni and Hartzler 1978, Connelly et al. 2003), we reported the number of minutes before or after sunrise that the survey was conducted. Sunrise times were based on estimates for Arco, ID, and were obtained from <http://www.sunrisesunset.com/>. We also photographed each site and searched for sign (e.g., feathers, tracks, and scat) that grouse had recently visited the area.

Before approaching a lek, we used binoculars to search the site for sage-grouse. Next, we attempted to detect sage-grouse strutting using both the unaided ear and a parabolic microphone. If no grouse were detected, we walked ~100 m from the center of the lek in each cardinal direction, and then listened again for male calls for two minutes using the parabolic microphone. If strutting grouse were heard, we attempted to locate the new lek by walking or driving towards the call. When sage-grouse were observed or flushed from areas other than those identified as historic lek sites, we recorded GPS coordinates and estimated the number of males and females. In most cases, we returned to these new sites another day in an attempt to document activity at leks.

Two sets of criteria have been established for determining whether a lek should be designated active. Connelly et al. (2000) suggested a lek be designated active only if it is attended by ≥ 2 male sage-grouse in ≥ 2 of the previous 5 years. More recently, the IDF&G issued criteria that allowed a lek to be designated active if it has been attended by ≥ 2 males during a single breeding season (Idaho Department of Fish and Game, unpublished document).



Using these new criteria, acceptable documentation includes observations of birds using the site or evidence of recent grouse activity (e.g., fresh droppings, feathers). If there are insufficient data for a lek to be designated active, it is given a status of inactive or unknown. Acceptable evidence that a lek is inactive includes (1) an absence of ≥ 2 males during 2 or more surveys, (2) surveys were separated by ≥ 7 days, (3) the weather was clear or partly cloudy and winds were < 10 km/h, and (4) there was no obvious disturbance. If the data are insufficient to classify a lek as either active or inactive, it is given an unknown status. Since the present report only contains data from the first two years of a multi-year survey, we adopted the IDF&G criteria for designating lek status. For our data, if a surveyed lek met all of the above criteria, but the sky was mostly or fully cloudy (no rain), we still assigned it an inactive status. If no grouse were detected at a lek that was visited > 90 minutes after sunrise, the lek was given an unknown status.

3. RESULTS

From March 20 to May 8, 2009, we visited 57 historic lek sites 1 to 3 times (88 total visits) between 0615 and 0945 hours. Surveys were performed, on average, 55 minutes after sunrise ($SD = 47$ min., range = 34 to 161 min.); however, 25 surveys (28%) occurred > 90 minutes after sunrise (range = 91 to 161 min.). The mean wind speed was 4.7 km/h ($n = 71$; $SD = 5.0$) when recorded precisely (during 17 surveys the wind speed was recorded as a bracketed number: 8-16 km/h), with a maximum of 18.7 km/h. We did not detect sage-grouse during surveys conducted in connection with the most extreme weather events, such as when it was raining ($n = 3$) or when the wind speed was > 6 km/h ($n = 19$). We detected sage-grouse, either visually or audibly, on or near 14 historic and 2 previously undocumented leks (Table 1, Figure 2). We detected grouse at 10 sites that we visited 2 or 3 times; and we detected sage-grouse more than once at 6 of the 10 sites. At least two males were detected on all but one (N5) of the 16 sites during the survey period. Of the 43 leks where sage-grouse were not detected, 18 (42%) were surveyed twice.

Based on our results in 2009, we classified each lek according to the IDF&G criteria (Table 2). At lek N5, only one male was observed even though the site was surveyed 3 times (Table 1). As such, there were insufficient data to give N5 an active status. We designated the other 15 leks where sage-grouse were detected (including 2 that were previously undocumented) as active. In addition, we designated 6 leks as inactive and 37 as unknown (Table 2, Figure 2). Lek J1 was the only lek for which data were not collected. Consequently, it was classified as status unknown.

From April 5 to May 10, 2010, we visited 57 historic lek sites 1 or more times (101 total visits) between 0550 and 0845 hours. Six surveys (7.6%) occurred > 90 minutes after sunrise (range = 91 to 114 min.). The mean wind speed was 6.3 km/h ($n = 79$; $SD = 5.5$) when recorded precisely (during 22 surveys the wind speed was recorded as a bracketed number: i.e., 0-8.1, 8.1-16.1, or 16.1-32.2 km/h), with a maximum of 32.2 km/h. We detected sage-grouse visually or audibly on or near 17 historic and 3 previously undocumented leks (NSTR T20, SW of L2, and Atomic City; Table 1, Figure 2). At least two males were detected on all but five (B2, G3, M4, N2, and N3) of the 20 sites during the survey period. Of the 39 leks where sage-grouse were not detected, 13 (33%) were surveyed twice.



We classified each lek according to the IDF&G criteria for our results in 2010 (Table 3). At leks B2, G3, M4, N2, N3, only one male was observed at each site (Table 1). As such, there were insufficient data to give lek B2, G3, M4, and N2 an active status. There were seven leks (G1, G2, K3, N3, N4, T8, and T13) that were designated as active in 2009 that had ≤ 2 males during our surveys in 2010. Those seven leks remained designated as active. We designated the other 16 leks where sage-grouse were detected (including 3 that were previously undocumented) as active. Of the 16 leks, there were 5 historic leks (F1, J4, I2, N7, and M6) that were designated unknown in 2009 that were now determined to be active; however, we determined that lek F1 was the same as an adjacent active lek, because they were in such close proximity to each other. In addition, we designated 6 leks as inactive and 33 as unknown (Table 3, Figure 2).

4. DISCUSSION

Nearly 30 years have passed since most of the historic leks surveyed in this report have been monitored. Our results during 2009 and 2010 indicate that the number of sage-grouse leks designated as active on the INL Site is less than one-half of what was identified historically as a potential lek. Caution should be used, however, when comparing the number of potential leks with leks that are active now, because it is uncertain whether some of the historic leks were active. Additionally, lek locations can change over time, and this change in location does not necessarily indicate a decline in population abundance, especially if a new lek is established. On a regional scale, which includes the INL Site, the number of active leks has declined since 1965 (Garton et al. 2010). A similar decline in number of active leks could be expected on the INL Site. Most likely, sage-grouse numbers declined throughout the 1980s and 1990s to current levels, and have remained stable at the current low levels over the past decade (Garton et al. 2010).

Two alternatives exist for why we may not have identified more active leks. First, although sage-grouse numbers are lower than in the late 1970s (Garton et al. 2010), there is a possibility that some leks that were assigned an inactive or unknown status are actively used by grouse, but we failed to detect grouse at these locations. During both years, more than 50% of leks with an unknown or inactive status were surveyed only once. Unfortunately, the number of historic leks that need to be surveyed, the short amount of time in which to collect data, and variable weather conditions restrict the number of visits that can be made to each historic lek. Assuming that populations are stable and with continual sampling over the next few years, we expect that additional historic leks will be determined to be active. Indeed, the number of new and historic leks documented increased from 15 to 22 from 2009 to 2010.

A second factor that may have contributed to low detection rates is slight variation in the consistency of our survey methods. Connelly et al. (2003) suggested that lek data collected > 90 minutes after sunrise should not be included in an analysis because most male strutting has ceased by that time. If our purpose was to compare data from different years or to document trends from year to year, it would be important to follow this guideline and discard data collected after 90 minutes. Our objective, however, was simply to determine which historic leks were active. As such, although surveying a lek more than 90 minutes after sunrise may reduce the probability of observing grouse, any grouse that are detected, regardless of the time of morning at which they are sampled, adds to the number of leks classified as active. One study carried out



over 3 years in Montana found that the majority of males left leks between 90 and 120 minutes after sunrise (Jenni and Hartzler 1978). Thus, grouse may still be on a lek if the survey time is only slightly more than 90 minutes after sunrise. In 2009 at two of our active leks, grouse were observed more than 90 minutes after sunrise (Table 1), and we surveyed all active leks in 2010 within 90 minutes after sunrise (Table 1). In future years, we will attempt to standardize lek survey times so that all surveys are conducted within 90 minutes after sunrise.

During spring 2010, we surveyed all historic leks, including the two that were newly identified in 2009. We will continue every spring to survey all the historic leks and newly identified leks. Ultimately, once all active sites are identified, our broader objective will be to quantify the number of males visiting leks from year to year (i.e., lek census) to provide an index of population trends on the INL Site. The ability to compare contemporary lek activity with historic patterns, coupled with annual lek census data of all known active leks, will provide officials valuable information to make informed decisions regarding the management of this species on the INL Site (Connelly et al. 2003, Garton et al. 2010).

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Table 1. Lek survey data from 2009 and 2010, where at least one sage-grouse was detected. Although grouse were not detected during every survey, they were detected at least once at all sites listed.

Lek group	Lek #	Date	Min. (+/-) from Sunrise	Wind Speed (km/h)	Temp (C)	Grouse Present	Observed	Males	Females	Easting	Northing
B	2	7-Apr-2010	-5	0.0	-0.5	Yes	1			338607	4840791
B	3	24-Apr-2009	49	3.2	7.2	Yes	3	2	1	341256	4835955
B	3	8-May-2009	34	3.5	-2.8	Yes	6	5	1	341256	4835955
B	3	7-Apr-2010	90	1.0	3.1	Yes	13	13		341256	4835955
C	2	27-Apr-2009	44	2.1	2.2	Yes	21	18	3	344537	4840856
C	2	20-Apr-2010	77	2.1	9.4	Yes	14	9		344537	4840856
E	4	14-Apr-2009	129	5.6	4.4	Yes	2			355340	4831131
E	4	4-May-2009	154	2.6	3.3	No	0	0	0	355340	4831131
E	4	14-Apr-2010	57	2.7	5.7	Yes	22	22		354519	4830689
F	1	6-May-2010	-15	8.5	0.0	Yes	13	13		376112	4838855
G	1	10-Apr-2009	1	2.6	3.3	Yes	0	3	0	380890	4837742
G	1	30-Apr-2009	23	0.0	-2.8	No	0	0	0	380890	4837742
G	1	19-Apr-2010	93	0.0	9.4	No	0	0	0	380890	4837742
G	2	13-Apr-2009	70	4.7	5.6	Yes	0	3	0	383387	4840981
G	2	30-Apr-2009	76	1.9	-2.8	Yes	7	5	2	382100	4839989
G	2	19-Apr-2010	24	0.0	0.6	No	0	0	0	383387	4840981
G	3	19-Apr-2010	-3	0.0	0.0	Yes	1	1		383750	4841249



Table 1. (Continued).

Lek group	Lek #	Date	Min. (+/-) from Sunrise	Wind Speed (km/h)	Temp (C)	Grouse Present	Observed	Males	Females	Easting	Northing
I	2	15-Apr-2010	64	6.1	4.1	Yes	2	2		372359	4830450
J	3	21-Apr-2009	17	0.0	6.7	Yes	24	22	2	336904	4811869
J	3	3-May-2010	36	16.4	5.9	Yes	7	6		336904	4811869
J	4	3-May-2010	57	20.8	6.4	Yes	10	10		338384	4811810
K	1	17-Apr-2009	43	2.3	1.1	Yes	5	0	0	342041	4815692
K	1	5-May-2010	60	4.0	-3.4	Yes	32	32		342060	4815537
K	3	17-Apr-2009	-22	4.2	-1.1	Yes	2	2	0	344937	4816207
K	3	5-May-2010	65	3.1	0.1	No	0	0	0	344937	4816207
L	4	22-Apr-2009	-5	4.3	6.1	Yes	18	16	2	331686	4811942
L	4	3-May-2010	-17	3.9	8.1	Yes	27	25	2	331686	4811942
M	4	8-Apr-2010	68	2.4	-0.2	Yes	1			338808	4818566
M	6	8-Apr-2010	17	0.0	-3.9	Yes	5	5		340015	4818597
N	2	26-Apr-2010	27	8.1-16.1	-2.0	Yes	1	1		355109	4873746
N	3	20-Mar 2009	124	8-16	1.7	Yes	>85	?	?	356068	4875331
N	3	2-Apr-2009	82	8-16	1.7	No	0	0	0	356068	4875331
N	3	27-Apr-2010	70	4.8	3.0	Yes	1	1		356068	4875331



Table 1. (Continued).

Lek group	Lek #	Date	Min. (+/-) from Sunrise	Wind Speed (km/h)	Temp (C)	Grouse Present	Observed	Males	Females	Easting	Northing
N	4	20-Mar-2009	69	8-16	1.7	Yes	21	7	14	357165	4873404
N	4	2-Apr-2009	35	8-16	1.7	Yes	6	6	0	357165	4873404
N	4	13-Apr-2009	6	8-16	1.7	Yes	2	2	0	357165	4873404
N	4	26-Apr-2010	17	8.1-16.1	3	No	0	0	0	357165	4873404
N	4	7-May-2010	20	3.2	0	No	0	0	0	357165	4873404
N	5	20-Mar-2009	24	8-16	1.7	Yes	1	1	0	359221	4872641
N	5	7-Apr-2009	61	8-16	-1.1	No	0	0	0	359221	4872641
N	5	13-Apr-2009	36	8-16	1.7	No	0	0	0	359221	4872641
N	5	26-Apr-2010	-3	0-8.1	-3.0	No	0	0	0	359221	4872641
N	5	7-May-2010	2	3.2	-1.0	No	0	0	0	359221	4872641
N	7	26-Apr-2010	-27	0-8.1	-3.0	Yes	3	3		361515	4870550
N	7	6-May-2010	33	8.1	2.0	No	0	0	0	361515	4870550
NSTR	7	22-Apr-2009	9	0.0	4.4	Yes	3	3	0	366099	4844300
NSTR	7	13-Apr-2010	81	1.6-6.4	1.1	No	0	0	0	366099	4844300
NSTR	7	4-May-2010	14	12.9-19.3	-2.2	Yes	2	2	0	366099	4844300
NSTR	T20	29-Apr-2010	-29	11.3	-3.9	Yes	10-12	10-12		359245	4835947
NSTR	T20	10-May-2010	18	0	2.2	Yes	5	5		359245	4835947
T	8	13-Apr-2009	-24	0	3.9	Yes	8			378430	4838326
T	8	30-Apr-2009	11	0	-2.8	Yes	17	15	≥ 3	378430	4838326
T	8	6-May-2010	81	9.2	1.0	No	0	0	0	378430	4838326



Table 1. (Continued).

Lek group	Lek #	Date	Min. (+/-) from Sunrise	Wind Speed (km/h)	Temp (C)	Grouse Present	Observed	Males	Females	Easting	Northing
T	13	21-Apr-2009	-21	0	1.1	Yes	6	6	0	334412	4813852
T	13	22-Apr-2009	-24	0	2.8	Yes	5	5	0	334412	4813852
T	13	4-May-2010	17	5.6	-1.4	No	0	0	0	334412	4813852
T1/T12*		6-May-2009	21	5.3	4.4	Yes	0	1		329437	4815907
T1/T12*		20-Apr-2009	93	0	11.7	Yes	1	1	0	329437	4815907
L	SW of L2	22-Apr-2010	-31			Yes	48	48		324903	4810300
L	SW of L2	29-Apr-2010	60	9.3	-2.8	Yes	47	47		324903	4810300
Atomic City		5-Apr-2010		8.1	-3.9	Yes	12	12		351931	4813874

*More than one grouse was potentially heard at this location.



Table 2. All historical and newly discovered leks and their designated status after surveys in 2009. Status designations are based on criteria set by the Idaho Department of Fish and Game in 2009.

Historic Lek	Status	Historic Lek	Status
A1	Unknown	K1	Active
A2	Unknown	K2	Unknown
A3	Unknown	K3	Active
B1	Unknown	L1	Inactive
B2	Unknown	L2	Unknown
B3	Active	L3	Unknown
C1	Unknown	L4	Active
C2	Active	M1	Inactive
D1	Unknown	M2	Inactive
D2	Unknown	M3	Unknown
D3	Unknown	M4	Unknown
E1	Inactive	M5	Unknown
E2	Unknown	M6	Unknown
E3	Unknown	N1	Unknown
E4	Active	N2	Unknown
F1	Unknown	N3	Active
F2	Unknown	N4	Active
G1	Active	N5	Unknown
G2	Active	N6	Unknown
G3	Unknown	N7	Unknown
H1	Inactive	NSTR1	Unknown
H2	Unknown	NSTR2	Unknown
I1	Unknown	NSTR3	Unknown
I2	Unknown	NSTR4	Unknown
I3	Inactive	NSTR6	Unknown
J1*	Unknown	NSTR7	Active
J2	Unknown	NSTR8	Unknown
J3	Active	T8	Active
J4	Unknown	T13	Active
		T1/T12	Active

*This lek was not surveyed in 2009.

Table 3. All historical and newly discovered leks and their designated status after surveys in 2010. Status designations are based on criteria set by the Idaho Department of Fish and Game in 2009.

Historic Lek	Status	Historic Lek	Status
A1	Unknown	K1	Active
A2	Unknown	K2	Unknown
A3	Unknown	K3	Active
B1	Unknown	L1	Inactive
B2	Unknown	L2	Unknown
B3	Active	L3	Unknown
C1	Unknown	L4	Active
C2	Active	M1	Inactive
D1 ²	Unknown	M2	Inactive
D2 ²	Unknown	M3	Unknown
D3 ²	Unknown	M4	Unknown
E1	Inactive	M5	Unknown
E2	Unknown	M6	Active
E3	Unknown	N1 ²	Unknown
E4	Active	N2 ²	Unknown
F1	Active	N3 ²	Active
F2	Unknown	N4 ²	Active
G1	Active	N5 ²	Unknown
G2	Active	N6 ²	Unknown
G3	Unknown	N7 ²	Active
H1	Inactive	NSTR1 ²	Unknown
H2	Unknown	NSTR2 ²	Unknown
I1	Unknown	NSTR3 ²	Unknown
I2	Active	NSTR4 ²	Unknown
I3	Inactive	NSTR6 ²	Unknown
J1	Unknown	NSTR7 ²	Active
J2	Unknown	NSTR8 ²	Unknown
J3	Active	NSTR T20	Active
J4	Active	T8	Active
SW of L2	Active	T13	Active
Atomic City	Active	T1/T12*	Active

*This lek was not surveyed in 2010.

²This lek was surveyed twice in 2010.

Figure 1. Known active and historic leks on and near the INL Site in southeast Idaho prior to the 2009 and 2010 lek surveys. The white dotted line is the boundary of the National Security Test Range. Roads are identified with faint white lines. Historic leks originally identified by Connelly (1980) are red and those identified by the IDF&G are yellow. In 2009, the historic leks were grouped into 15 routes (A-N and NSTR) for the surveys documented in this report.

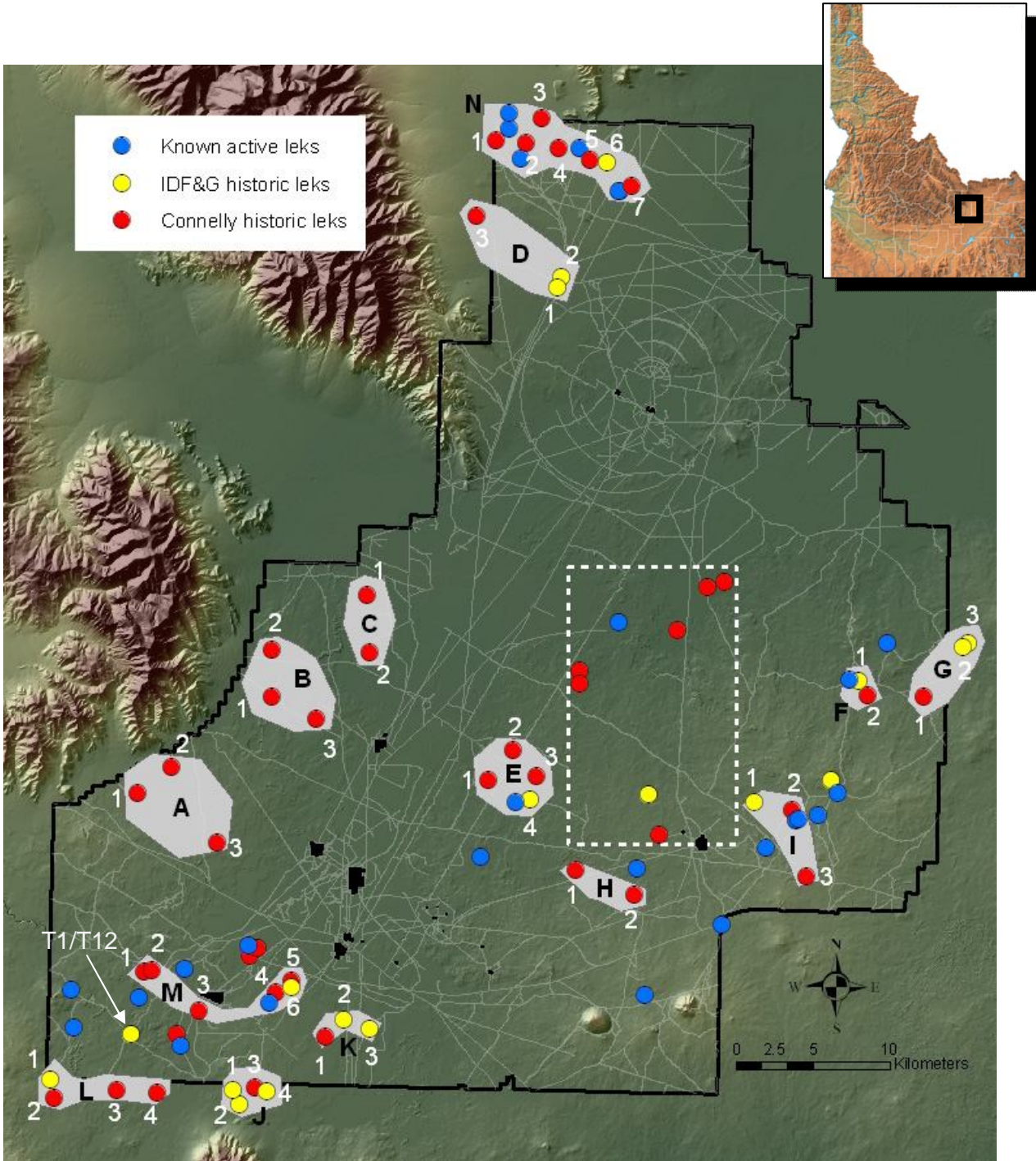


Figure 2. Current distribution of historic leks on the INL Site after completion of the 2010 lek surveys. Leks known to be active prior to 2009 and are indicated by blue dots, whereas the new leks identified in 2009 and 2010 are marked with a circled crosshair. In several instances, the location of leks identified in the current study was shifted slightly from its historical coordinates, as is evident when the crosshairs do not line up directly with the underlying dot.

