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Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site: 2021 Summary Report

January 2022

Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site

2021 Summary Report

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**Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office**

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CONTENTS

1.	INTRODUCTION.....	1-1
2.	POPULATION TRIGGER MONITORING.....	2-1
2.1	Task 1—Lek Counts and Lek Route Surveys.....	2-1
2.1.1	Introduction.....	2-1
2.1.2	Results and Discussion.....	2-1
3.	HABITAT TRIGGER MONITORING.....	3-1
3.1	Task 5—Sagebrush Habitat Condition Trends.....	3-1
3.1.1	Introduction.....	3-1
3.1.2	Results and Discussion.....	3-1
3.2	Task 6—Monitoring to Determine Changes in Sagebrush Habitat Amount and Distribution.....	3-6
3.2.1	Introduction.....	3-6
3.2.2	Results and Discussion.....	3-6
4.	THREAT MONITORING.....	4-1
4.1	Task 4—Raven Nest Surveys.....	4-1
4.1.1	Introduction.....	4-1
4.1.2	Results and Discussion.....	4-1
4.2	Task 8—Monitor Expansion of the Infrastructure Footprint within the SGCA and Other Areas Dominated by Big Sagebrush.....	4-3
4.2.1	Introduction.....	4-3
4.2.2	Results and Discussion.....	4-3
5.	IMPLEMENTATION OF CONSERVATION MEASURES.....	5-2
5.1	Summary of 2021 Implementation Progress.....	5-2
5.1.1	Threat: Wildland Fire.....	5-2
5.1.2	Threat: Infrastructure Development.....	5-2
5.1.3	Threat: Livestock.....	5-2
5.1.4	Threat: Seeded Perennial Grasses.....	5-3
5.1.5	Threat: Landfills and Borrow Sources.....	5-3
5.1.6	Threat: Raven Predation.....	5-3
5.1.7	Threat: Human Disturbance.....	5-3
5.2	Reports on Projects Associated with Conservation Measures.....	5-3
5.2.1	Conservation Measure 1—Post-fire Recovery Planning, Implementation, and Monitoring.....	5-3
5.2.2	Conservation Measure 1—Sagebrush Seedling Planting for Habitat Restoration.....	5-7
6.	SYNTHESIS AND ADAPTIVE MANAGEMENT.....	6-1
6.1	Sage-grouse and Sagebrush Habitat Trends.....	6-1
6.2	Proposed Changes.....	6-2
6.3	Adopted Changes.....	6-2
7.	LITERATURE CITED.....	7-1

FIGURES

Figure 2-1. Location of 38 leks on or near the Idaho National Laboratory Site that were classified active following the 2021 field season.	2-2
Figure 2-2. Peak male attendance of greater sage-grouse at 27 leks in the Sage-grouse Conservation Area—the basis for the population trigger. The trigger would trip if the 3-year running average falls below the dashed line.	2-2
Figure 3-1. Mean cover from functional groups of native species in sagebrush habitat plots on the Idaho National Laboratory Site from 2013 through 2021. Error bars represent ± 1 SE. Tick marks along the top denote sample size.	3-3
Figure 3-2. Mean cover from functional groups of introduced species in sagebrush habitat plots on the Idaho National Laboratory Site from 2013 through 2021. Error bars represent ± 1 SE. Tick marks along the top denote sample size.	3-3
Figure 3-3. Annual water-year precipitation (October-September) by month from the Central Facilities Area, Idaho National Laboratory Site. Mean monthly precipitation includes data from 1951 through 2021 (206 mm).	3-4
Figure 4-1. Results of the 2021 raven nest survey depicting all documented active raven nests on infrastructure, after accounting for potential renesting attempts.	4-2
Figure 4-2. Raven nests observed on Idaho National Laboratory Site infrastructure (adjusted values).	4-2
Figure 5-1. Four of the wildland fires that burned on the Idaho National Laboratory Site in 2020 shown with all major wildland fires since 1994 and the boundary for the Sage-grouse Conservation Area.	5-5
Figure 5-2. Proposed sagebrush seedling planting areas on the Sheep Fire at the Idaho National Laboratory Site and criteria used to identify prioritization. Areas are prioritized as Area 1 being highest priority and Area 6 being lowest priority.	5-6
Figure 5-3. Areas planted with big sagebrush (<i>Artemisia tridentata</i>) seedlings in 2021 with reference to previous years plantings on the Idaho National Laboratory Site.	5-7
Figure 5-4. Sagebrush seedling survivorship one year after planting on the Idaho National Laboratory Site. The yellow and green bar represents the observed living seedlings. The blue and red bar represents seedlings either observed dead or presumed to be dead. The black line and dots indicate water year precipitation average levels (mm). Water year is calculated as precipitation received in October of the planting year to September of the following year.	5-8
Figure 6-1. An overlay of the INL Site boundary onto two Idaho Conservation Areas (Desert and Mountain Valleys), with emphasis on Important and Priority Habitat Management Areas within each. Figure was adapted from Ellsworth et al. (2019).	6-1

TABLES

Table 3-1. Summary of selected vegetation measurements for characterization of condition of sagebrush habitat monitoring plots ($n = 43^*$) on the Idaho National Laboratory Site in 2021.	3-2
Table 3-2. Five-year averages of selected vegetation measurements for characterization of condition of sagebrush habitat plots on the Idaho National Laboratory Site. Baseline values were generated from vegetation monitoring plot data from 2013–2017. Standard Error (SE) was used to estimate the upper and lower limits in the baseline range.....	3-2
Table 3-3. Absolute cover (%) by functional group for annual and rotational plots comparing seven burned areas with unburned sagebrush habitat on the Idaho National Laboratory Site. Areas marked with differing letters (a, b) indicate statistical significant differences between pairwise comparison at $\alpha \leq 0.05$. For example, sagebrush cover in unburned areas (21.13%) is marked with the letter ‘ a ’ and sagebrush cover from the 1994 Butte City Fire (0.27%) is marked with the letter ‘ b ’ which indicates the difference in sagebrush cover between the two areas was statistically significant.....	3-5
Table A-1. Accomplishments in 2021 for each CCA conservation measure.....	A-1

ACRONYMS

BLM	Bureau of Land Management
CCA	Candidate Conservation Agreement
DOE	U.S. Department of Energy, Idaho Operations Office
EA	Environmental Assessment
ESER	Environmental Surveillance, Education, and Research
HMA	Habitat Management Area
IDFG	Idaho Department of Fish and Game
INL	Idaho National Laboratory
MPLS	males per lek surveyed
SE	Standard Error
SGCA	Sage-grouse Conservation Area
USFWS	U.S. Fish and Wildlife Service
WFMC	Wildland Fire Management Committee

1. INTRODUCTION

In October 2014, the U.S. Department of Energy, Idaho Operations Office (DOE) and the U.S. Fish and Wildlife Service (USFWS) entered into a Candidate Conservation Agreement (CCA) for Greater Sage-Grouse (*Centrocercus urophasianus*; hereafter sage-grouse) on the Idaho National Laboratory (INL) Site (DOE and USFWS 2014). The CCA stipulates that DOE submit a report annually to USFWS documenting monitoring activities that occurred within the preceding twelve months. This Summary Report highlights key findings of a comprehensive report (INL 2022) produced by DOE's Environmental Surveillance, Education, and Research Program (ESER), now the Battelle Energy Alliance Natural Resources Group (hereafter Natural Resources Group), which satisfies the reporting requirement of the CCA. Comprehensive reports (i.e., Full CCA Reports) for each year can be found under the heading *Sage-grouse Reports* at <https://idahoeser.inl.gov/publications.html>

Key findings from 2021 that are summarized here include (1) a concise description of results from all CCA monitoring tasks performed by the Natural Resources Group, and (2) actions taken by DOE, INL contractors, and other stakeholders to meet objectives of conservation measures designed to reduce threats to sage-grouse and its habitats (DOE and USFWS 2014). Most important, this Summary Report updates stakeholders regarding sage-grouse population and habitat trends as applied to adaptive regulatory triggers established in the CCA. The two triggers and criteria that define them are:

Population Trigger: The three-year running average of peak male attendance, summed across 27 leks within the Sage-grouse Conservation Area (SGCA). This trigger will trip if the average falls below 253 males—a 20% decrease from the 2011 baseline of 316 males.

Habitat Trigger: Total area designated as sagebrush habitat within the SGCA. This trigger will trip if total area falls below 62,846 ha (155,296 acres)—a 20% drop from the 2013 baseline of 78,558 ha (194,120 acres).

Related monitoring tasks are grouped into three sections: Population Trigger Monitoring (Section 2), Habitat Trigger Monitoring (Section 3), and Threat Monitoring (Section 4). Section 5 describes actions taken during the past year to achieve the objectives of conservation measures listed in the CCA. The final section (Section 6) synthesizes key results from all monitoring tasks, proposed changes to the CCA or associated monitoring tasks for DOE and USFWS to consider, and documents changes to the CCA that have been approved by both signatories during the past year.

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2. POPULATION TRIGGER MONITORING

2.1 Task 1—Lek Counts and Lek Route Surveys

Summary of Key Results: The three-year running average of peak male attendance at the 27 leks that inform the population trigger was down 15% from 2020. It is now exactly at the population trigger threshold. In 2022, counts on these leks must increase 34% to avoid tripping the trigger.

2.1.1 Introduction

The primary purpose of the sage-grouse monitoring task is to track male attendance trends on INL Site leks and determine the three-year average male count on 27 leks within the SGCA (hereafter, baseline leks), which is the basis of the population trigger (DOE and USFWS 2014). Leks are surveyed individually or as a part of six lek routes (Figure 2-1) from mid-March until early May. Those included on lek routes are used to estimate abundance trends. We also survey a few lek sites each year that are no longer active to determine if sage-grouse have reoccupied those sites. These monitoring activities help maintain accurate records of the number and location of active leks on the INL Site.

2.1.2 Results and Discussion

SGCA Baseline Leks

In 2021, we surveyed each baseline lek three to seven times, and peak male attendance on baseline leks was 227—the same number observed in 2020 (Figure 2-2). This value remains the lowest recorded since 2011 when we began tracking them as a unit. Prior to 2021, annual baseline lek counts had declined four consecutive years, reaching a level 52% lower than the peak in 2016 and 28% below the 2011 value. Upon completion of the 2021 field season, 17 baseline leks were classified active, a reduction of two since 2020.

The three-year (2019–2021) running average of peak male attendance on baseline leks declined 15.4% to 253 (SD = 44.5), placing this value exactly at the population trigger threshold (Figure 2-2). Results from 2021 represent the third consecutive year of double-digit percent declines and the lowest average number of males observed since calculations began in 2013. During the 2022 field season, the number of males observed on baseline leks must be 34% greater than in 2021 (i.e., 304 males) to avoid a further decline in the three-year average, which would trip the population trigger.

Lek Routes

We surveyed six lek routes five to seven times each (Figure 2-1). The sum of peak male attendance across all routes was 222 males, which was three less (–1%) than in 2020. Changes in the number of males per lek surveyed (MPLS) between 2020 and 2021 ranged from an 103% increase on the Radioactive Waste Management Complex route (MPLS in 2020 = 3.1; in 2021 = 6.3) to a 62% decrease on the Lower Birch Creek route (MPLS in 2020 = 7.6; in 2021 = 2.9; INL 2022). On four routes, MPLS values were the same or higher than in 2020. Taken together, lek route data suggest the number of breeding males occupying INL leks in 2021 was approximately the same as in 2020. This result is concordant with the result from baseline lek surveys, but it should be noted that many baseline leks are also assigned to lek routes, and thus results would be expected to converge (INL 2022).

Other Surveys and Changes of Lek Status

In addition to routine surveys of active and inactive baseline and route leks, we visited 20 inactive leks, two times each, to verify if they remained unoccupied. Fifteen of these had not been visited since 2017, and the remaining five were most recently surveyed in 2019 or 2020. No sage-grouse were observed at any of these leks, so each will retain its inactive status and will be visited again in five years or less.

Following the 2021 field season, two baseline leks were downgraded to inactive status, reducing the count of known active leks on or near the INL Site to 38 (Figure 2-1). This is the lowest number of active leks documented since discovery surveys and historical lek surveys were discontinued following the 2017 field season (45 leks were known to be active that year; Shurtliff et al. 2018).

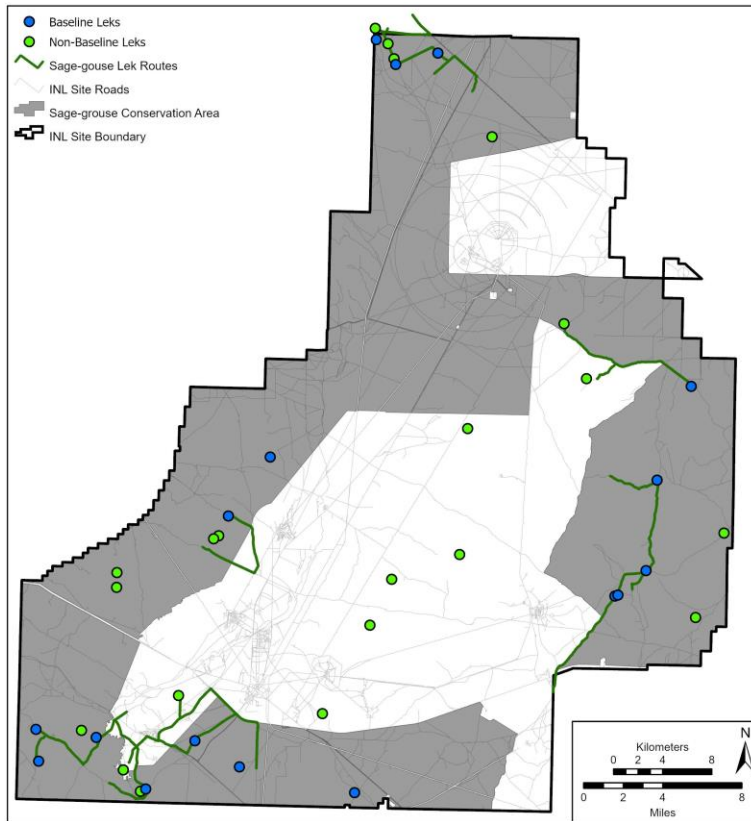


Figure 2-1. Location of 38 leks on or near the Idaho National Laboratory Site that were classified active following the 2021 field season.

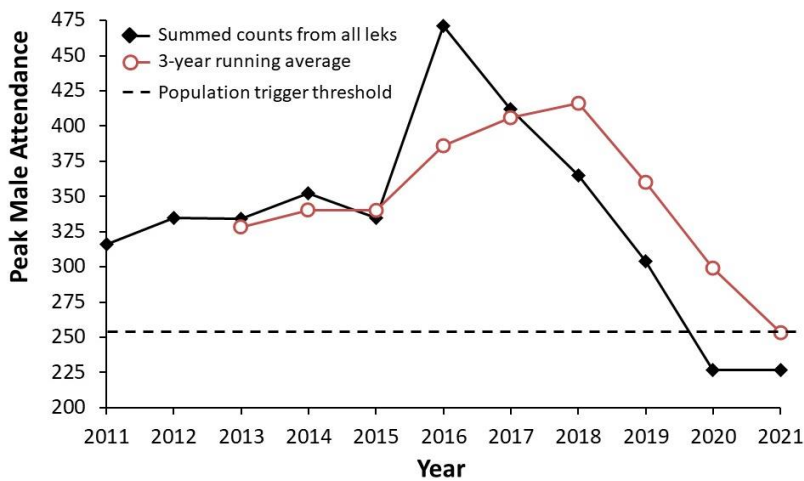


Figure 2-2. Peak male attendance of greater sage-grouse at 27 leks in the Sage-grouse Conservation Area—the basis for the population trigger. The trigger would trip if the 3-year running average falls below the dashed line.

3. HABITAT TRIGGER MONITORING

Areas designated as sagebrush habitat will change through time based on gradual changes in vegetation composition and abrupt changes caused by wildland fire. Two monitoring tasks are designed to identify vegetation changes across the landscape and assist in maintaining an accurate record of the condition and distribution of sagebrush habitat within the SGCA to facilitate annual evaluation of the habitat trigger.

3.1 Task 5—Sagebrush Habitat Condition Trends

Summary of Results:

Sagebrush habitat remained in good condition based on 2021 summary metrics compared to a five-year baseline dataset. Trend analyses in sagebrush habitat indicate that intact sagebrush habitat communities are resistant to invasive species dominance and to effects of drought. Vegetation composition did not have apparent broad declines nor improvements between livestock allotments and similar adjacent areas. Wildland fire footprints exhibited a range of condition, some are recovering to healthy native plant communities while others have a substantial weedy component. Post-fire communities appear to have more annual fluctuation in species composition in response to precipitation amount and timing.

3.1.1 Introduction

This section of the Summary Report addresses habitat condition assessment from a dataset collected yearly from permanent vegetation monitoring plots distributed throughout the INL Site. General sage-grouse habitat condition assessments use annual vegetation abundance and structure data summarized from vegetation plots in polygons mapped as sagebrush habitat. Sagebrush habitat condition characteristics are evaluated by comparing the current year's metrics against baseline values. The baseline values were calculated for vegetation cover, vegetation height, and sagebrush density from 48 vegetation monitoring plots over five consecutive years (2013–2017; Shurtliff et al. 2019). Trend analyses provide longer-term context, using nine years of vegetation cover data to examine abundance trends of native and non-native plant functional groups (i.e., shrubs, grasses, and forbs). Similar trend analyses are conducted on plots located in areas recovering from wildland fire to determine the status of their recovery to sagebrush habitat.

Once every five years assessments are completed to evaluate potential effects from wildland fire and livestock allotments on sagebrush habitat condition, as those have been identified as two potential threats to sage-grouse populations. Habitat plot sample size was supplemented in these areas by incorporating 150 rotational habitat monitoring plots in analyses. Rotational plots are sampled over three seasons in subsets of 50 vegetation monitoring plots. Analyses incorporated the data collected from rotational plots from 2018 – 2020 and annual plots in 2020 totaling 225 vegetation monitoring plots.

3.1.2 Results and Discussion

General Habitat Condition

Overall, 2021 general summary vegetation data indicated intact sagebrush habitat is in good condition when compared to baseline data (Table 3-1; Table 3-2). Sagebrush habitat plots remain dominated by sagebrush (*Artemisia spp.*) species (INL 2022) and sagebrush species cover was greater than baseline. Sagebrush species height measurements were slightly below baseline but within the historical range of variability for this dataset. Perennial grass/forb cover (21%) was two times greater than the baseline mean, exceeding the upper limit of the baseline range. Perennial grass/forb height was below baseline, but within the baseline range. Sagebrush density was lower than baseline and likely reflected low juvenile sagebrush recruitment.

Table 3-1. Summary of selected vegetation measurements for characterization of condition of sagebrush habitat monitoring plots ($n = 43^*$) on the Idaho National Laboratory Site in 2021.

2021 Summary	Mean Cover (%)	Mean Height (cm)	Mean Density (individuals/m ²)
Sagebrush	24.56	46.27	2.63
Perennial Grass/Forb	21.42	17.44	

*sample size is different from past sampling efforts due to habitat loss from wildland fire.

Table 3-2. Five-year averages of selected vegetation measurements for characterization of condition of sagebrush habitat plots on the Idaho National Laboratory Site. Baseline values were generated from vegetation monitoring plot data from 2013–2017. Standard Error (SE) was used to estimate the upper and lower limits in the baseline range.

Baseline Summary	Mean Cover (%)	SE	Mean Height (cm)	SE	Mean Density (individuals/m ²)	SE
Sagebrush	21.27	±0.33	47.81	±0.98	5.19	±1.80
Perennial Grass/Forb	9.99	±2.53	20.70	±3.67		

Habitat Condition Trends

Within sagebrush habitats, trend results support the idea that sagebrush plant communities are resistant to invasive species dominance and native perennial functional groups are resistant to short-term drought (Figure 3-1; Figure 3-2; Figure 3-3). Sagebrush and native perennial forb cover values remained consistent over the nine-year dataset while native perennial grasses remained higher over the last few years when compared to the earlier part of the dataset (Figure 3-1). Introduced perennial grass cover remained consistently low, while introduced annual grass cover has been more variable but was relatively low over the past two years, likely in response to unfavorable precipitation conditions (Figure 3-2; Figure 3-3). Cheatgrass (*Bromus tectorum*) is the only introduced annual grass represented in this dataset. Although cheatgrass cover has increased during favorable weather conditions, its total cover values indicate that it remains a minor component within intact sagebrush habitat (Figure 3-3).

Additional annual vegetation monitoring plots located in recovering burned areas are analyzed as non-sagebrush plots with the potential to recover to sagebrush habitat (Shurtliff et al. 2016). Compared to sagebrush habitat, post-fire plant communities exhibit amplified fluctuations of cheatgrass cover and are more susceptible to non-native weedy species dominance (INL 2022). Cheatgrass cover reached a high in 2018, but has since declined, likely in response to seasonal distribution of precipitation (INL 2022). The threat of annual grasslands should not be underestimated because cheatgrass is found within all habitats on the INL Site and can increase precipitously in a single growing season (Forman and Hafla 2018, INL 2022).

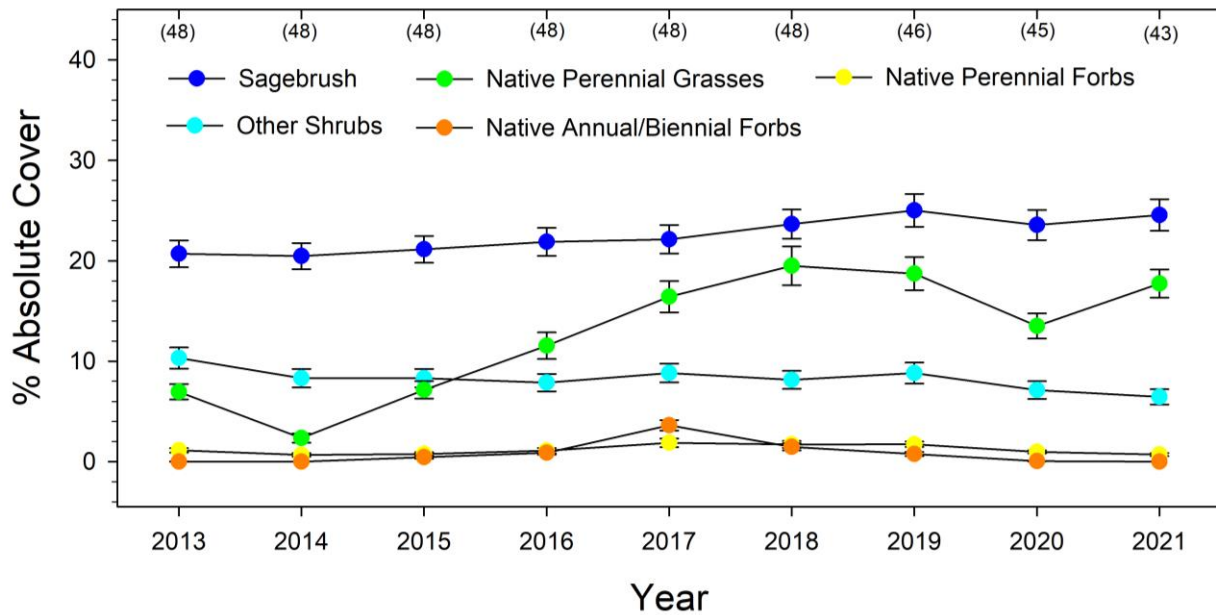


Figure 3-1. Mean cover from functional groups of native species in sagebrush habitat plots on the Idaho National Laboratory Site from 2013 through 2021. Error bars represent ± 1 SE. Tick marks along the top denote sample size.

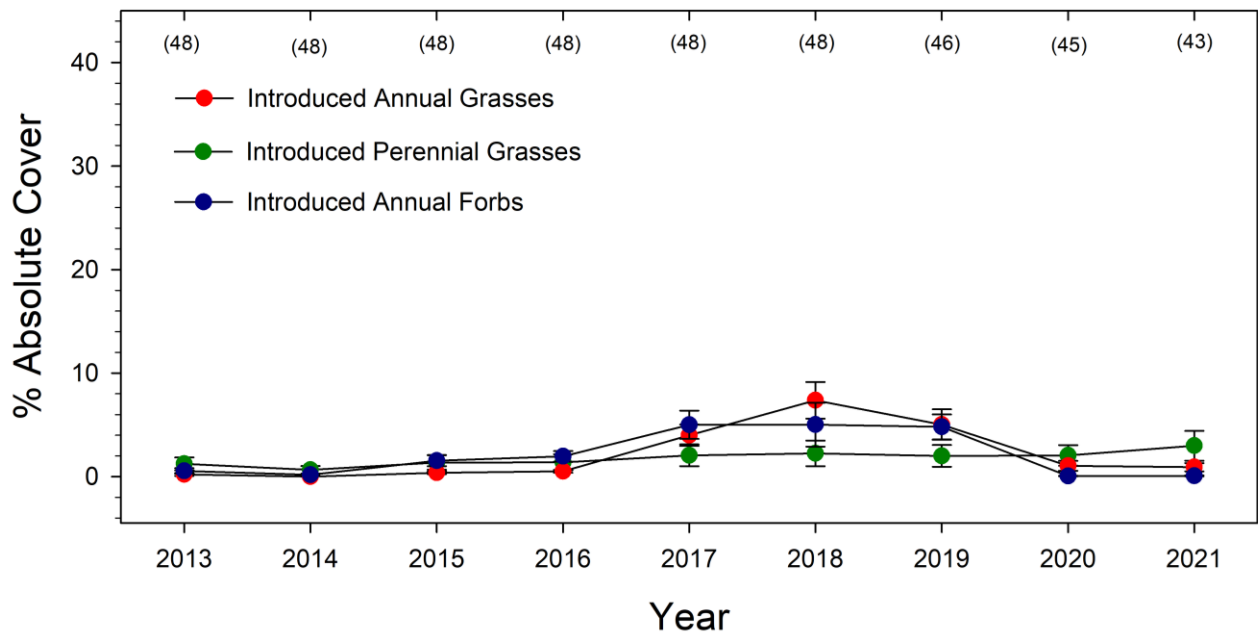


Figure 3-2. Mean cover from functional groups of introduced species in sagebrush habitat plots on the Idaho National Laboratory Site from 2013 through 2021. Error bars represent ± 1 SE. Tick marks along the top denote sample size.

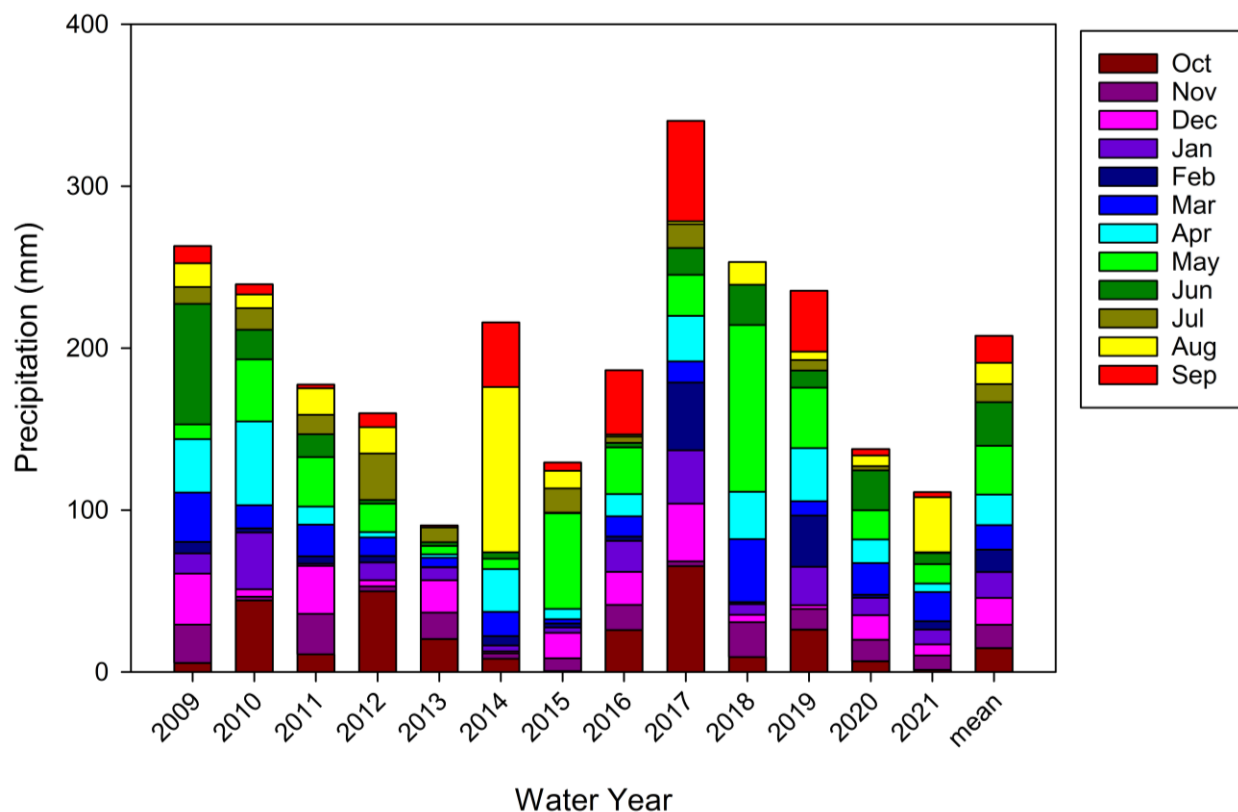


Figure 3-3. Annual water-year precipitation (October-September) by month from the Central Facilities Area, Idaho National Laboratory Site. Mean monthly precipitation includes data from 1951 through 2021 (206 mm).

Assessment of Potential Threats to Habitat Condition

Habitat condition monitoring results from areas within livestock grazing allotments (hereafter, allotments) and areas recovering from wildland fire support that wildland fire has the greatest immediate impact to sagebrush habitat condition. While allotments had localized degradation (often related to supplemental water, salt locations, and trailing routes), there were no apparent broad declines nor improvements in habitat condition across any of the allotments (INL 2022) analyzed.

Despite the lack of sagebrush species in all post-fire plant communities, several post-fire recovering habitats appear to be in relatively good ecological condition (Table 3-3). The results from the wildland fire analyses indicate native perennial grasses dominate many post-fire communities and cover from this functional group was greatest in the 2011 T-17 Fire. The 1996 Fire had the greatest other shrub cover compared to other fires and green rabbitbrush (*Chrysothamnus viscidiflorus*) cover in the 1996 Fire was comparable to sagebrush cover in sagebrush habitat. Other shrub species likely perform similar ecosystem function and are important in recovering habitats until sagebrush returns. Higher ratios of non-native, weedy species were evident in the 2000 Tin Cup Fire and the 2010 Jefferson Fire, suggesting less than optimal habitat recovery. Although a higher ratio of native functional groups was reported within the 2019 Sheep Fire, it is likely more than one year of monitoring data will be required to identify the trajectory of invasive species abundance in this recovering habitat (Table 3-3). Wildland fires remove sagebrush species from the plant communities and recovering communities are likely more susceptible to

introduced species dominance, especially if precipitation deviates from historical patterns (Bates et al. 2006, Forman and Hafla 2018, INL 2022) and possibly even more so if these areas have reburned (Davies et al. 2012). If precipitation events deviating from historical patterns are related to climate change, then climate change may pose a larger concern for post-fire habitat recovery than previously thought in the short-term. For this reason, it is important to continue monitoring post-fire plant communities to evaluate habitat recovery and support ongoing efforts to facilitate habitat recovery.

Table 3-3. Absolute cover (%) by functional group for annual and rotational plots comparing seven burned areas with unburned sagebrush habitat on the Idaho National Laboratory Site. Areas marked with differing letters (*a*, *b*) indicate statistical significant differences between pairwise comparison at $\alpha \leq 0.05$. For example, sagebrush cover in unburned areas (21.13%) is marked with the letter ‘*a*’ and sagebrush cover from the 1994 Butte City Fire (0.27%) is marked with the letter ‘*b*’ which indicates the difference in sagebrush cover between the two areas was statistically significant.

	Unburned (<i>n</i> = 89)	1994 Butte City Fire (<i>n</i> = 14)	1996 Fire (<i>n</i> = 10)	2000 Tin Cup Fire (<i>n</i> = 20)	2010 Jefferson Fire (<i>n</i> = 27)	2010 Middle Butte Fire (<i>n</i> = 9)	2011 T-17 Fire (<i>n</i> = 14)	2019 Sheep Fire (<i>n</i> = 17)
Native								
Sagebrush Species Cover	21.13 <i>a</i>	0.27 <i>b</i>	0.17 <i>b</i>	0.58 <i>b</i>	0.22 <i>b</i>	0.15 <i>b</i>	0.10 <i>b</i>	0.00 <i>b</i>
Perennial Graminoid Cover	16.10 <i>b</i>	23.36 <i>ab</i>	18.50 <i>b</i>	29.00 <i>ab</i>	31.79 <i>ab</i>	32.18 <i>ab</i>	42.27 <i>a</i>	20.10 <i>b</i>
Introduced								
Total Introduced Cover	6.47 <i>b</i>	24.06 <i>a</i>	9.94 <i>ab</i>	30.11 <i>a</i>	28.75 <i>a</i>	17.34 <i>ab</i>	14.02 <i>ab</i>	4.75 <i>b</i>

Vegetation composition was compared among allotments and analogous non-allotment areas. Recovering burned areas and current sagebrush habitat were analyzed separately within each allotment and within non-allotment areas. Results between allotments and analogous adjacent areas indicated no statistical declines nor improvements between native and introduced functional group composition (INL 2022). Livestock use has been observed to be locally concentrated to areas where supplemental resources are located. Allotments have a considerable amount of remote terrain with limited access, which likely contributes to uneven utilization. Livestock sign was reported on 13% of vegetation monitoring plots in allotments (INL 2022) further suggesting no major difference of conditions between livestock allotments and adjacent analogous areas may be due to uneven use. These results could be due to a lack of use as much as prescribed grazing practices. It is important to continue working with the Bureau of Land Management (BLM) on grazing practices in those areas that are utilized so that localized degradation areas do not become weed vectors for adjacent areas.

Overall, wildland fires have a greater immediate impact on sagebrush habitat condition than livestock. Post-fire recovering habitats are likely affected by changes in precipitation amount and timing, which could prolong the recovery of sagebrush habitat sufficient to support sage-grouse and lead to greater non-native cover.

3.2 Task 6—Monitoring to Determine Changes in Sagebrush Habitat Amount and Distribution

Summary of Results: There was one small fire that occurred on the INL Site in 2021. The total burned area was estimated to be 2.4 ha (5.9 ac) and did not remove any sagebrush habitat. The total area of sagebrush habitat in the SGCA on the INL Site remains unchanged from 2020 with 77,486 ha (191,472.1 ac). The current estimated area of sagebrush habitat remaining outside the SGCA also remains unchanged with 28,284.1 ha (69,891.5 ac).

3.2.1 Introduction

This task is intended to provide an update to the current sagebrush habitat distribution map, and primarily deals with losses to sagebrush habitat following events that alter vegetation communities. As updates are made to map classes (i.e., vegetation polygon boundaries are changed), the total area of sagebrush habitat mapped will be compared to the baseline value established for the habitat trigger to determine status with respect to the habitat trigger threshold.

3.2.2 Results and Discussion

There was one small fire that occurred on the INL Site in 2021. The East Butte Fire burned on September 8 and was located in a grassy area on the butte. The fire did not require dozer lines and was suppressed with hand tools and water lines. The fire was deemed controlled that day and declared out on September 9. The total burned area was estimated to be 2.4 ha (5.9 ac) and did not remove any sagebrush habitat.

The total area of sagebrush habitat in the SGCA on the INL Site remains unchanged from 2020 with 77,486 ha (191,472.1 ac). The sagebrush habitat outside of the SGCA is considered a “conservation bank” that could be incorporated into the SGCA to replace lost sagebrush habitat resulting from wildland fire or new infrastructure development (DOE and USFWS 2014). The current estimated area of sagebrush habitat remaining outside the SGCA also remains unchanged with 28,284.1 ha (69,891.5 ac).

4. THREAT MONITORING

Threats that impact sage-grouse and its habitats on the INL Site require regular monitoring to track the status of the threat and establish baseline evidence so success of implemented conservation actions can be evaluated. The impacts of wildland fire and livestock on sage-grouse habitat are assessed once every five years and are included in this report (Section 3.1). Monitoring non-native annual grasslands (i.e., cheatgrass) trends is also addressed in Section 3.1. Cheatgrass control is a component of post-fire restoration and is addressed in Section 5.2.1. In the following sections (4.1 and 4.2), we report on raven predation and infrastructure development.

4.1 Task 4—Raven Nest Surveys

Summary of Results: Observations of common raven nests on INL Site infrastructure and in associated ornamental trees increased 31% (n = 38) after reaching a multi-year low in 2019. The current year count now represents the median value during eight years of monitoring. In contrast, 11 raven nests were documented at facilities, which is higher than previously recorded.

4.1.1 Introduction

Raven predation is considered a low-level threat to sage-grouse on the INL Site. Conservation Measure 10 in the CCA (as amended—see Shurtliff et al. 2019) states that DOE will work with INL contractors and the National Oceanic and Atmospheric Administration to opportunistically reduce raven nesting on power lines and towers and at facilities. To support this effort, nearly all infrastructure on the INL Site is monitored annually during the common raven (*Corvus corax*; hereafter, raven) core nesting period in April and May. Our primary objective is to determine how many raven nests are built on INL Site infrastructure each year and to track the nesting trend so DOE may be alerted if numbers increase.

4.1.2 Results and Discussion

We documented 38 raven nests on INL Site structures or in ornamental trees associated with facilities, after accounting for re-nest attempts (i.e., adjusted total; Figure 4-1). From April 1 through June 4, we observed 51 active raven nests, but 13 of these were considered re-nest attempts after nearby nests fell to the ground or disappeared for other reasons (INL 2022). Twenty-four of the 38 nests (63%) were on power lines, all of which were transmission-line structures. The number of failed nests was unusually high in 2021, and we suspect a contributing factor was that on two days in early April, peak wind speeds reached or exceeded 101 kilometers per hour (63 miles per hour). Wind speeds on both days were higher than on any single day in April since surveys began in 2014.

Eleven active raven nests were observed at 10 facilities, including one at the Central Facilities Area, a facility where no raven nests had been reported previously. At no previous time since surveys began has so many active nests been documented at the 12 surveyed facilities. Outside of facilities, three nests were found on cellular and meteorological towers on the east side of the INL Site (Figure 4-1). We have noted that the towers selected by ravens for nesting are often used year after year. For example, ravens have nested on at least two of the three towers occupied in 2021 every year since 2016, despite efforts by the National Oceanic and Atmospheric Administration to deter nesting on one of them.

Active raven nests recorded on all infrastructure associated with the INL Site was 15% higher in 2021 than 2020, and 31% higher than the multi-year low in 2019 (Figure 4-2). The 2021 count represents the median for the eight years the survey has been performed.

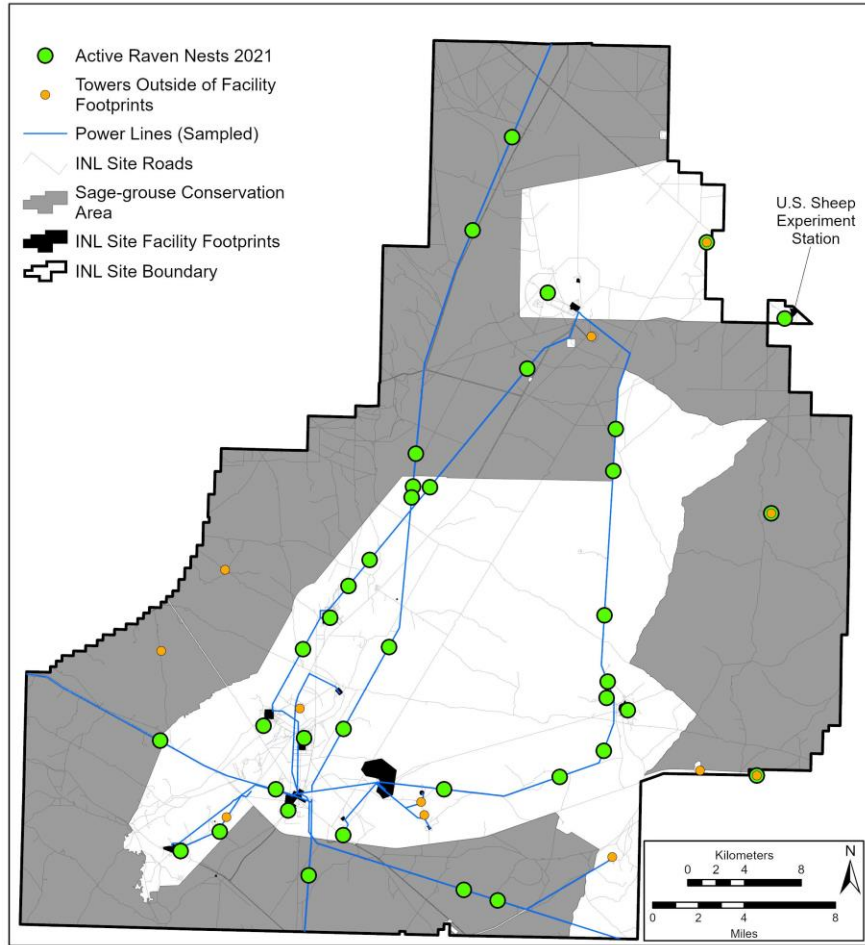


Figure 4-1. Results of the 2021 raven nest survey depicting all documented active raven nests on infrastructure, after accounting for potential renesting attempts.

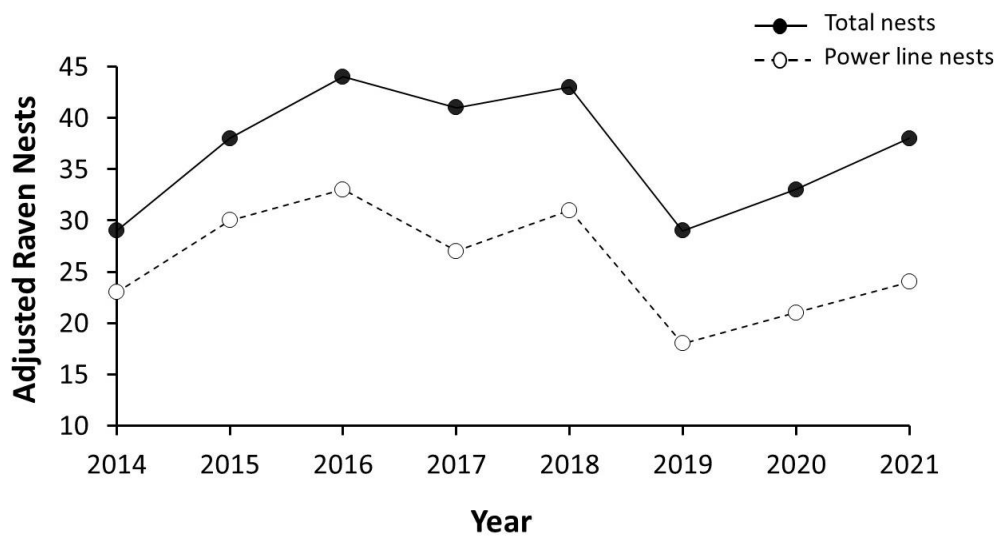


Figure 4-2. Raven nests observed on Idaho National Laboratory Site infrastructure (adjusted values).

4.2 Task 8—Monitor Expansion of the Infrastructure Footprint within the SGCA and Other Areas Dominated by Big Sagebrush

Summary of Results: There was no work conducted on this task in 2021 because no new high-resolution imagery was available for the INL Site prior to reporting.

4.2.1 Introduction

Infrastructure development is considered a medium-ranked threat to sage-grouse on the INL Site. Infrastructure expansion on the INL Site occurs when facility or project footprints encroach into adjacent patches of sagebrush habitat or when new two-track linear features are created in otherwise undisturbed areas. The goal of this monitoring task is to identify where expansion of infrastructure has occurred and document and map all two-track linear features within the SGCA and other areas dominated by big sagebrush. This task serves as the mechanism to identify and report on new infrastructure and two-track linear features being developed and to update the sagebrush habitat distribution data layer due to changes across the landscape not associated with wildland fires. Losses in sagebrush habitat documented under this monitoring task are included in habitat distribution task totals to evaluate the status of the trigger.

This monitoring task is conducted whenever new high resolution imagery that encompasses the entire INL Site becomes available. Currently, this is reliant on the U.S. Department of Agriculture National Agricultural Imagery Program, which typically collects aerial digital imagery in Idaho every two years and is made publicly available at no cost. As other high resolution imagery becomes available (e.g., INL Site image acquisition following a large wildland fire), those data are also incorporated into the analysis to monitor infrastructure changes.

4.2.2 Results and Discussion

There was no work conducted on this task in 2021 because no new high-resolution imagery was available for the INL Site prior to reporting. The U.S. Department of Agriculture National Agriculture Imagery Program collected high resolution imagery across the state of Idaho during the summer of 2021 and those data are typically made available the following spring or early summer. Once we download and process the new 2021 National Agriculture Imagery Program imagery, we will systematically review the INL Site for expansion of linear features and losses of sagebrush habitat due to facility or project footprint expansions, and those results will be presented in 2022.

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5. IMPLEMENTATION OF CONSERVATION MEASURES

5.1 Summary of 2021 Implementation Progress

The CCA outlines conservation measures designed to mitigate and reduce threats to sage-grouse and its habitats on the INL Site. It also articulates DOE's desire that infrastructure development results in no net loss of sagebrush. The following list highlights activities and accomplishments associated with conservation measures that DOE, contractors, and stakeholders participated in and achieved in 2021 to reduce threats. Minor activities and conservation measures that were not actively implemented during the past year are not listed here. For a full description, see Appendix A.

5.1.1 Threat: Wildland Fire

Conservation Measure 1—At the end of each fire season, conduct a burn assessment for all wildland fires that occurred during the year. Based on the assessment, prepare a restoration plan for each fire that burned >40 ha (99 acres) to hasten sagebrush reestablishment.

- No fires greater than 40 ha (99 ac) occurred on the INL during 2021. Post-fire recovery plans were developed for four of the 2020 fires (Section 5.2.1).
- ESER facilitated the planting of 45,000 sagebrush seedlings within the Sheep Fire area to support habitat restoration efforts. In addition, DOE, ESER, and INL collaborated with Idaho Department of Fish and Game (IDFG) to plant 38,750 sagebrush seedlings to speed up habitat recovery in portions of the Jefferson Fire.
- Survivorship and condition of sagebrush seedlings planted in 2020 and in 2016 were assessed (Section 5.2.2).

5.1.2 Threat: Infrastructure Development

Conservation Measure 2—Adopt Best Management Practices outside facility footprints.

- Multiple projects co-located new infrastructure with existing infrastructure to avoid the impacts to both seasonal and potential habitats on the INL Site.

5.1.3 Threat: Livestock

Conservation Measure 5—Encourage BLM to take steps to keep livestock off leks; provide updated lek locations.

- The Twin Buttes Allotment permit renewal is under legal appeal period. When the appeal is resolved, Terms and Conditions on the permits will be amended.

Conservation Measure 6—Communicate and collaborate with BLM to maintain the herbaceous understory for the benefit of sage-grouse and to ensure rangeland improvements follow guidelines.

- DOE, ESER, and INL supported BLM in scoping restoration efforts on a section of Birch Creek where herbaceous understory has been lost and erosion is of concern.
- INL and BLM collaborated on spraying noxious weeds in infested areas of the INL Site.
- DOE, ESER, and INL provided field support to identify locations for a proposed fence in Deadman Allotment that would keep cattle out of the Big Lost River channel.

5.1.4 Threat: Seeded Perennial Grasses

Conservation Measure 7—Rehabilitate disturbance areas using only native seed mixes that are verified free of crested wheatgrass contamination.

- Project specific native perennial seed mixes that exclude crested wheatgrass are being recommended by Battelle Energy Alliance’s Natural Resources Group for all revegetation work.

5.1.5 Threat: Landfills and Borrow Sources

Conservation Measures 8 and 9—Do not disturb lekking sage-grouse at borrow sources and ensure sagebrush habitat is not lost due to borrow pit or landfill development.

- INL complied with seasonal and time of day restrictions.
- No new borrow pits or landfills were opened.

5.1.6 Threat: Raven Predation

Conservation Measure 10—Opportunistically reduce raven nesting on infrastructure.

- INL Power Management installed avian protection on 124 structures and 20 new transmission-line cross arms that are too narrow to support nests.

5.1.7 Threat: Human Disturbance

Conservation Measures 12 and 13—During the lekking and nesting periods, minimize human disturbance of sage-grouse on leks across the INL Site and nesting hens within the SGCA.

- All CCA requirements were met, and restrictions followed at the National Security Test Range.
- No meteorological, sound detection and ranging, or other cell towers were erected within 1 km (0.6 mi) of a sage-grouse lek or within the SGCA.

5.2 Reports on Projects Associated with Conservation Measures

Since the CCA was signed, DOE, INL, and ESER have implemented activities on an as-needed or recurring basis to reduce the impact of wildland fire to sage-grouse habitats and to support the objective of Conservation Measure 1 (Appendix A).

5.2.1 Conservation Measure 1—Post-fire Recovery Planning, Implementation, and Monitoring

Summary of Results: There were no fires larger than 99 acres on the INL Site in 2021. Post-fire recovery plans were developed for four of the 2020 fires; emergency stabilization has been completed, noxious weed control is ongoing, and sagebrush restoration has been scheduled for 2022. Post-fire ecological recovery actions will continue to be implemented on the 2019 Sheep Fire, including noxious weed control, cheatgrass treatment, and sagebrush restoration.

Introduction

The threat level of wildland fire was ranked as high in the CCA (DOE-ID and USFWS 2014) and wildland fire is one of the top threats to sage-grouse (Federal Register 2010), especially in the western portion of their range (Brooks et al. 2015). Based on the analysis of the threat of wildland fire to sage-grouse, a conservation measure was developed for inclusion in the CCA that stated an assessment evaluating the need for post-fire restoration would be prepared and DOE would guide an approach for hastening sagebrush reestablishment on fires larger than 40 ha (99 ac). After the CCA was signed, the

INL Site did not experience any wildland fires meeting the conservation measure criteria for nearly five years, but several larger fires burned in 2019 and 2020.

2020 Fires

In 2020, there were two small wildland fires (<1000 m² or 0.25 ac) and five wildland fires ranging in size from 11 ha (27 ac) to 678 ha (1,675 ac) on the INL Site. The Wildland Fire Management Committee (WFMC) requested an ecological assessment and fire recovery plan for four of the fires: the Howe Peak Fire, the Telegraph Fire, the Cinder Butte Fire, and the Lost River Fire (Figure 5-1). In 2021, ESER completed an ecological resources post-fire recovery plan for the four fires (Forman et al. 2021), which included an assessment of the ecological resources impacted by the fires and addressed four primary recovery objects. The plan also included several options for meeting recovery objectives and an implementation approach that can be phased based on restoration priorities and available funding.

Under approved emergency stabilization actions listed in the existing Wildland Fire Environmental Assessment (EA) (DOE 2003), the INL completed several activities during the fall of 2020, including recontouring containment lines on the fires where they were used, reseeding containment lines with native grass seed, and spraying noxious weeds, especially in disturbed soils on and around containment lines. Upon completion and review of the ecological resource recovery plan, additional recovery actions that were prioritized by INL's WFMC included: monitoring temporary fire suppression access roads for natural recovery, signing and replanting those roads if necessary, and ongoing noxious weed inventory and treatment across all four fires. Additionally, sagebrush restoration was recommended on the Telegraph Fire because the area was used extensively by collared sage-grouse pre-fire (BLM unpublished data), restoration would improve habitat value in proximity to an active lek, and it would provide some habitat connectivity across the burned area. A total of 41,300 sagebrush seedlings are scheduled to be planted in the Telegraph Fire in 2022.

2019 Fires

In 2019, the Sheep Fire burned more than 40,000 ha (98,842 ac) of land on the INL Site. Under the direction of the WFMC, ESER completed the Sheep Fire Ecological Resources Post-Fire Recovery Plan (Forman et al. 2020). Soil stabilization efforts were completed on the Sheep Fire containment lines in 2020 and the WFMC prioritized restoration/treatment actions within two post-fire recovery objectives: noxious weed/cheatgrass control and big sagebrush habitat restoration.

Noxious weed treatment continued throughout the Sheep Fire footprint in 2021 and will remain a focus over the next several years. In 2021, rush skeletonweed (*Chondrilla juncea*) and musk thistle (*Carduus nutans*) were the two most frequently encountered noxious weeds. They were sprayed along roadsides with a vehicle-mounted tank and in the backcountry using backpacks.

Additional National Environmental Policy Act evaluation will be required before pre-emergent chemicals can be aerially applied to cheatgrass at the INL Site. However, Facilities and Site Services applied Indaziflam (Esplanade SC©) to high priority cheatgrass treatment areas in September 2021 using a truck-mounted tank and boom. The application was completed along sections of two-track roads in a swath extending 20 feet on each side of the road for a total of 8 km (5 mi), resulting in 9.7 ha (24.0 ac) receiving application. Though restrictions on off-road travel prevented applying chemical throughout the entire prioritized treatment area with a vehicle, sufficient area was treated to test the use of the chemical and application methodology and evaluate their efficacy.

DOE and agency stakeholders collaborated to seed sagebrush on portions of the Sheep Fire during the winter of 2019/2020. The seeding was completed across a target area of approximately 10,100 ha (25,000 ac) in and adjacent to the SGCA. ESER monitored germination and establishment of sagebrush in the seeded areas in 2020 and again in 2021. There were no sagebrush seedlings observed that could be attributed to the aerial seeding. Unfavorable precipitation patterns over the past two seasons likely led to

poor conditions for germination and establishment, which is one of the inherent uncertainties associated with aerial seeding.

The Sheep Fire Ecological Resources Post-Fire Recovery Plan suggested replanting areas where aerial seedings did not result in seedling establishment, and that seedlings should be placed strategically where they can provide the greatest habitat benefit. Six areas were identified as a high priority for sagebrush seedling planting in the Sheep Fire (Figure 5-2). The proposed planting sites were selected based on CCA priority restoration areas, logistics and access, ecological condition of the recovering herbaceous plant community, and agency stakeholder input.

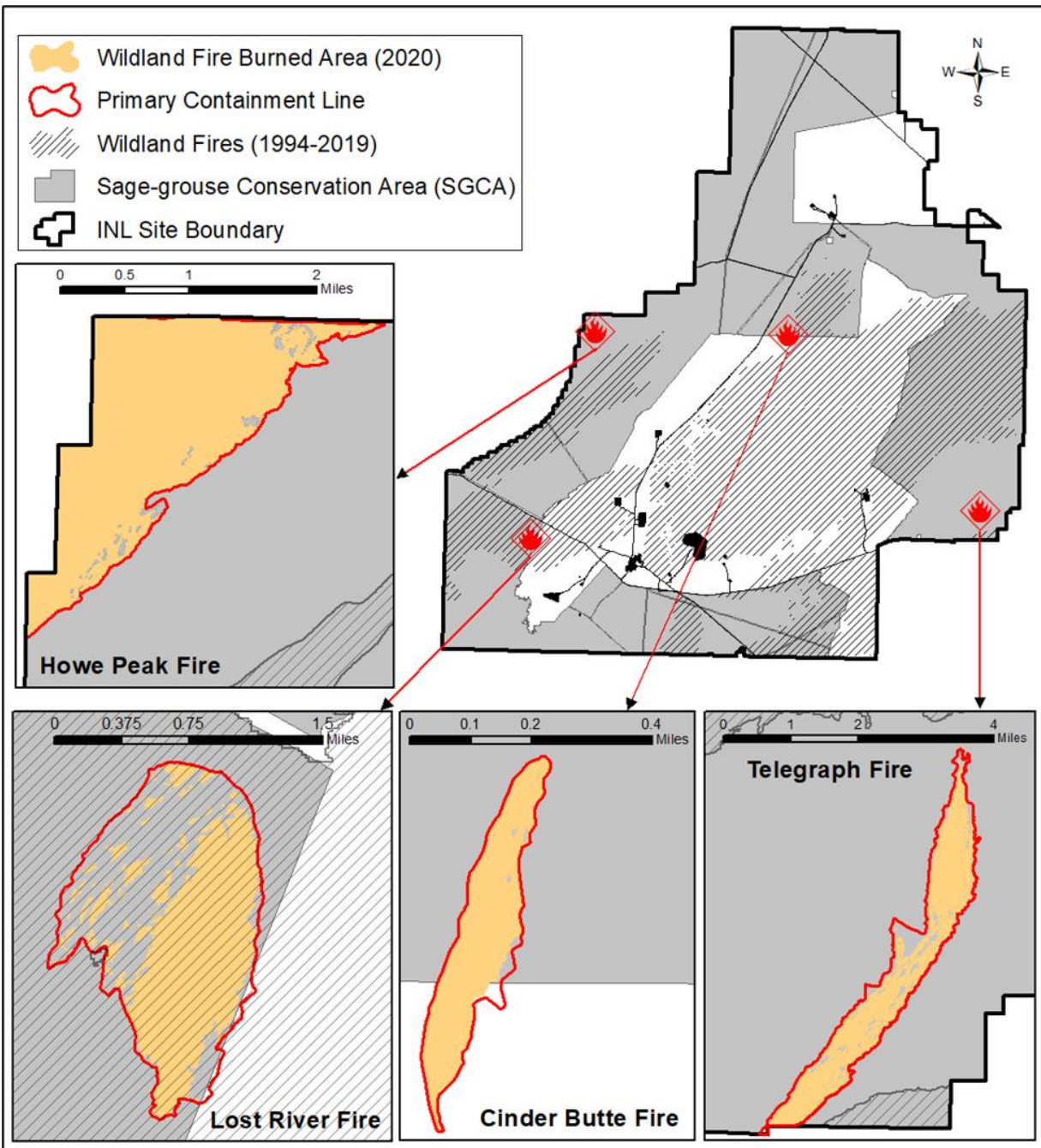


Figure 5-1. Four of the wildland fires that burned on the Idaho National Laboratory Site in 2020 shown with all major wildland fires since 1994 and the boundary for the Sage-grouse Conservation Area.

A total of 45,000 seedlings were planted in the Sheep Fire in October 2021. Approximately 15,000 seedlings were planted in each of proposed planting areas 1, 2, and 3 (Figure 5-2). The remaining proposed planting areas will be planted in 2022; 15,000 seedlings will be planted in each of areas 4, 5, and 6 for an additional 45,000 seedlings.

Programmatic Changes to Improve Fire Suppression and Ecological Recovery

Emergency wildland fire response and associated soil stabilization actions are addressed in the INL Wildland Fire EA (DOE 2003); however, many of the post-fire recovery options presented in the Sheep Fire Ecological Resources Post-Fire Recovery Plan and the 2020 Fires Ecological Post-Fire Recovery Plan are not. Currently each non-emergency post-fire recovery action is subject to additional National Environmental Policy Act review. Although this approach was adequate at the time the EA was signed, there have been changes in fire frequency and land cover over the past twenty years, making this approach to wildland fire recovery less effective. Given the changing ecological conditions at the INL Site and the number of post-fire recovery actions that were recommended by the WFMC after the Sheep Fire and the 2020 Fires, the INL is evaluating the need to update their wildland fire recovery approach and associated NEPA evaluation. An update would facilitate a more comprehensive and efficient response in fire suppression and in post-fire restoration in the future.

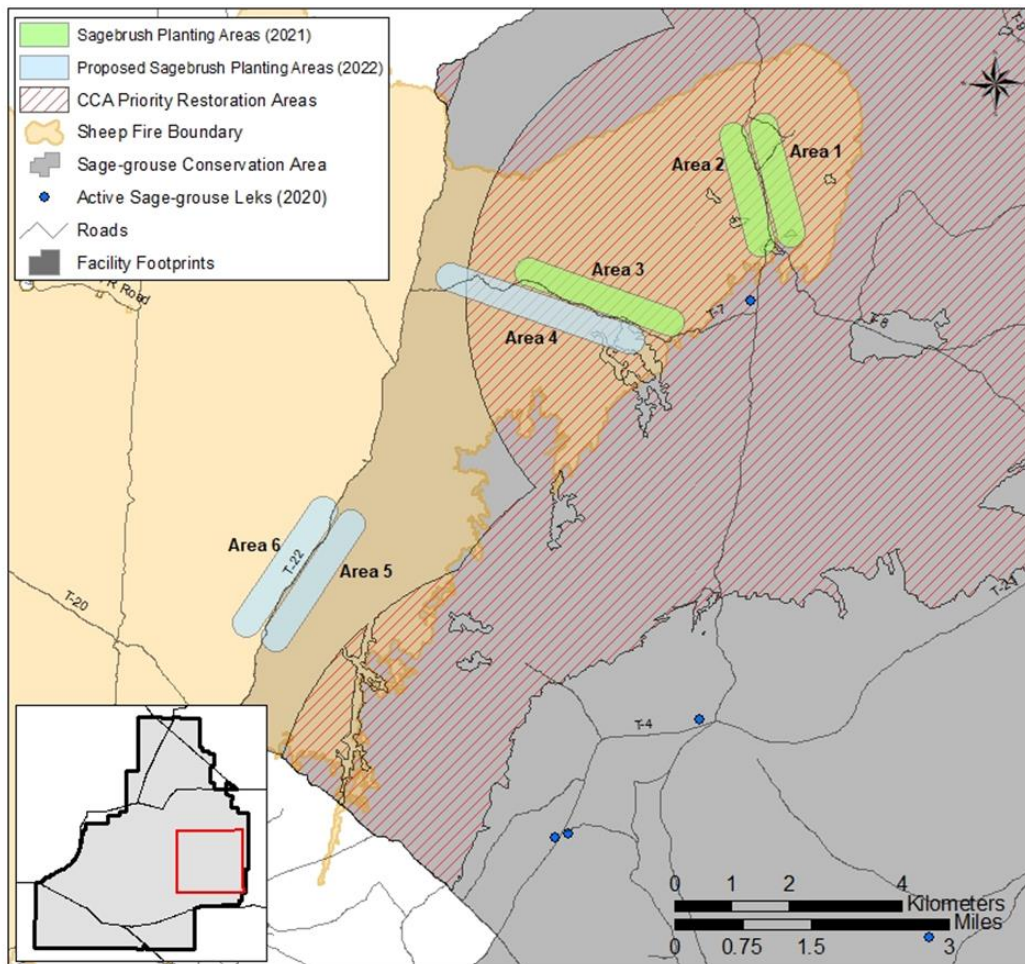


Figure 5-2. Proposed sagebrush seedling planting areas on the Sheep Fire at the Idaho National Laboratory Site and criteria used to identify prioritization. Areas are prioritized as Area 1 being highest priority and Area 6 being lowest priority.

5.2.2 Conservation Measure 1—Sagebrush Seedling Planting for Habitat Restoration

Summary of Results: INL managed the planting of 83,750 sagebrush seedlings in fall of 2021 in areas prioritized for restoration. Survivorship of seedlings planted in 2020 was below one percent.

Introduction

The objective of Conservation Measure 1 is to minimize the impact of habitat loss due to wildland fire and fire-fighting activities (Section 5.1). DOE began planting sagebrush seedlings in 2015. Since then, sagebrush plantings have gotten larger as more stakeholders have turned their attention and funding toward sagebrush habitat restoration. Sagebrush planting efforts include strategically planting older burned areas, planting to address wildland fire recovery objectives, and planting for compensatory mitigation. Approximately 45,000 of the seedlings planted in 2021 were funded by INL to address Sheep Fire sagebrush habitat restoration objectives. The remaining 38,750 seedlings were planted in collaboration with IDFG to address high-priority restoration areas in the Jefferson Fire.

Results and Discussion

During the fall of 2021, 83,750 sagebrush seedlings were planted in the eastern part of the INL Site (Figure 5-3). Density of the plantings were approximately ~212 seedlings/ha (~86 seedlings/ac) resulting in sagebrush seedlings being planted on approximately 391.6 ha (967.7 ac). The locations of 1,008 seedlings were marked for future monitoring of survival.

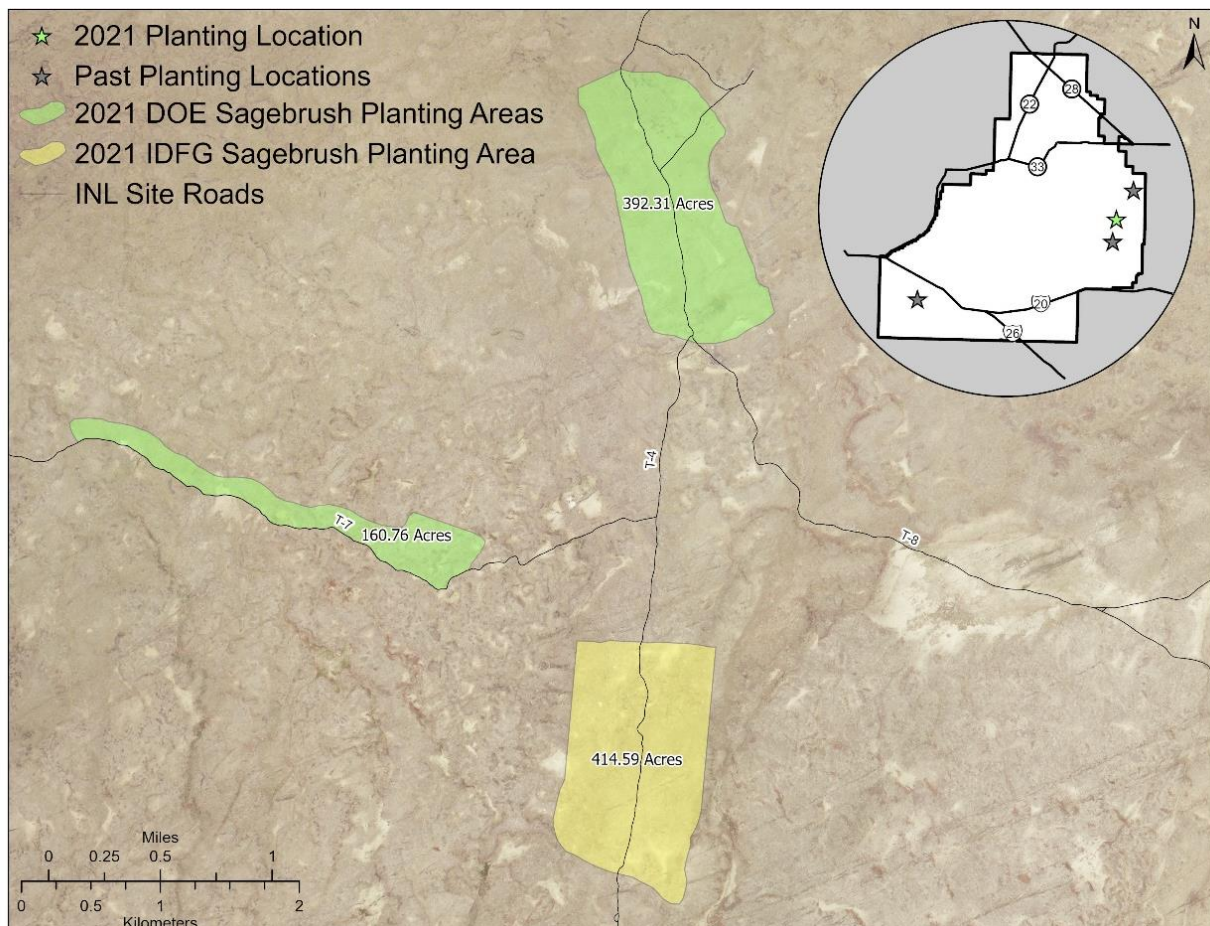


Figure 5-3. Areas planted with big sagebrush (*Artemisia tridentata*) seedlings in 2021 with reference to previous years plantings on the Idaho National Laboratory Site.

To quantify 2020 seedling survivorship and condition, we revisited 540 sagebrush seedlings in August 2021. Survivorship surveys indicated zero healthy, two stressed, 66 dead, and 472 individuals were missing. Assuming the missing seedlings were dead, less than one percent of revisited seedlings survived the first year. Comparison to previous sagebrush planting survivorship and average water year precipitation is shown in Figure 5-4. While the cause of low survivorship in 2020 is ultimately unknown due to many possible contributing variables, low precipitation would appear to be a major contributing factor.

Longer-term survivorship of seedlings planted in fall 2016 was also assessed in August 2021. We revisited the same 499 seedlings that were previously revisited in August of 2017. We relocated 282 seedlings, of which 254 (50.9%) were healthy, 23 (4.6%) were stressed, and five (1%) were dead. This means over the last five years, 277 (55.5%) of the marked seedlings survived. The initial one-year assessment of survivorship from the 2016 sagebrush planting was 62% (Shurtliff et al. 2018).

Sagebrush restoration has now been initiated on 610 ha (1,507.4 ac) across the INL Site. Over the past six years, a total of 155,750 seedlings have been planted from all funding sources, including DOE, INL, the Idaho Governor’s Office of Species Conservation, and IDFG.

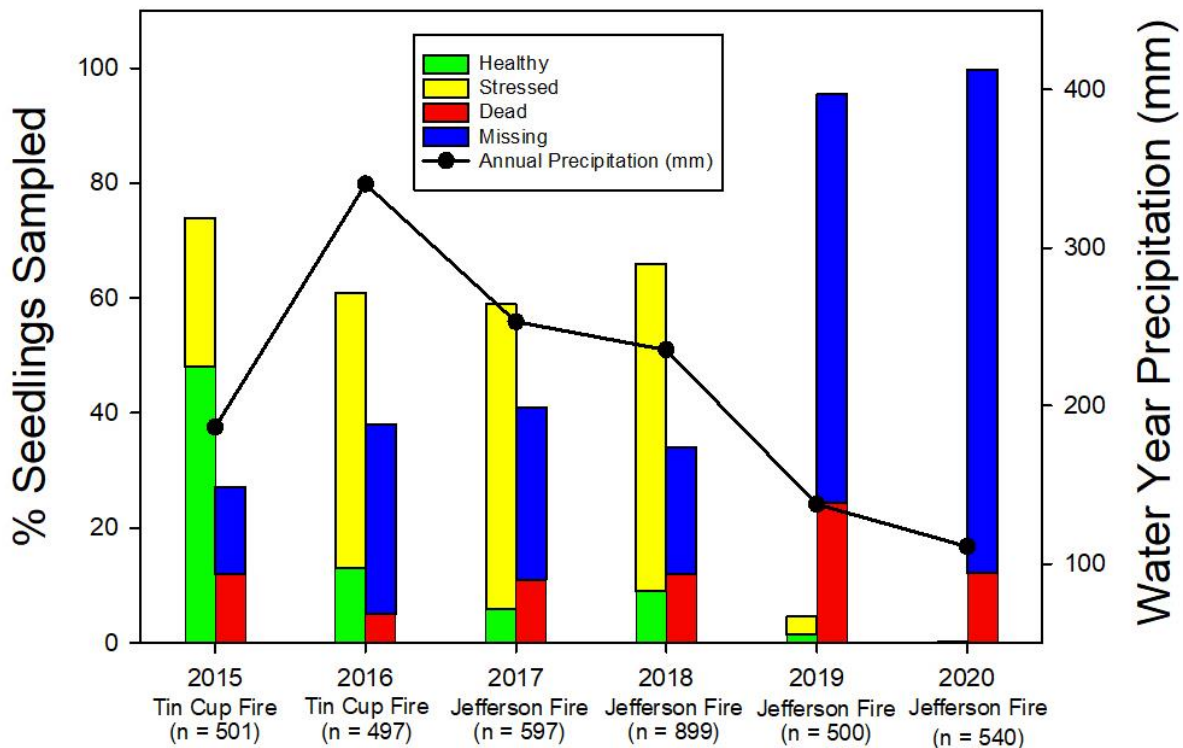


Figure 5-4. Sagebrush seedling survivorship one year after planting on the Idaho National Laboratory Site. The yellow and green bar represents the observed living seedlings. The blue and red bar represents seedlings either observed dead or presumed to be dead. The black line and dots indicate water year precipitation average levels (mm). Water year is calculated as precipitation received in October of the planting year to September of the following year.

6. SYNTHESIS AND ADAPTIVE MANAGEMENT

6.1 Sage-grouse and Sagebrush Habitat Trends

The IDFG manages sage-grouse populations in Idaho by dividing all sage-grouse habitats into four Conservation Areas and distinguishing areas within the Conservation Areas as Priority or Important Habitat Management Areas (HMAs; Governor’s Sage-grouse Task Force 2012). Lek route data are monitored each year to determine trends in these areas and to monitor populations across the state.

Much of the INL Site falls within Priority and Important HMAs in the Desert and Mountain Valleys Conservation Areas (Figure 6-1). Similar to results from baseline leks on the INL Site (Figure 2-2), total male counts on lek routes in these four HMAs dropped precipitously (–47% to –56%) from 2016 to 2019. The following year (2020), Desert Priority and Important HMAs dropped an additional 17% and 11%, respectively, slightly less than the 25% decline recorded on the INL Site (Shurtliff et al. 2021). In contrast, the Mountain Priority and Important HMAs increased 9% and 24%, respectively, in 2020. In 2021, results were mixed for these HMAs (Desert Priority = 29%, Desert Important = –11%, Mountain Priority = 14%, Mountain Important –2%) while baseline lek counts on the INL Site remained unchanged. Statewide, lek counts dropped across all HMAs from 2016 to 2019, but rebounded 2.5% in 2020 and another 13% in 2021 (Moser 2021).

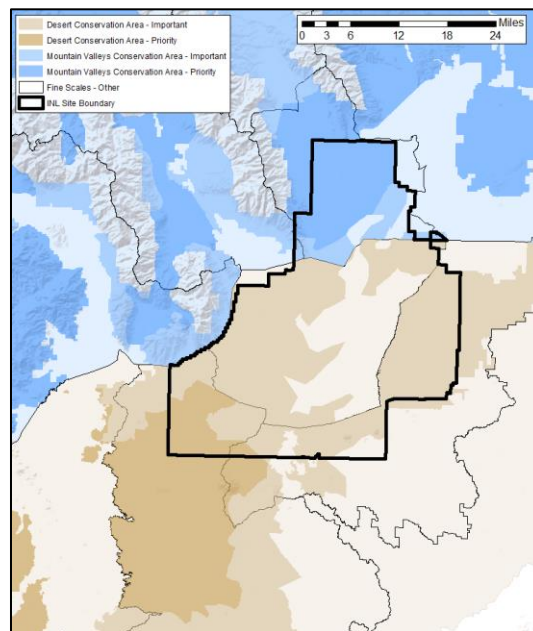


Figure 6-1. An overlay of the INL Site boundary onto two Idaho Conservation Areas (Desert and Mountain Valleys), with emphasis on Important and Priority Habitat Management Areas within each. Figure was adapted from Ellsworth et al. (2019).

The decline observed on INL Site baseline leks from 2016 to 2019 is similar to state and regional trends, although it should be noted that baseline leks on the INL Site are analyzed differently by INL than statewide lek routes are by IDFG (Moser 2021, INL 2022). All but three active baseline leks on the INL Site are within the Desert Conservation Area (Figure 2-1 and 6-1), so naturally the decline observed on the INL Site in 2020 did not differ greatly from counts in that Conservation Area. The discrepancy between state and INL Site lek trends in 2021, relative to 2020, are interesting but not surprising, especially in light of mixed results observed at the regional HMA level. We understand that deviations in lek attendance are influenced by multiple variables, and we have not identified any specific factors that would suggest leks on the INL Site are exhibiting a different trend currently.

Wildfire continues to be a dominant threat to sage-grouse habitats in the western portion of the species' range, especially when coupled with regional cheatgrass-driven fire regimes (Balch et al. 2013). Fortunately, intact sagebrush habitat on the INL Site appears to be resistant to cheatgrass dominance and is generally in good condition; however, data from adjacent burned areas indicate habitats are less resistant to invasion and can facilitate fluctuations in non-native species abundance during variable environmental conditions. The INL is considering updating its wildland fire recovery approach and associated NEPA evaluation, which would likely result in more comprehensive and efficient responses to wildfire by the fire department and more tools available for post-fire habitat restoration. The DOE continues to provide significant resources to reduce post-fire habitat degradation and hasten the return of sagebrush where fires have burned during the past two years.

Other threats monitored on the INL Site that can potentially reduce sage-grouse reproductive success include improper livestock grazing (Boyd et al. 2014) and raven predation (Coates et al. 2020). Regarding the first, we continue to find no apparent decline or increase in habitat quality measures between areas inside or outside of grazing allotments (Shurtliff et al. 2017, INL 2022). These findings suggest habitat condition in livestock allotments may be just as likely from logistical constraints and uneven utilization as much as prescribed grazing practices, underscoring the importance of continuing to work with the BLM and to continue monitoring potential threats to sage-grouse habitat condition. It remains unknown what impact breeding ravens have on sage-grouse nest success on the INL Site, but the number of raven nests on infrastructure, which probably represent the majority of breeding pairs (Howe et al. 2014), does not appear to have increased over the past eight years.

During the period after the 2012 Midway Fire and prior to the 2019 Sheep Fire, little sagebrush habitat was lost to wildland fire, but lek counts declined 52% between 2016 and 2021. At least three possible mechanisms could be responsible individually or cumulatively for this decline. First, sage-grouse populations could be experiencing a lag effect (Ricca and Coates 2020) from loss of sagebrush habitat caused by the Jefferson, T-17, and previous fires. Second, large regional fires in recent years (e.g., Grassy Ridge Fire, Indian Butte Fire) have eliminated sagebrush from thousands of hectares, potentially reducing the sage-grouse carrying capacity of the region (Swenson et al. 1987, Connelly et al. 2000, Crawford et al. 2004). Lastly, recent declines in sage-grouse populations could be driven or exacerbated by broad-scale climatic and environmental factors that have historically resulted in cyclic population trends in Idaho (Rich 1985, Row and Fedy 2017). If regional sage-grouse abundance is naturally cyclic, and if regional threats do not overwhelm that trajectory to break the cycle, lek counts may stabilize and increase in the next few years. Indeed, virtually unchanged lek counts observed on the INL Site in 2021 coupled with mixed signals of lek count trends regionally and two consecutive years of increasing counts across the state may be signaling the beginning of an upswing in regional and state sage-grouse populations.

6.2 Proposed Changes

No changes to the CCA were proposed in 2021, but two proposals made in 2019 are still being considered by the USFWS. The first proposal was that the basis of the population trigger be changed from 27 SGCA baseline leks to the six lek routes, or perhaps to all active leks (either in the SGCA or the entire INL Site). The CCA stated that signatories would consider a change to the current "interim population trigger" once new lek routes were created. The second proposal was to update the estimated area of sagebrush habitat in the SGCA, which is the basis for the habitat trigger. ESER updated the INL Site vegetation classification and map in 2019, resulting in a refined estimate of sagebrush habitat in 2011 that was 8% lower than the original estimate.

6.3 Adopted Changes

The USFWS and DOE made no changes to the CCA or associated monitoring tasks in 2021.

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APPENDIX A. ACCOMPLISHMENTS IN 2021 FOR EACH CONSERVATION MEASURE

Table A-1. Accomplishments in 2021 for each CCA conservation measure.

Threat:	Wildland Fire
Objective:	Minimize the impact of habitat loss due to wildland fire and firefighting activities.
Conservation Measures:	1) Prepare an assessment for the need to restore the burned area. Based on that assessment, DOE would prepare an approach for hastening sagebrush reestablishment in burned areas and reduce the impact of wildland fires >40 ha (99 acres).
<p>Conservation Measure 1—Accomplishments in 2021:</p> <p><u>BURN ASSESSMENT</u>—A single 2.4 ha (5.9 ac)¹ wildfire occurred on the INL Site in 2021. Dozer lines were not necessary or practical to control this fire. Due to the size of the fire, no recovery plan will be developed.</p> <p><u>RECOVERY PLANNING</u>—Post-fire recovery plans were developed for four of the 2020 fires (Section 5.2.1).</p> <p><u>SAGEBRUSH REESTABLISHMENT</u>—INL planted approximately 45,000 seedlings within the Sheep Fire area to support habitat restoration efforts. In addition, DOE, ESER, and INL collaborated with IDFG to plant 38,750 sagebrush seedlings to speed up habitat recovery in portions of the Jefferson Fire. Weed control efforts continue in recently burned areas. A subset of sagebrush seedlings planted in 2020 and 2016 were revisited in 2021, and 1-year and 5-year survivorship assessed (Section 5.2.2)</p> <p>Associated Conservation Actions that Addressed the Wildland Fire Threat:</p> <p><u>POST FIRE ADAPTIVE MANAGEMENT</u>—Areas within the Twin Buttes, and Deadman grazing allotments that were burned by the 2019 Sheep Fire, and 2020 Telegraph and Lost River Fires remained closed to grazing during the 2021 grazing season (Personal Communication with Jordan Hennefer, Rangeland Management Specialist, BLM, 11/02/2021). This concludes the required 2-year closure for the Sheep Fire that occurred in the Twin Buttes Allotment.</p>	
Threat:	Infrastructure Development
Objective:	Avoid new infrastructure development within the SGCA and 1 km (0.6 mi) of active leks and minimize the impact of infrastructure development on all other seasonal and potential habitats on the INL Site.
Conservation Measures:	2) Adopt Best Management Practices outside facility footprints for new infrastructure development. 3) Infrastructure development within the SGCA or within 1 km (0.6 mi) of an active lek will be avoided unless there are no feasible alternatives.

¹ Unpublished wildland fire statistics summary for 2021; Eric Gosswiller, INL Fire Chief.

Table A-1. (continued).

Conservation Measure 2—Implementation of Best Management Practices in 2021:

Multiple projects in 2021 adopted and implemented best management practices outside facility footprints to minimize the impacts to both seasonal and potential habitats on the INL Site.

The following infrastructure projects were designed so that the total distance of habitat edge caused by construction activities is minimized.

- Test Area North-691 maintenance and vehicle-storage building (Environmental Compliance Permit [ECP] INL-20-035) was sited immediately adjacent to the Specific Manufacturing Capability fence.
- A construction support yard to the east of the Materials and Fuels Complex (MFC) (ECP INL-21-042) was sited between the MFC facility fence and the perimeter road.
- Power line testing along the Power Grid Test Bed at INL (ECP INL-20-116 R1) took place along the new line adjacent to existing linear features and areas that have already been disturbed.

The following infrastructure projects were co-located with existing infrastructure and/or were sited in areas dominated by non-native grasses and other exotic species.

- The Unmanned Aerial System Testing project (ECP INL-19-089 R2) sited a new parking space in areas dominated by crested wheatgrass.
- Weather installations on Highways 20, 26, 33, and 93 (ECP INL-20-093) sited their locations based on avoiding impact to sagebrush and placed them in areas dominated by non-natives such as crested wheatgrass.
- The MFC parking lot expansion and reconfiguration (ECP INL-19-088 R2) placed excess soil from project activities in old borrow sources dominated by crested wheatgrass and plan on revegetating the areas beginning in 2022.
- B2-TR-600 RRTR Trailer Relocation (ECP INL-19-049 R1) mowed the surrounding area dominated by non-natives as a fire break.
- Power line testing on Circuit 56 (ECP INL-19-054 R1) sited a new parking area based on the dominance of crested wheatgrass.

Best Management Practices employed by INL Power Management Activities 2021 (ECP INL-21-067) included the installation of perch deterrents and eliminating nesting opportunities where possible.

The projects, Temporary Wind Tower and Ambient Air Monitoring (ECP INL-17-108 R3) and Weather installations on Highways 20, 26, 33 and 93 (ECP INL-20-093), appropriately marked guy wires and fences to render them more conspicuous and minimize the risk of in-flight collisions by sage-grouse and other birds.

Conservation Measure 3—Accomplishments in 2021:

The Carbon Free Power Project (CFPP) Site Characterization (ECP INL-19-067 R4) was the only project to initiate infrastructure development within the SGCA in 2021. After reviewing alternative footprints, DOE was consulted on the preferred siting location. This consultation was followed-up with consultation with the USFWS on how to mitigate risks to sage-grouse.

Table A-1. (continued).

Threat:	Annual Grasslands
Objective:	Maintain and restore healthy, native sagebrush plant communities.
Conservation Measures:	4) Inventory areas dominated or co-dominated by non-native annual grasses, work cooperatively with other agencies as necessary to identify the actions or stressors that facilitate annual grass domination, and develop options for eliminating or minimizing those actions or stressors. DISCONTINUED (See Section 6.2.4, Shurtliff et al. [2019]).
Threat:	Livestock
Objective:	Limit direct disturbance of sage-grouse on leks by livestock operations and promote healthy sagebrush and native perennial grass and forb communities within grazing allotments.
Conservation Measures:	5) Encourage the BLM to seek voluntary commitments from allotment permittees and to add stipulations during the permit renewal process to keep livestock at least 1 km away from active leks until after May 15 of each year. Regularly provide updated information to BLM on lek locations and status to assist in this effort. 6) Communicate and collaborate with BLM to ensure that the herbaceous understory on the INL Site is adequately maintained to promote sage-grouse reproductive success and that rangeland improvements follow guidelines in the BLM Land Use Plan and the CCA.
<p>Conservation Measure 5—Accomplishments and Disturbances in 2021:</p> <p><u>PERMIT RENEWAL</u>—The Environmental Assessment (EA) for the Grazing Permit Renewal for the Twin Buttes Allotment (DOI-BLM-ID-I010-2020-0032-EA) has been finalized and a Finding of No Significant Impact issued for the proposed action. However, the EA is under legal appeal and a resolution is not expected until Spring 2022. The Preferred Alternative includes adjusting the season of use to include year-long grazing to occur on the allotment and to convert fall/winter use to spring use with spring grazing beginning on March 1 rather than April 1. The Preferred Alternative in the EA also defined a 1 km exclusion buffer for camping, temporary corrals, or watering from an occupied lek as well as prohibited creating new roads, bed grounds or watering sites without prior authorization.</p> <p><u>UPDATED INFORMATION TO BLM</u>—DOE submitted shapefiles to BLM containing all active leks on the INL Site during January of 2021.</p> <p>Conservation Measure 6—Accomplishments in 2021:</p> <p><u>COMMUNICATION & COLLABORATION</u>—Due to the Covid-19 pandemic, the annual meeting among BLM, DOE, and ESER staff did not occur in 2021. However, ESER provided field support to identify locations for a proposed fence in the Deadman allotment that would keep cattle out of the Big Lost River channel, and to discuss methods such as seeding or fencing, to improve conditions within the Mahogany Butte Allotment and to protect a culturally sensitive area. DOE and BLM continued to collaborate on updating their memorandum of understanding for management of land currently occupied by the INL Site. DOE, ESER, and INL supported BLM in scoping restoration efforts on a section of Birch Creek where herbaceous understory has been lost and erosion is of concern. INL and BLM have also collaborated on spraying noxious weeds in infested areas of the INL Site.</p>	

Table A-1. (continued).

<p>RANGELAND IMPROVEMENTS—DOE supported a 2019 decision by BLM to permit installation of an underground pipe to maintain water troughs in the Deadman and Quaking Aspen allotments and to construct a fence in the Deadman Allotment. An EA (DOI-BLM-ID-I010-2021-0008-EA) for the project has been completed but is now under legal appeal. The water distribution portion of the project, if authorized, will allow for a more reliable water source, resulting in better livestock distribution and less road traffic. The fencing portion of the project will restrict cattle from entering the Big Lost River channel and culturally sensitive areas (Personal Communication with Jordan Hennefer, Rangeland Management Specialist, BLM, 11/2/2021). Part of the EA also indicates that new structures will be sited no closer than 1 km to an occupied sage-grouse lek.</p>	
Threat:	Seeded Perennial Grasses
Objective:	Maintain the integrity of native plant communities by limiting the spread of crested wheatgrass.
Conservation Measure:	7) Inform INL contractors about negative ecological consequences resulting from crested wheatgrass and persuade them to rehabilitate disturbed land using only native seed mixes that are verified to be free of crested wheatgrass contamination.
<p>Conservation Measure 7—Accomplishments in 2021: When ESER (now the INL Natural Resources Group) assists projects by recommending a project specific native perennial seed mix list for revegetation work, they exclude non-native crested wheatgrass from any recommendation.</p>	
Threat:	Landfills and Borrow Sources
Objective:	Minimize the impact of borrow source and landfill activities and development on sage-grouse and sagebrush habitat.
Conservation Measures:	<p>8) Eliminate human disturbance of sage-grouse that use borrow sources as leks (measure applies only to activities from 6 p.m. to 9 a.m., March 15–May 15, within 1 km [0.6 mi] of active leks).</p> <p>9) Ensure that no net loss of sagebrush habitat occurs due to new borrow pit or landfill development. DOE accomplishes this measure by:</p> <ul style="list-style-type: none"> • avoiding new borrow pit and landfill development in undisturbed sagebrush habitat, especially within the SGCA; • ensuring reclamation plans incorporate appropriate seed mix and seeding technology; • implementing adequate weed control measures throughout the life of an active borrow source or landfill.
<p>Conservation Measure 8—Accomplishments in 2021: INL complied with seasonal and time-of-day restrictions associated with sage grouse. Per “Idaho National Laboratory Gravel/Borrow Pits (Overarching) Environmental Checklist” (EC INL-14-045), projects must complete Form 450.AP01, “Gravel/Borrow Source Request Form,” before removing gravel. This form reminds gravel-pit users of restrictions in place to protect sage-grouse. Projects must also submit, in writing to Environmental Support and Services personnel, that they complied with the directives in this EC. Adams Boulevard, Lincoln Boulevard, Monroe Boulevard, Ryegrass Flats, T-12, and T-28 South are covered by this EC.</p>	

Table A-1. (continued).

<p>Conservation Measure 9—Accomplishments in 2021:</p> <p>No new borrow pits or landfills were opened in 2021. Facilities and Site Services reports that T-12 was closed for all use in the spring of 2021, and there are no plans to reopen it in the near future. Expansion of existing borrow sources and landfills is limited to footprints approved in Appendix C of the Spent Nuclear Fuel Environmental Impact Statement (EIS) (DOE/EIS-0203) or the EA for Silt/Clay Development and Use (DOE-EA-1083). Any expansion of gravel or borrow pits that would disturb surface soil or vegetation also requires a survey of cultural resources by Cultural Resource Management Office and biological resources by ESER, now the Natural Resources Group. INL Facilities and Site Services personnel assist in the identification of approved footprints.</p>	
Threat:	Raven Predation
Objective:	Reduce food and nesting subsidies for ravens on the INL Site.
Conservation Measures:	<p>10) DOE will work with INL contractors and the National Oceanic and Atmospheric Administration to opportunistically reduce raven nesting on power lines and towers and at facilities.</p> <p>11) Instruct the INL to include an informational component in its annual Environment, Safety, and Health training module by January 2015 that teaches the importance of eliminating food subsidies to ravens and other wildlife near facilities.</p>
<p>Conservation Measure 10—Accomplishments in 2021:</p> <p>INL Power Management operates and maintains 209 km (130 mi) of overhead power lines. New power lines go through the EA or ECP process to determine whether nesting deterrents are required. When Power Management performs maintenance on distribution overhead lines, they install nesting deterrents in the form of avian protection devices on each structure as the engineer and linemen see fit. There are approximately five different types of avian protection devices available for install. Per the Facilities and Site Services Program Environmental Lead, Power Management installed avian protection on 124 structures in FY 2021. Power Management replaces transmission structures based on age and deterioration by installing prefabricated metal crossarms in place of the existing wooden crossarms. The new crossarms are inherently nesting deterrents because only one beam is available for birds to build on (instead of two). In FY 2021, Power Management installed 20 new transmission-line cross arms.</p>	
<p>Conservation Measure 11: Completed</p>	
Threat:	Human Disturbance
Objective:	Minimize human disturbance of sage-grouse courtship behavior on leks and nesting females within the SGCA and 1 km (0.6 mi) Lek Buffers.
Conservation Measures:	<p>12) Seasonal guidelines (March 15–May 15) for human-related activities within 1 km (0.6 mi) Lek Buffers both in and out of the SGCA (exemptions apply—see Section 10.9.3):</p> <ul style="list-style-type: none"> • Avoid erecting portable or temporary towers, including meteorological, SODAR, and cellular towers. • Unmanned aerial vehicle flights conducted before 9 a.m. and after 6 p.m. will be programmed so that flights conducted at altitudes <305 m (1,000 ft) will not pass over land within 1 km (0.6 mi) of an active lek. • Detonation of explosives >1,225 kg (2,700 lbs) will only occur at the National Security Test Range from 9 a.m.–9 p.m. • No non-emergency disruptive activities allowed within Lek Buffers March 15–May 15.

Table A-1. (continued).

	<p>13) Seasonal guidelines (April 1–June 30) for human-related activities within the SGCA (exemptions apply—see Section 10.9.3):</p> <ul style="list-style-type: none"> • Avoid non-emergency disruptive activities within the SGCA. • Avoid erecting mobile cell towers in the SGCA, especially within sagebrush-dominated plant communities.
<p>Conservation Measures 12 and 13—Accomplishments in 2021:</p> <p>Due to COVID-19 there were few detonations at the National Security Test Range (NSTR) this spring. All CCA requirements were met, and restrictions were followed.</p> <p>The Carbon Free Power Project site is located within the SGCA. All non-emergency disruptive activities associated with site characterization activities met seasonal guideline requirements in the CCA.</p> <p>All unmanned aerial vehicle flights conducted at the Unmanned Aerial System runway met all CCA requirements by conducting flights above 305 m (1,000 ft) if flying after 6 p.m. and before 9 a.m.</p> <p>No meteorological, sound detection and ranging, or other cell towers were erected within 0.6 miles of a sage-grouse lek or within the SGCA during 2021.</p>	