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

Natural Resources Group

2025

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Foreword

This 2025 implementation report for the Candidate Conservation Agreement for Greater Sage-grouse on the Idaho National Laboratory Site (CCA) is a departure from the traditional formatting of this document. In years past, two separate reports were prepared and published. A Full Report was written on an annual basis with the intent of providing detailed and technical information regarding the status of sage-grouse populations, sagebrush habitat, and the implementation of Conservation Measures at the INL Site. A Summary Report was also written on an annual basis with the intent of distilling information regarding regulatory triggers and conservation efforts into a concise format.

Beginning with this annual reporting cycle, the Summary Report will no longer be published. Instead, the traditional Executive Summary of the Full Report will be changed to a Plain Language Summary that is intended for a non-technical audience that contains concise information related to the background and implementation of the CCA. The traditional Full Report that contains the technical basis and results for activities supporting the CCA can be found beginning at Section 1.0 of this document.

Plain Language Summary

Background

The sage-grouse is a ground-dwelling bird species native to the Western U.S. and Canada and is completely reliant on sagebrush for food, shelter, and nesting. Due to this dependence on sagebrush, sage-grouse are particularly sensitive to changes in their environment. The U.S. Geological Survey has estimated that populations of sage-grouse have declined over 75% since the 1960's[1]. The loss of large areas of sagebrush, the introduction of invasive plant species, and the expansion of human development is known to contribute to the decline of sage-grouse populations. The loss of sagebrush has accelerated across the Western U.S. with over 22 million acres lost to wildfire alone between 1984 and 2020[2].

The drastic declines in sage-grouse populations and their habitat have caught the attention of wildlife and land management agencies, scientific researchers, and environmental advocacy groups for decades. The sage-grouse has been petitioned for listing under the Endangered Species Act on multiple occasions beginning in the late 1990's. If listed, the sage-grouse would be afforded legal protection under this Act, and any activities that are authorized, funded or carried out in whole, or in part, by the Federal government would be subject to increased levels of environmental review (which can delay project implementation) and the potential for mitigation measures (which can increase project costs).

An often overlooked, and arguably more important, function of the Endangered Species Act is that it has a goal of recovering species that are listed. This is directly accomplished by establishing recovery plans and recovery criteria for the listed species that include input from the U.S. Fish and Wildlife Service, other Federal, State and/or Tribal agencies, species experts found in academia, and other non-governmental organizations. To further support the recovery of a listed species, the Act also established mechanisms for stakeholders to continue work while providing positive benefits that aid in the recovery of the species.

One of these mechanisms that originated in the Endangered Species Act is the Candidate Conservation Agreement, or CCA. These agreements between the U.S. Fish and Wildlife Service and other participants, including Federal agencies, are intended to be proactive approaches to conserve species that are likely to or are already being considered for listing under the Act. There are two primary advantages for participants in these agreements. The first is that if enough participants agree to adopt monitoring and management activities that benefit a particular species or their habitat, the listing of those species can be averted. Secondly, if a species is listed under the Act, the monitoring and management practices already established and implemented in the agreement will reduce delays during environmental review and permitting processes.

In response to the 2010 "warranted but precluded" Endangered Species Act listing decision for the sage-grouse[3], the U.S. Department of Energy, Idaho Operations Office established a CCA with the U.S. Fish and Wildlife Service for the protection of sage-grouse and their habitat at the Idaho National Laboratory (INL) Site in 2014[4]. This Agreement established population and habitat monitoring, Best Management Practices, and Conservation Measures that are consistent with Federal and State agencies throughout the West. The CCA also positions the INL with the tools, practices, and land management strategies that would be required if sage-grouse were to be listed under the Endangered Species Act, which will reduce or eliminate delays to INL Site activities.

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[1] Prochazka, B.G., P.S. Coates, C. L. Aldridge, M. S. O'Donnell, D. R. Edmunds, A. P. Monroe, S. E. Hanser, L. A. Wiechman, and M. P. Chenaille. 2024. "Range-wide population trend analysis for greater sage-grouse (*Centrocercus urophasianus*)–Updated 1960–2023." U. S. Geological Survey Data Report 1190.

[2] Crist, M.R., R. Belger, K.W. Davies, D.M. Davis, J.R. Meldrum, D.J. Shinneman, T.E. Remington, J. Welty, and K.E. Mayer. 2023. "Trends, impacts, and cost of catastrophic and frequent wildfires in the sagebrush biome." Rangeland Ecology & Management, 89, pp.3-19.

[3] Federal Register. 2010. "Endangered and threatened wildlife and plants; 12-month findings for petitions to list the greater sage-grouse (*Centrocercus urophasianus*) as threatened or endangered (proposed rule)." 23 March.

[4] U.S. Department of Energy, Idaho Operations Office and U.S. Fish and Wildlife Service. 2014. "Candidate Conservation Agreement for Greater Sage-grouse (*Centrocercus urophasianus*) on the Idaho National Laboratory Site." U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho. DOE/ID-11514.

In 2015, the U.S. Fish and Wildlife Service determined the listing of the sage-grouse under the Endangered Species Act was "not warranted" at the time[5]. The reasoning provided to support the decision was that Federal, State, and private landowners had implemented conservation plans and agreements, like CCAs, and that these proactive efforts were sufficient to address further losses to sage-grouse populations and their habitat.

Since the 2015 "not warranted" listing decision, sage-grouse continue to be imperiled. Sage-grouse are currently listed as an endangered species in Canada under the Species at Risk Act[6]. The States of California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming all manage sage-grouse at some level of conservation concern. Two States have afforded sage-grouse protections under State laws with Washington listing the sage-grouse as an endangered species under the Washington State Endangered Species Act[7] and California declaring the sage-grouse a candidate for protection under the California Endangered Species Act[8]. In North Dakota, sage-grouse are in danger of being completely lost with no males observed at leks in 2025[9].

The sage-grouse continues to attract attention from Federal agencies. In 2023, the U.S. Fish and Wildlife Service proposed a rule to list a Distinct Population Segment of sage-grouse in California and Nevada as threatened along with a Critical Habitat designation under the Endangered Species Act[10]. The Bureau of Land Management has also proposed an amended Resource Management Plan for sage-grouse which uses updated scientific understanding to provide consistent and effective range-wide conservation[11]. As of November 2025, this Resource Management Plan has been adopted by Colorado and Oregon[12] and is under an additional comment period for implementation in other Western States[13].

Summary of 2025 CCA Implementation

This annual implementation report, written by the Battelle Energy Alliance Natural Resources Group, is required by the 2014 CCA and is intended to update to the U.S. Department of Energy, Idaho Operations Office and the U.S. Fish and Wildlife Service regarding two adaptive management triggers established in the CCA. These triggers relate to the status of sage-grouse populations on the INL Site and the amount of sagebrush available within the Sage-grouse Conservation Area—an area designated in the CCA to be prioritized for sage-grouse conservation. Threats to sage-grouse and their habitats were evaluated in the CCA and this report summarizes the status of those threats and effectiveness of the actions, or Conservation Measures, intended to reduce or eliminate the threats. The Conservation Measures developed in the CCA support the INL mission while simultaneously protecting and enhancing sage-grouse populations and their habitat. For more detailed information regarding the background and purpose of this annual report, see Section 1.0.

Sage-grouse Population Monitoring

Counting the number of male sage-grouse is a standardized way to monitor sage-grouse populations[14]. Male sage-grouse congregate at traditional breeding areas known as leks where they perform a breeding display intended to attract female sage-grouse. Sage-grouse are counted every spring during the breeding season at leks throughout

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[5] Federal Register. 2015. "Endangered and threatened wildlife and plants; 12-month finding on a petition to list greater sage-grouse (*Centrocercus urophasianus*) as an endangered or threatened species." 2 October.

[6] SOR/2013-202. Emergency Order for the Protection of the Greater Sage-Grouse. November 20, 2013.

[7] Washington Administrative Code 220-610-010.

[8] California Fish and Game Commission Notice of Findings – Greater sage-grouse (*Centrocercus urophasianus*). June 19, 2023.

[9] North Dakota Game and Fish Department. Retrieved from https://gf.nd.gov/wildlife/id/grassland-birds/greater-sage-grouse. November 24, 2025.

[10] Federal Register. 2023. "Endangered and Threatened Wildlife and Plants; Threatened Status for the Bi-State Distinct Population Segment of Greater Sage-Grouse with Section 4(d) Rule and Designation of Critical Habitat." 27 April.

[11] Bureau of Land Management. 2024. "Greater Sage-Grouse Rangewide Planning Proposed Resource Management Plan and Final Environmental Impact Statement." United States Department of the Interior, Bureau of Land Management.

[12] Federal Register. 2025. "Records of Decision and Approved Resource Management Plan Amendments for Greater Sage-Grouse Rangewide Planning". January 17.

[13] Federal Register. 2025. "Opportunity to Comment on Changes to the Proposed Resource Management Plan Amendment for the Greater Sage-Grouse Rangewide Planning". September 3.

[14] Cook, A., P. Deibert, S. Espinosa, A. Moser, L. Schreiber, M. Schroeder. 2022. "Greater Sage-grouse Range-wide Population Monitoring Guidelines Part A: Standards for Collection and Reporting of Greater Sage-grouse Lek Count Data." WAFWA Sage- and Columbian Sharp-tailed Grouse Technical Team, Boise, Idaho.

their range including those located on the INL Site. The highest number of males counted at each lek is referred to as peak male attendance. We use peak male attendance to evaluate the status of the sage-grouse population at the INL Site in three different ways.

Our primary focus for evaluating the sage-grouse population on the INL Site is the population trigger established in the CCA. A baseline of male sage-grouse lek attendance was established from the 2011 peak male attendance at a subset of leks, called baseline leks. The baseline number of males is 316, and the adaptive management trigger is a 20% reduction of this peak male attendance averaged over a three-year period. The trigger would be tripped if the three-year average is below 253 males.

In 2025, the peak male attendance at the baseline leks was 527 males, bringing the three-year running average on baseline leks to 444 males, which exceeds the population baseline by 128 males and is a 26% increase from the prior year.

Sage-grouse populations are also monitored with what is known as a lek route which consists of multiple leks that are close enough to be visited in one morning. There are six lek routes located on the INL Site. These routes are surveyed by counting all males along the route resulting in peak male attendance for the entire route, rather than for a single lek. This is the same method used by the Idaho Department of Fish and Game to survey sage-grouse across the State. The peak male attendance from routes is used to analyze population trends. Using this method allows us to make a direct comparison between sage-grouse population trends on the INL Site with those seen across the State of Idaho.

The peak male attendance across the six lek routes in 2025 was 567 males, a 13% increase over 2024. Four of the six routes showed increases in peak male attendance when compared to 2024, and two showed slight decreases. Route trends could not be compared to State trends because Idaho Department of Fish and Game has not issued their 2025 Population Triggers Analysis Report[15] at the time of this publication.

We also monitor leks that are not considered part of the baseline or are not on a lek route across the INL Site. These leks are surveyed annually if they are active, or rotationally (every five years) if they are inactive to determine if males have returned to the area. This results in a varied survey effort from year-to-year that can influence population estimates. The peak male attendance from all leks (baseline, route, active, and rotational) and the total number of leks counted on the INL Site is compared across years to ensure that survey effort is not influencing the population estimate.

We surveyed a total of 69 leks on the INL Site in 2025, with a peak male attendance of 931, the highest recorded since current monitoring efforts began in 2011. The comparison of survey effort to peak male attendance across years indicated that our survey effort is not influencing annual population estimates.

Sage-grouse populations naturally cycle every 6-10 years, depending on location. Record high male attendance on leks in 2025 on the INL Site likely reflects a population peak since the previous population low was in 2020. A similar pattern is reflected in regional trends. High male attendance on the INL Site does not indicate species recovery, as long-term estimates indicate overall sage-grouse populations are still decreasing range-wide[1]. For more detailed information on the population trigger and sage-grouse monitoring, see Section 2.0 of this report.

Sagebrush Habitat Distribution Monitoring

Monitoring sagebrush habitat on the INL Site is important because sage-grouse are completely dependent on large areas of intact sagebrush. These sagebrush stands include other native plant species and provide the birds with food and cover for nesting and brood rearing. The CCA established a section of land referred to as the Sage-grouse Conservation Area, or SGCA. Per the CCA, this area is deprioritized for land development activities and the amount of sagebrush habitat within this area is the basis for the habitat baseline and associated adaptive management trigger. The habitat baseline is 178,656 acres, or about 279 square miles. The adaptive management trigger is a 20% loss of this habitat, which results in 142,925 acres, or about 223 square miles, of remaining sagebrush habitat.

Sagebrush loss is often the result of threats to habitat like wildland fire and infrastructure development. We monitor the distribution of sagebrush habitat across the INL Site annually following wildland fires, and every two

[15] Idaho Governor's Office of Species Conservation. https://species.idaho.gov/wildlife-species/greater-sage-grouse/

years to document losses from infrastructure development or expansion. Our GIS analysts use high resolution imagery to determine any changes in the amount of sagebrush habitat available within the SGCA and across the entire INL Site. By comparing the most recently mapped habitat to new imagery, we can determine changes to the total amount of sagebrush habitat within the SGCA and across the INL Site.

This task was last completed in 2024 and no further changes to the updated amount of sagebrush were made in 2025 because no wildland fires burned on the INL Site. Our analysis determined that there are approximately 176,241 acres (about 275 square miles) of sagebrush habitat within the SGCA which represents about a 1.4% decrease from the sagebrush habitat baseline. This task is scheduled to be performed again in 2026. For more information about the habitat trigger, see Section 3.2 of this report. For more information regarding the last analysis of the habitat trigger, see Section 3.2 of the 2024 CCA Full Report[16].

Sagebrush Habitat Condition Monitoring

Equally as important as the amount of habitat available to sage-grouse is the quality of the habitat. We evaluate the health of the habitat available to sage-grouse by performing annual assessments of habitat condition, analyzing the trends in habitat condition, and evaluating precipitation patterns to determine if the amount and timing of precipitation can inform any of the changes observed in habitat condition.

Annual habitat condition assessments are conducted at what are known as habitat plots. There are 75 permanent plots scattered throughout the INL Site and distributed between two different habitats, sagebrush habitat and recovering habitat. Sagebrush habitat is defined as an area where the plant community is dominated by sagebrush. Recovering habitat is defined as an area where sagebrush species have been lost due to wildfire, but the area is able to return to a sagebrush community given suitable time and favorable environmental conditions. These habitat plots are visited every summer during the growing season. We determine the condition of the habitat by measuring the amount of cover the plant species provide, their height, the density of sagebrush, and how often sagebrush seedlings occur. We then compare the results of this annual habitat condition assessment to the habitat condition baseline values. This comparison allows us to determine if the current habitat condition is outside of acceptable ranges to effectively provide food and shelter for sage-grouse. For more detailed information on how we collect habitat condition data on the INL Site, see Appendix B of the 2015 CCA Full Report[17].

After we compare the annual habitat condition to the habitat condition baseline, we look at long-term trend patterns in plant abundance for changes in community composition since monitoring efforts began in 2013. By analyzing these trends, we can observe changes in plant communities to determine whether the condition of habitat is increasing or decreasing over time. Comparing the annual habitat condition results and plant abundance trends to annual precipitation data allows us to understand if precipitation can explain any effects or if changes in habitat condition may be due to threats like invasive species or livestock grazing. For more detailed information on how we analyze habitat condition trends and precipitation data on the INL Site, see Section 3.1.2.2 of this report.

This year, the habitat condition analyses revealed changes in plant communities across both sagebrush habitat and recovering habitat that are consistent with signs of ecological stress. Within both habitat types, the most apparent evidence of ecological stress was in the reduced abundance and size of native grass and wildflower species. We observed the amount of cover from native grass and wildflower species were below the habitat condition baseline and that these species were also shorter in height than expected. This is likely due to a drier than average spring combined with below average annual precipitation that resulted in limited growth during critical periods of plant development. It is important to note that the impact of these stresses observed in sagebrush habitat were less apparent than those observed in recovering habitat which is likely due to the ability of sagebrush habitat to better withstand these stresses.

Recovering habitats continue to be dominated by native species with high amounts of species diversity. Sagebrush cover in recovering habitats continue to trend upward over time which indicates a gradual recovery of

[16] Williams, S. R., T. M. Owens, K. N. Kaser, J. P. Shive, A. D. Forman, C. J. Kramer, S. A. Baccus and K. T. Edwards. 2025. “Implementing the Candidate Conservation Agreement for Greater Sage-grouse on the Idaho National Laboratory Site: 2024 Full Report.” Idaho National Laboratory; Environmental, Safety, Health & Quality Organization, Idaho Falls, ID. INL/RPT-25-82779.

[17] Shurtliff, Q. R., A. D. Forman, J. P. Shive, J. R. Hafla, K. T. Edwards, and R. D. Blew. 2016. “Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site: 2015 Full Report.” Environmental Surveillance, Education, and Research Program, Gonzales-Stoller Surveillance, LLC, Idaho Falls, ID. GSS-ESER-199

this habitat to pre-wildland fire conditions. However, recovering habitats are sensitive to shifting precipitation patterns, which makes them more susceptible to being overtaken by invasive plant species. In some recovering habitats, we are seeing an increase in invasive plant species that may outcompete native plant species if shifts in precipitation amount and timing continue. For now, cover from cheatgrass, an invasive species of concern across the Western U.S., remains variable from year to year, lacks a clear directional trend, and is localized to certain areas on the INL Site while long-term abundance trends suggest that native species are maintaining a strong foothold in recovering habitats. For more detailed information on our annual assessment of habitat condition at the INL Site, see Section 3.1 of this report.

Threat Monitoring, Implementation of Conservation Measures, Lands Affected by Wildland Fire, and Restoration Efforts

The CCA contains an evaluation of the conservation needs of sage-grouse and of how any potential impacts from operations at the INL Site can be minimized. This evaluation considered the findings of the U.S. Fish and Wildlife Service in their "warranted but precluded" listing determination for sage-grouse[3], INL Site specific data, and sage-grouse conservation objectives identified by the State of Idaho[18] and the U.S. Fish and Wildlife Service[19]. This evaluation led to a list of threats to sage-grouse and their habitat which were then ranked to reflect INL Site activities and land uses. Working with INL stakeholders, this ranked list of threats led to the development of monitoring tasks associated with these threats and Best Management Practices that can be used to offset these threats known as Conservation Measures. As an example, the expansion of infrastructure, such as roads, powerlines, and buildings, is identified as a threat to sage-grouse because it can result in the loss of a breeding area, and result in the removal of sagebrush which contributes to habitat fragmentation by dividing large sections of sagebrush into smaller pieces. To offset this threat, two Conservation Measures were adopted: co-location of new projects with existing infrastructure and avoiding development within 0.6 miles of a lek inside the SGCA. These threats are monitored via GPS mapping on a periodic basis. For a complete list of threats and associated Conservation Measures intended to accommodate the INL mission while proactively managing sage-grouse populations and their habitat, see Section 10.0 of the CCA[4]. For a complete list of monitoring tasks associated with threats to sage-grouse and sagebrush at the INL Site, see Section 11.0 of the CCA[4].

The two greatest threats to sage-grouse at the INL Site identified in the CCA are losses of sagebrush habitat from wildland fire and the expansion of infrastructure. As such, monitoring of these threats occurs on a more frequent basis. Monitoring for infrastructure expansion occurs every two years using high-resolution imagery and was last analyzed and presented in the Section 4.2 of the 2024 CCA Full Report[16]. Threat monitoring associated with wildland fire events also incorporates the use of high-resolution imagery and is completed on an as needed basis. The restoration of habitats affected by wildland fires is identified as a Conservation Measure within the CCA. To facilitate these restoration efforts, we perform an assessment of INL lands that are affected by wildland fire using the methodology identified in the INL Wildland Fire Recovery Framework[20]. The 2024 Dry Channel Fire was the first wildland fire on the INL Site to be evaluated using this framework. The analysis of total acreage and the vegetation communities affected by this fire were provided in Section 3.2.3 of the 2024 CCA Full Report[16]. A recovery plan[21] for the 2024 Dry Channel Fire has been written and is currently being implemented.

This year, we were able to finalize the analysis of the effects of fire suppression activities related to the 2024 Dry Channel Fire. There are approximately five miles of containment lines, averaging 15 to 20 feet in width encircling approximately 114 acres, or a 0.18 square miles of fire footprint. There are also approximately 35 miles of two track roads that were created within or near the fire footprint. Due to the excessive amounts of soil disturbance associated with fire suppression and mop up activities, many of the recommended post fire treatments are focused

[18] Idaho Sage-grouse Advisory Committee. 2006. "Conservation Plan for the Greater Sage-grouse in Idaho."

[19] U.S. Fish and Wildlife Service. 2013. "Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report." U.S. Fish and Wildlife Service. Denver, CO. February 2013.

[20] Forman, A. D., C. J. Kramer, J. P. Shive, S. R. Williams, K. N. Kaser, and B. F. Bybee. 2024. "Idaho National Laboratory Site Natural Resources Wildland Fire Recovery Framework." Idaho National Laboratory, Natural Resources Group, Idaho Falls, ID. INL/RPT-24-76050.

[21] Forman A. D., C. J. Kramer, J. P. Shive, T. M. Owens, S. R. Williams, and K. N. Kaser. 2025. "Dry Channel Fire Ecological Resources Recovery Plan." Idaho National Laboratory, Environmental, Safety, Health & Quality Organization, Idaho Falls, ID. INL/RPT-25-85459.

on stabilizing the impacted soils and associated vegetation. For more detailed information regarding the analysis of impacts and recovery efforts for the Dry Channel Fire, see Sections 4.2.4 and 5.2.1.2 of this report.

In 2025 we continued work on two projects that support habitat recovery in areas affected by wildland fire. Funding awarded from the Bipartisan Infrastructure Law to a multiagency partnership that includes the U.S. Department of Energy, Idaho Operations Office, U.S. Fish and Wildlife Service, and Bureau of Land Management was used to support sagebrush habitat restoration efforts in the Tractor Flats area of the INL Site. In 2025, 1,900 acres (about three square miles) of habitat lost in the 2010 Jefferson Fire was reseeded with sagebrush seed collected on the INL Site. For more detailed information on habitat restoration efforts using sagebrush seeding on the INL Site, see Section 5.2.1.3 of this report.

The U.S. Fish and Wildlife Service also received separate funding from the Bipartisan Infrastructure Law to purchase herbicide to support cheatgrass suppression in areas affected by the 2019 Sheep Fire. In 2025, the aerial application of this herbicide was funded by the INL to treat approximately 2,100 acres, or three-square miles, of cheatgrass within the footprint of the 2019 Sheep Fire. For more detailed information regarding efforts to control cheatgrass in 2025, see Section 5.2.1.3 of this report.

Avoiding loss of sagebrush habitat to infrastructure expansion combined with the goal of no net loss of sagebrush habitat stated by the U.S. Department of Energy, Idaho Operations Office in the CCA, has resulted in the development of a compensatory mitigation program. This program requires that for every acre of sagebrush habitat or recovering sagebrush habitat affected by infrastructure expansion, the contractor responsible for conducting project work will contribute funds to replant 1,000 sagebrush seedlings to offset these impacts on the INL Site. In 2025, compensatory mitigation funds obtained from the Carbon Free Power Plant project and a storage expansion at the Materials and Fuels Complex were used to plant 42,600 sagebrush seedlings in the footprint of the 2000 Tin Cup Fire. For more detailed information on sagebrush restoration efforts using sagebrush seedlings, see Section 5.2.2 of this report.

Predation of sage-grouse nests by ravens was also identified as a threat to sage-grouse on the INL Site in the CCA. Ravens are effective nest predators of sage-grouse and increases in raven abundance have been linked to local declines in sage-grouse populations. Breeding ravens primarily search for food around their nests and may have a larger impact on sensitive species like sage-grouse than non-breeding individuals. Raven populations have increased in part due to their ability to nest on man-made structures. Tracking the number and distribution of raven nests on infrastructure such as powerlines, equipment, and buildings, is the primary way we evaluate the potential impacts ravens may have on sage-grouse on the INL Site. To continue monitoring this threat, we resumed raven nest monitoring on all infrastructure present on the INL Site in 2025. A total of 41 active raven nests were recorded. The number of active raven nests fell within the range reported (29–44 nests) for the eight years of surveys completed from 2014–2021 which indicates that the number of breeding territories on infrastructure on the INL remains stable. To support the Conservation Measure related to the threat of ravens, INL Power Management continually modifies existing power infrastructure to deter raven nesting with a total of 68 transmission structures completed to date. For more information about raven monitoring and raven nest deterrence efforts, see Section 4.1 of this report.

Since 2014, all actions related to threat monitoring, Conservation Measures and associated Best Management Practices have been summarized in the annual CCA implementation reports that are available at https://inl.gov/aser/environmental-publications/. For more specific information regarding Conservation Measures implemented by the INL in 2025, see Section 5.1 of this report.

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Contents

Figures

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Acronyms

BIL	Bipartisan Infrastructure Law
BLM	Bureau of Land Management
CCA	Candidate Conservation Agreement
CFA	Central Facilities Area
DOE-ID	U.S. Department of Energy, Idaho Operations Office
IDFG	Idaho Department of Fish and Game
INL	Idaho National Laboratory
EA	Environmental Assessment
FC	Frenchmans Cabin
FONSI	Finding of No Significant Impact
GIS	Geographic Information System
LBC	Lower Birch Creek
MFC	Materials and Fuels Complex
NAIP	National Agriculture Imagery Program
NEPA	National Environmental Policy Act
NSTR	National Security Test Range
RWMC	Radioactive Waste Management Complex
SGCA	Sage-grouse Conservation Area
TF	Tractor Flats
USFWS	U.S. Fish and Wildlife Service
WFMC	Wildland Fire Management Committee

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

2025

1. Introduction, Background, and Purpose

In October 2014, the United States Department of Energy, Idaho Operations Office (DOE-ID) and the U.S. Fish and Wildlife Service (USFWS) entered into the Candidate Conservation Agreement for Greater Sage-grouse (*Centrocercus urophasianus*) on the Idaho National Laboratory Site (DOE-ID and USFWS 2014). This Candidate Conservation Agreement (CCA) includes monitoring tasks that occur on the Idaho National Laboratory Site (INL) that are designed to track greater sage-grouse (hereafter, sage-grouse) abundance and habitat indicators, key threats, and Conservation Measures intended to reduce these threats. This report, produced by the Battelle Energy Alliance Natural Resources Group, documents year-end results of CCA monitoring tasks and DOE-ID and INL contractor activities associated with CCA Conservation Measures.

The primary purpose of this report is to update sage-grouse population and habitat estimates as they apply to adaptive regulatory triggers established in the CCA. If a regulatory trigger is tripped, a responsive action by DOE-ID and USFWS will be initiated (DOE-ID and USFWS 2014, Section 9.4.3). The two triggers and criteria that define them are:

1) Population Trigger: The three-year running average of peak male attendance, summed across 27 baseline 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.
2) Habitat Trigger: Total area designated as sagebrush habitat within the SGCA. This trigger will trip if total area falls below 57,840 ha (142,925 ac), a 20% drop from the updated 2019 baseline of 72,300 ha (178,656 ac).

Reports of related monitoring tasks described in Section 11.1 of the CCA (DOE-ID and USFWS 2014) are grouped into three sections in this report: Population Monitoring (Section 2), Habitat Monitoring (Section 3), and Threat Monitoring (Section 4). Section 5 reports on how DOE-ID, contractors, and other organizations implemented Conservation Measures listed in the CCA during the past year. Section 6 synthesizes results from all monitoring tasks and discusses results and their implications within the context of regional trends and future management directions. This section also documents changes and updates to the CCA that have been approved by both signatories during the past year and outlines the upcoming CCA annual work plan.

This report informs of a continuing dialogue between DOE-ID and USFWS as the two agencies cooperate to achieve CCA objectives for sage-grouse conservation on the INL Site. Consistent re-evaluation and analysis of new information ensures that the CCA continues to benefit sage-grouse on the INL Site, is grounded in the best available science, and retains its value to both signatories.

2. Population Trigger Monitoring

2.1. Task 1—Lek Counts and Lek Route Surveys

2.1.1. Introduction

The monitoring strategy outlined in the CCA (DOE-ID and USFWS 2014, Section 11.1) includes a task (Task 1) to track sage-grouse abundance on the INL Site, allowing DOE-ID and USFWS to evaluate population trends relative to the population trigger. Counts from 27 leks located in the SGCA (hereafter, baseline leks) are the basis of the population trigger (Figure 2-1). These leks are surveyed annually, either individually or as part of a lek route. The baseline value for the population trigger is 316 males, the sum of peak male attendance of the baseline leks in 2011. The population trigger will trip if the three-year running average of peak male attendance at these baseline leks falls below 253, a 20% decrease from the 2011 baseline value.

In addition to baseline lek counts, six lek routes are surveyed annually, three routes have been surveyed since the late 1990s, and three routes were established in 2017 to evaluate long-term sage-grouse abundance trends. Surveying a cluster of leks in the same order in a single day (i.e., lek routes) reduces some of the confounding issues inherent in surveys of individual leks; thus, lek route data are considered more suitable for tracking abundance trends across relatively small spatial extents than data from individual lek surveys (Connelly et al. 2003, Garton et al. 2007, DOE-ID and USFWS 2014). Data from these routes continue to build on more than 25 years of sage-grouse monitoring on the INL Site, providing context to interpret relatively short-term results derived from baseline lek monitoring. Lastly, the Task 1 monitoring strategy includes surveys of a subset of inactive leks (hereafter, rotational surveys) that are not visited annually because they are not baseline leks and are not assigned to lek routes. The goal is to revisit all inactive leks at least once every five years to determine if sage-grouse have reoccupied the sites. This, and other monitoring activities described above, helps maintain accurate records of the number and location of active leks on the INL Site.

2.1.2. Methods

2.1.2.1. Field Methods

The primary goal each year is to survey all known active leks on the INL Site. Lek routes are surveyed ≥4 times, baseline leks and active leks not on a route are surveyed ≥3 times, and rotational inactive leks are surveyed ≥2 times. Lek counts begin each year on or soon after March 20 and typically end about the first week of May. Our counts occur from 30 minutes before to 90 minutes after sunrise and are not conducted during adverse weather (e.g., heavy precipitation or winds >19 km [12 mi] per hour). If sage-grouse are present at a lek, we tally the number of visible males three or four times over a 5–10-minute period. If males flush as we approach the survey location or if previously unseen males flush during the count, that number is added to the subsequent high count during the lek visit. The highest tally is recorded as the lek count for the day. Visits to single leks are separated by at least seven days, and lek routes are visited every 7–10 days. Counts continue weekly on lek routes until there is a decrease in male attendance, indicating that the peak male count was reached the prior week.

Lek routes are comprised of 3-10 leks each, encompassing 38 active and inactive leks across the six routes (Figure 2-1). During each survey, all leks on a route are visited during the two-hour morning window, in the same order, and usually by the same observer during a field season. Three routes established by the Idaho Department of Fish and Game (IDFG), Lower Birch Creek (LBC), Tractor Flats (TF), and Radioactive Waste Management Complex (RWMC), have been surveyed annually since the mid-1990s. Three additional routes established by INL have been surveyed since 2017—West T-3 (hereafter, T-3), T-9, and Frenchmans Cabin[1] (FC). The TF and LBC routes each include a lek located off the INL Site, within 1.6 km (1 mi) of the boundary. Dozens of inactive leks occur on the INL Site that are not baseline leks and are not assigned to a route. Over a five-year period, we survey a set of these annually on a rotational basis. Some inactive leks are visited more frequently because IDFG classifies them as priority leks for statewide monitoring.

[1] “Frenchmans Cabin” is a recognized map feature by the U.S. Board on Geographic Names and is not misspelled.

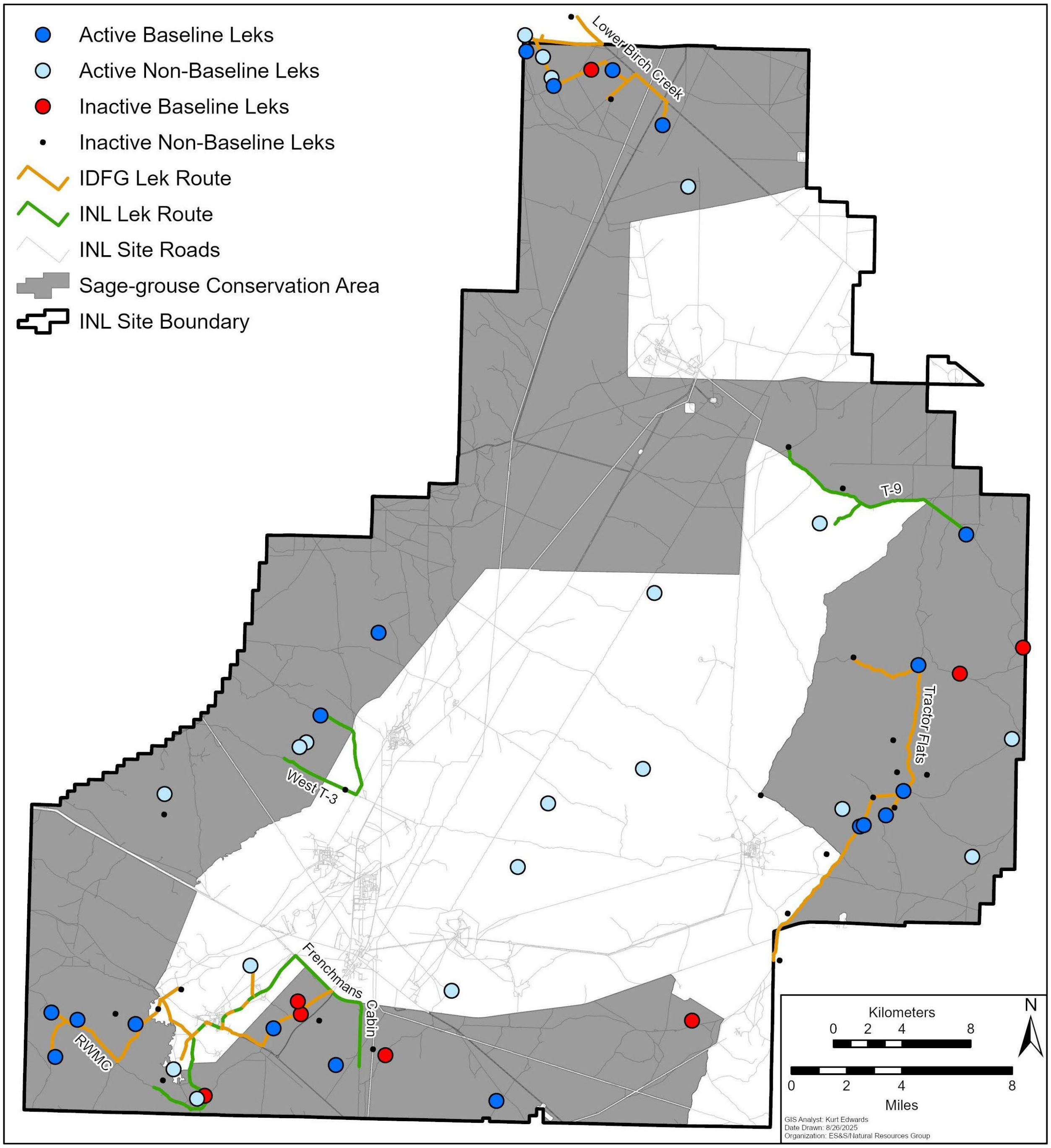

Figure 2-1. Greater sage-grouse (*Centrocercus urophasianus*) leks surveyed on or near the Idaho National Laboratory Site in 2025. Lek activity designations (active vs. inactive) refer to lek status at the end of 2025. Inactive non-baseline leks include inactive leks assigned to lek routes (visited annually) and inactive rotational leks visited once every five years.

Lek Status

Leks were classified as active if two or more male sage-grouse were observed displaying on the lek in at least two of the previous five years (Connelly et al. 2000, Whiting et al. 2014). Leks with attendance that did not meet these criteria were classified as inactive. If two or more males were observed displaying at a new location at least 400 m (437 yd) from a known lek, the location was assigned a new lek number and classified as active in the current year. It will remain classified as active until at least four years of surveys without sage-grouse observations have accumulated within a five-year period. Following the field season, we examined data from the past five years for each lek and adjusted lek activity status as necessary.

2.1.2.2. Analysis

Summary statistics were calculated separately for baseline leks and lek routes, although 19 baseline leks (50% of leks on routes) contributed to both summaries. Separating the two summaries is necessary because baseline leks are used in the calculation of the population trigger while lek routes allow for a comparison in regional observations and long-term population trends. To evaluate current sage-grouse abundance relative to the population threshold of 253 males, we identified peak male attendance for each baseline lek (i.e., the highest male count recorded during any visit after March 20) and summed individual peak counts across all 27 baseline leks. The annual total was then averaged with the preceding two years to produce a three-year running average—the population trigger metric (DOE-ID and USFWS 2014). We assessed long-term abundance trends by examining peak male attendance for each of the six lek routes from 2011–2025. Additionally, we assessed potential bias from survey effort (number of leks counted each year) using linear regression to compare annual peak male attendance for all leks surveyed (baseline, route, and rotational) to the annual survey effort.

2.1.3. Results

2.1.3.1. Baseline Leks and Population Trigger

Summed peak attendance across the baseline leks in 2025 was 527 males—26 (5%) more than in 2024 (Figure 2-2). The three-year (2023–2025) running average of peak male attendance on baseline leks increased 26.5% to 444 males, exceeding the population trigger threshold of 253 males (Figure 2-2). This value is the highest recorded on the INL Site since the onset of monitoring efforts in 2011, the baseline year for the population trigger. Surveys of baseline leks accounted for 39.1% (n = 27) of all leks surveyed, 50% (n = 19) of active leks in 2025, and accounted for 56.6% of the total sage-grouse observed on the INL Site in 2025.

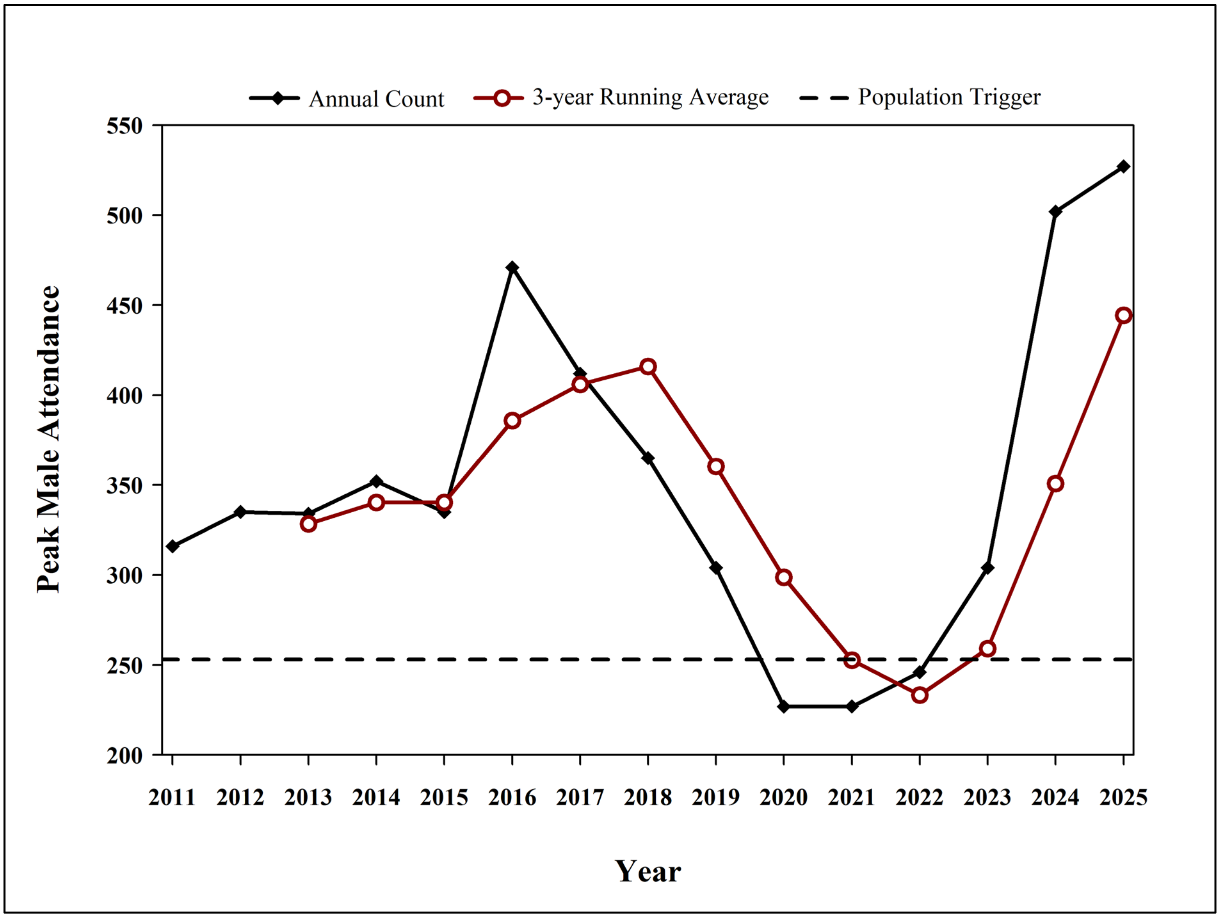

Figure 2-2. Peak male attendance of greater sage-grouse (*Centrocercus urophasianus*) at 27 baseline leks within the Sage-grouse Conservation Area on the Idaho National Laboratory Site from 2011 to 2025.

2.1.3.2. Lek Routes

Lek routes were surveyed four to five times each in 2025. The sum of peak male attendance across all routes increased in 2025 to 567 males (13.4%). Four of the six lek routes had increases of peak male attendance compared to 2024, while two routes showed decreases. The TF and RWMC routes both had the most males recorded at peak attendance since 2011 (Table 2-1, Figure 2-3). TF had a total of 116 males, an increase of six males at peak attendance compared to 2024 (+9.4%, Table 2-1). RWMC had a total of 181 males, an increase of 22 males at peak attendance from 2024 (+13.8 %, Table 2-1). The T-3 route had the highest peak male attendance since 2017, with a total of 105 males, representing a 23.5% increase from 2024. With a total of 84 males, the LBC route had the highest increase in peak male attendance of 29, a 52.7% increase compared to 2024 (Table 2-1). The T-9 and FC routes experienced a decrease of seven males each during their peaks when compared to 2024, with a total of 52 (-11.9%) and 29 (-19.4%) males, respectively (Table 2-1).

Table 2-1. Historical data of peak male attendance of greater sage-grouse (*Centrocercus urophasianus*) and annual percent change (Δ%) on the Tractor Flats (TF), Radioactive Waste Management Complex (RWMC), Lower Birch Creek (LBC), West T-3 (T-3), T-9, and Frenchmans Cabin (FC) lek routes on the Idaho National Laboratory Site from 2011 to 2025. Annual percentage changes exceeding -50% from the previous year are highlighted in red and annual percentage changes exceeding +50% from the previous year are highlighted in green.

	IDFG Lek Routes						INL Lek Routes*							
Year	**TF**	**Δ%**	**RWMC**	**Δ%**	**LBC**	**Δ%**	**T-3**	**Δ%**	**T-9**	**Δ%**	**FC**	**Δ%**	**Total**	**Δ%**
2011	63		132		50								245	
2012	63	0.0	107	-18.9	52	4.0							222	-9.4
2013	53	-15.9	110	2.8	48	-7.7							211	-5
2014	55	3.8	141	28.2	64	33.3							260	23.2
2015	76	38.2	96	-31.9	82	28.1							254	-2.3
2016	115	**51.3**	133	38.5	133	**62.2**							381	**50.0**
2017	84	-27.0	112	-15.8	132	-0.8	49†		34†		46†		457	19.9
2018	74	-11.9	94	-16.1	100	-24.2	47	-4.1	39	14.7	36	-21.7	390	-14.7
2019	69	-6.8	60	-36.2	94	-6.0	16	**-66.0**	35	-10.3	28	-22.2	302	-22.6
2020	56	-18.8	28	**-53.3**	76	-19.1	19	18.8	31	-11.4	15	-46.4	225	-25.5
2021	51	-8.9	57	**103.6**	29	**-61.8**	19	0.0	38	22.6	28	**86.7**	222	-1.3
2022	58	13.7	56	-1.8	50	**72.4**	35	**84.2**	48	26.3	28	0.0	275	23.9
2023	55	-5.2	91	**62.5**	44	-12.0	32	-8.6	55	14.6	35	25.0	312	13.5
2024	106	**92.7**	159	**74.7**	55	25.0	85	**165.6**	59	7.3	36	2.9	500	**60.3**
2025	116	9.4	181	13.8	84	**52.7**	105	23.5	52	-11.9	29	-19.4	567	13.4

*INL Lek Routes began in 2017

† Peak male attendance not included in 2017 annual percent change

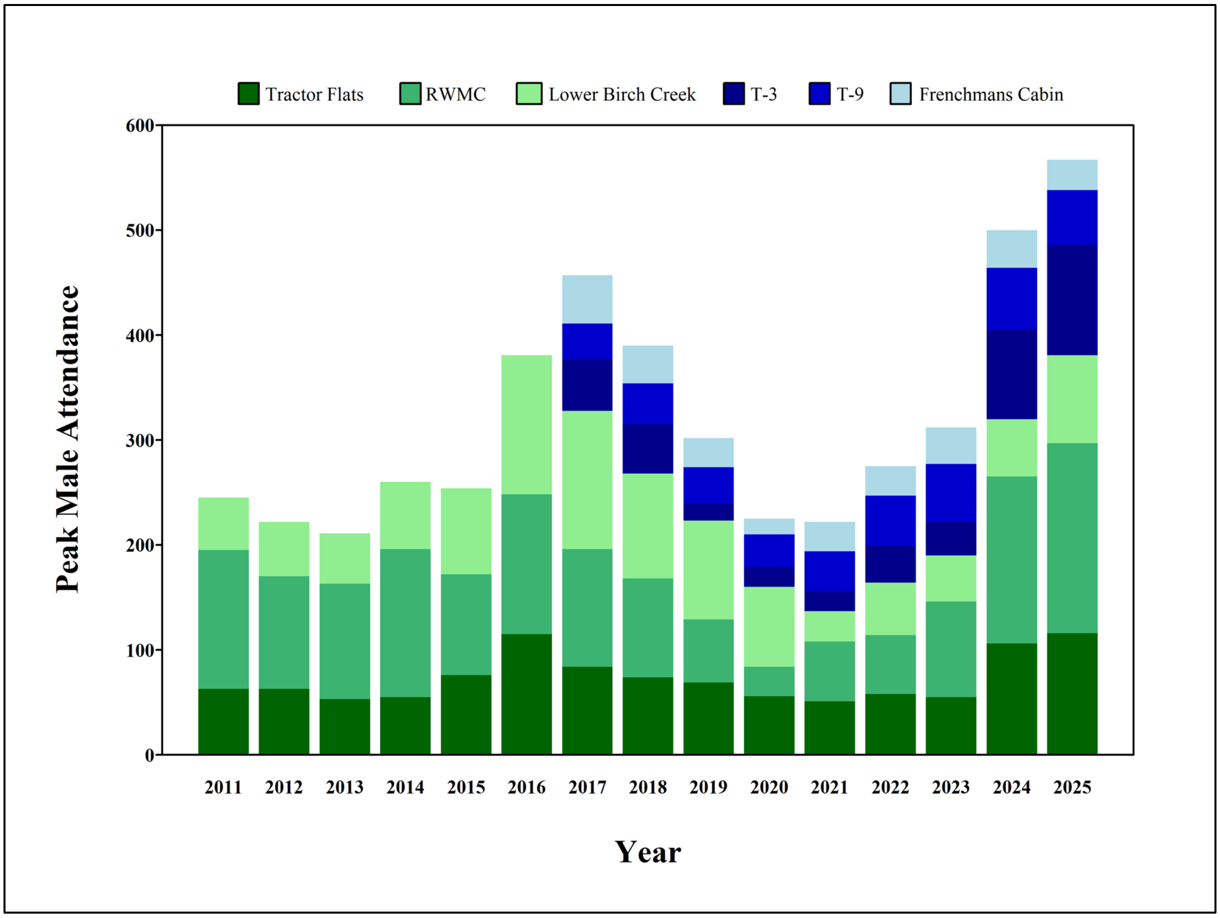

Figure 2-3. Peak male attendance of greater sage-grouse (*Centrocercus urophasianus*) on all lek routes at the Idaho National Laboratory Site from 2011 to 2025. The T-3, T-9, and Frenchmans Cabin routes began in 2017.

2.1.3.3. Rotational Surveys of Inactive Leks and Changes in Lek Status

Ten rotational inactive leks were surveyed in 2025 and no sage-grouse were observed on these leks this season. INL 26, an inactive lek where two male sage-grouse were observed in 2024, was revisited in 2025 but no sage-grouse were detected. Two leks on the RWMC route, INL 11 and INL 112, became active in 2025 (Figure 2-4). INL 11, inactive since 2023, regained active status in 2025 following peak male attendance of six in 2024 and 12 in 2025. INL 112, inactive since 2021, also became active this season, with peak male counts of 19 in 2024 and 11 in 2025. INL 35 and INL 54 were pending active in 2024, but no sage-grouse were observed in 2025. INL 158, part of the RWMC route, and INL 159, part of the T-3 route, had no sage-grouse observations from 2014 until this season, when at least two sage-grouse were observed in 2025. If two or more sage-grouse are observed within the next five years on these four leks, they will be designated as active (Figure 2-4). No sage-grouse have been observed on INL 6 since 2022; if no sage-grouse are observed in the 2026 season, it will be designated as inactive. A new lek was discovered near INL 128 on the east side of the Site and was designated as INL 166 (Figure 2-4). The peak male attendance on this new lek was 30 males. Of the 27 baseline leks, 19 are currently active (Figure 2-1). There are 37 total leks classified as active, two more than 2024 (Figure 2-1).

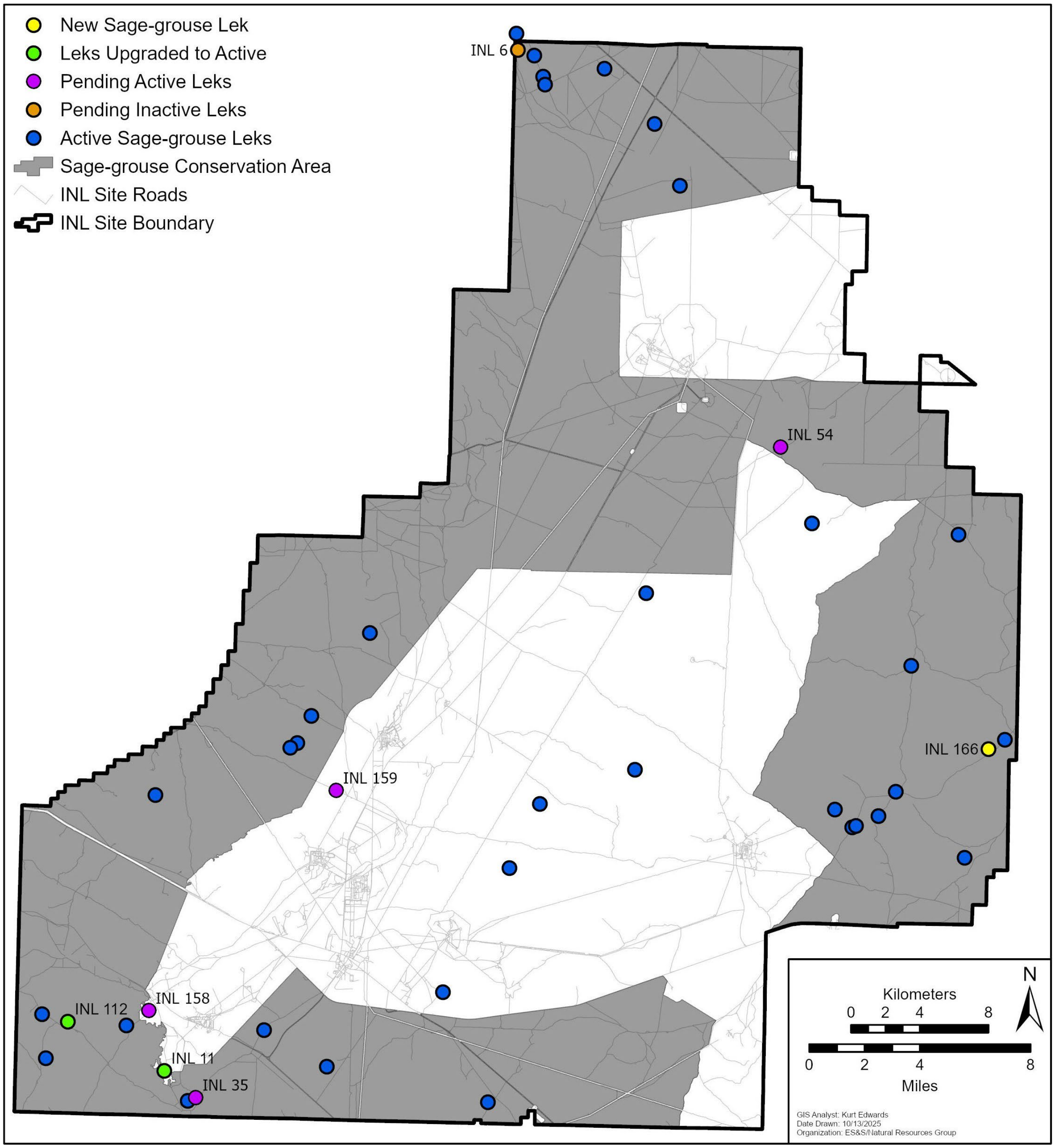

Figure 2-4. Greater sage-grouse (*Centrocercus urophasianus*) lek designations and status updates on or near the Idaho National Laboratory Site following the 2025 field season.

2.1.3.4. Site-wide Population and Survey Effort

The sum of peak male attendance for all leks surveyed on the INL Site in 2025 was 931 (Figure 2-5). Mean survey effort between 2011 and 2025 was 78 leks (range 67–93) with 69 leks surveyed in 2025. The number of leks surveyed between 2011 and 2017 varied as discovery and historical lek surveys were completed in an initial effort to inventory all leks present on the INL Site. Survey effort has been largely consistent since 2018 (mean = 73, range 67–78), and fluctuations are due to the number of rotational leks that are scheduled to be surveyed each year and spring weather conditions. Linear regression indicated that the total number of leks visited each year does not influence annual peak male attendance ($R^2 = 0.06$, $p = 0.40$).

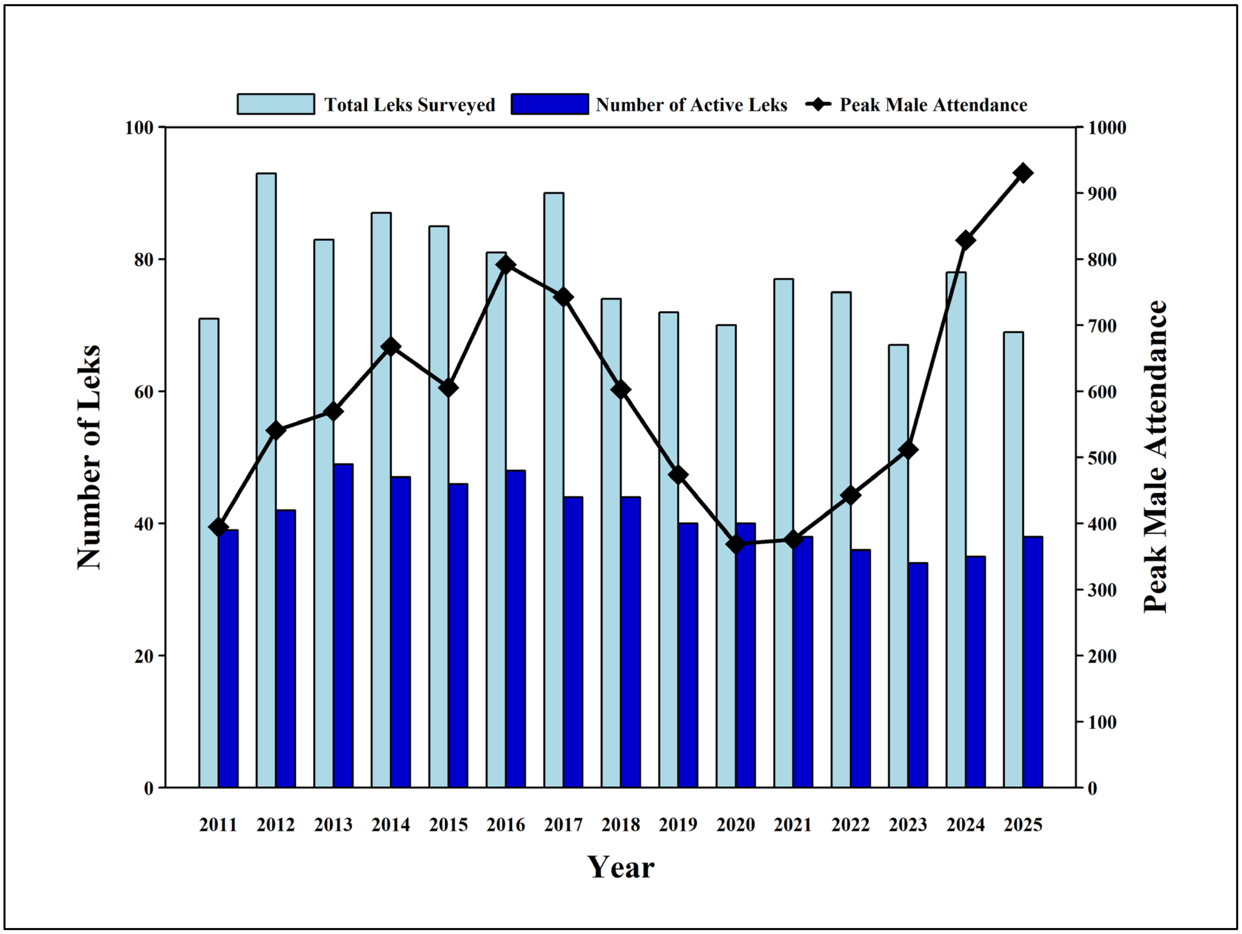

Figure 2-5. Lek survey effort, lek activity status, and peak male attendance of greater sage-grouse (*Centrocercus urophasianus*) for all leks surveyed on or near the Idaho National Laboratory Site from 2011 to 2025. Leks are classified as active if two or more male sage-grouse were observed displaying on the lek in at least two of the previous five years.

2.1.4. Discussion

The three metrics described above are used to comprehensively assess the health of sage-grouse populations present on the INL Site. The three-year average of peak male attendance from baseline leks is used to evaluate how the current sage-grouse population within the SGCA compares to the baseline population of 2011 as established as a trigger in the CCA. Using peak male attendance for all leks surveyed provides a broader picture of sage-grouse meta-populations on the INL Site, including for those leks located in less suitable habitat (i.e., habitat recovering from wildland fire). It can also be used to evaluate the influence of survey effort on annual counts. Counts from lek routes allow for a more direct comparison between the population on the INL Site and populations across the State of Idaho. This regional context is important when assessing tripped triggers since sage-grouse that occupy the INL Site also use habitats outside of the INL Site boundary.

Sage-grouse populations naturally cycle every 6–10 years and high counts of male attendance at leks on the INL Site in 2025 may indicate an approaching population peak given that the last peak was observed in 2016. Patterns on the INL Site mimic those observed in the region as Montana Fish, Wildlife and Parks and Wyoming Game and Fish Department reported 27.8% and 11% increases in their statewide sage-grouse populations, respectively (MFWP 2025, WGFD 2025). Peak male attendance from the six routes on the INL Site has also documented the cyclical nature of sage-grouse populations which mirrors with regional trends reported by the State of Idaho in 2024 (Struthers 2025). The increase of male attendance on the LBC route in 2025 has alleviated concerns expressed in the 2025 CCA report (Williams et al. 2025) that indicated this route was still well below the 2016 peak. However, as of 2024, the population trigger for the Mountain Valleys Priority Habitat Management Area where the LBC route is located, remains tripped as the three-year running average for that management area remains below the 2011 baseline for the State of Idaho (Struthers 2025). It is important to note that record high male attendance at leks on the INL Site does not indicate population or species recovery as sage-grouse populations continue to decline range wide (Prochazka et al. 2024). Additionally, active lek status on the INL Site has declined from a high of 49 in 2013 to a low of 34 in 2023 (Figure 2-5). This decline may be a result of 1) leks becoming inactive after wildfire events and those birds moving to active leks in higher quality habitat, 2) an artifact of a time-lag as inactive leks become active during population peaks, or 3) population declines. Evaluation of the population trajectory (increasing, decreasing, or stable) cannot be completed until the next low point in the population cycle.

3. Habitat Trigger Monitoring

All vegetation-based estimates of sagebrush habitat distribution for the CCA were initially determined using a vegetation map completed in 2010 (Shive et al. 2011). Sagebrush habitat was designated by selecting all map polygons assigned to stand-alone big sagebrush or low sagebrush classes, and all map class complexes where one of the two classes was either a big sagebrush or low sagebrush class. Areas designated as sagebrush habitat may change over time based on gradual changes in vegetation composition and from abrupt changes caused by wildland fire.

The original baseline value of the habitat trigger was defined as the total area designated as sagebrush habitat within the SGCA at the beginning of 2013 (DOE-ID and USFWS 2014). DOE-ID and USFWS mutually agreed to adjust the sagebrush habitat trigger baseline in 2022 to incorporate the best available vegetation data. A new vegetation classification and map for the INL Site was published in 2019 which included updates to map class boundaries delineated at a finer scale to improve spatial accuracy (Shive et al. 2019). The newly established baseline value is estimated at 72,300 ha (178,656 ac). The sagebrush habitat trigger will be tripped if there is a loss of >14,460 ha (35,731 ac) within the SGCA (i.e., a 20% reduction in sagebrush habitat). If the trigger is tripped, DOE-ID can respond by altering the boundary of the SGCA to include more sagebrush habitat and initiate further restoration efforts on Priority Restoration Areas at the INL Site.

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 all current sagebrush habitat, particularly within the SGCA, to facilitate annual evaluation of the habitat trigger:

1) Task 5: Sagebrush Habitat Condition Trends: This task provides information to support the ongoing assessment of habitat conditions within polygons mapped as sagebrush habitat and facilitates comparison of current year sagebrush habitat on the INL Site with baseline values. Data collected to support this task may also be used in Task 6 to document gains in sagebrush habitat as recovering habitat polygons transition back into sagebrush map classes or to support map class polygon reassignments based on other plant community compositional shifts.
2) Task 6: Monitoring to Determine Changes in Sagebrush Habitat Amount and Distribution: This task is intended to update to the current sagebrush habitat distribution map by reconciling losses to sagebrush habitat following events that alter vegetation communities. As updates are made to map classes (vegetation polygon boundaries), the total area of sagebrush habitat available will be compared to the baseline value established for the habitat trigger to determine status with respect to the habitat threshold.

Together, these two monitoring tasks provide the basis for maintaining an accurate map of vegetation classes and an assessment of habitat condition on the INL Site. For example, imagery of burned areas may show changes in vegetation class boundaries immediately or several years post-burn, or sagebrush cover may be evaluated using habitat condition monitoring data from plots located within that burned area. Once substantial increases in sagebrush cover have been identified from either the plot data or the imagery, field-based sampling will be conducted within affected polygons to determine whether it has enough big sagebrush cover over a substantial area to redefine the polygon as a sagebrush class, or whether re-delineating smaller sagebrush-dominated polygons within the burn area is appropriate.

3.1. Task 5 – Sagebrush Habitat Condition Trends

3.1.1. Introduction

The CCA identified monitoring habitat condition as an integral component for assessing the habitat trigger because it provides information about the health of available habitat types and informs management actions to conserve habitats important to sage-grouse on the INL Site. This long-term monitoring approach is intended to detect changes in habitat condition and results from this task help guide the designation process used to determine the distribution of sagebrush habitat which informs the habitat trigger. Vegetation monitoring data are collected each year to accomplish this task. The health of habitats available to sage-grouse is determined by 1) annual habitat condition assessments, 2) habitat condition trend analyses, and 3) precipitation pattern summaries.

1) Annual habitat condition assessment is used to compare annual habitat condition metrics (cover, height, etc.) against the INL Site habitat condition baseline ranges (hereafter, baseline) to determine if current habitat conditions are within or outside of acceptable ranges of variability. Connelly et al. (2000) recognized regional habitat guidelines are too broad to form the basis for finer scale habitat management and recommended local habitat baselines be established to define the range of variation appropriate to local areas. Following these regional guidelines, the INL Site specific baseline was established in 2018 by averaging habitat condition results over five consecutive years (2013–2017) for sagebrush and recovering habitat plots from annual monitoring plots (Shurtliff et al. 2019). The habitat condition baseline was adjusted this year to include ten years of data (2013–2022).
2) Habitat condition trend analyses are used to evaluate changes in vegetation composition and structure by contextualizing plant abundance patterns over time since 2013. Species cover data are summarized by plant functional groups, which are groupings based on species growth forms and nativity (e.g., native vs. introduced species). Plant functional group cover is used to track changes in abundance across groups within habitats important to sage-grouse. In addition to tracking vegetation change, these trend analyses allow for the evaluation of habitat decline and/or recovery of sagebrush habitat impacted by wildland fire or other disturbances.
3) Precipitation data are used to interpret changes in annual habitat conditions and longer-term habitat condition trends within the context of local weather patterns. To support this analysis, long-term precipitation data from 1951 to the current year are summarized by water year to evaluate total yearly accumulation, while seasonal patterns are evaluated by using monthly totals.

Habitat condition data analyses are used to assess the condition of both intact sagebrush habitat and recovering habitat types to provide insight into the ecological health of habitats relating to sage-grouse. Vegetation metrics are sampled from permanent monitoring plots which were allocated by habitat type. The sagebrush habitat plots are located within sagebrush vegetation map classes and recovering habitat plots are located primarily within post-fire vegetation map classes which are dominated by other shrub species and perennial grasses. It is important to monitor recovering habitats because recovering plant communities that are in good ecological condition provide resources for seasonal sage-grouse use (Germino et al. 2023) and will eventually become sagebrush habitat.

3.1.2. Methods

3.1.2.1. Sampling

We sampled data from 75 vegetation monitoring plots, which were distributed between two habitat types: sagebrush and recovering habitat (Figure 3-1). Plot locations were randomly stratified within these habitat types based on the INL Site vegetation map (Shive et al. 2011). Initially, 48 plots were selected from intact sagebrush plant communities to represent the existing sagebrush habitat type, and 27 plots were selected from plant communities that have burned but have the potential to recover to functional sagebrush habitat. Over time, the number of plots per habitat type has and is expected to change to accurately reflect habitat type transition, primarily due to wildland fire events. There are now 43 sagebrush plots and 32 recovering sagebrush plots.

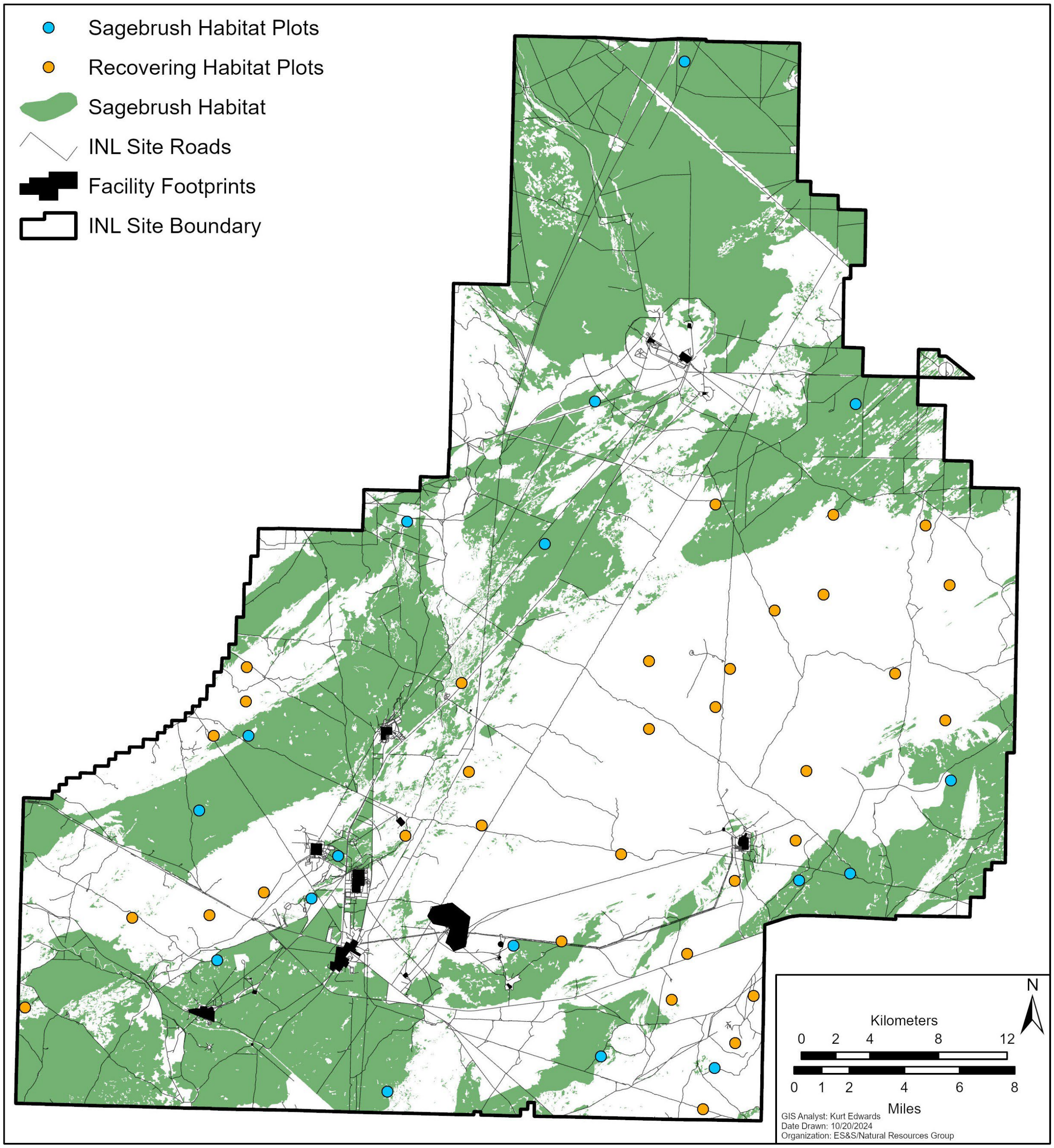

Figure 3-1. The 75 annual habitat condition monitoring plots sampled on the Idaho National Laboratory Site in 2025 to support the Candidate Conservation Agreement in relation to sagebrush habitat.

Data are collected within 20 x 20 m (21.9 x 21.9 yd) vegetation monitoring plots along four interior transect lines. The data metrics collected along the transect lines are vascular foliar cover by species, height by species, sagebrush density, and sagebrush juvenile frequency. Cover data are collected using a point-frame, heights are collected by measuring woody and herbaceous individuals, and sagebrush density and juvenile frequency are collected by counting individuals rooted within the five-meter belt transects. Within each plot, a species list is completed and photographs are taken of a 1 x 1 m (1.1 x 1.1 yd) photo-frame along with another photograph of the surrounding landscape. Using a dichotomous plant community key, the vegetation class within the plot is determined. Additionally, signs of use by sage-grouse, signs of grazing, and other disturbances are noted.

For the complete description of our sample site selection, plot sampling methodology, and vegetation monitoring plot diagram, please review our study plan and sample protocol in Appendix B from Shurtliff et al. (2016).

3.1.2.2. Data Analysis

There are three main categories of data analyses completed to support this task. The first set of analyses is the annual habitat condition assessment, the second set is longer-term habitat condition trends, and the third set is precipitation summaries. Results for annual habitat condition assessment and trends analyses are summarized by habitat type, either sagebrush or recovering habitat. Results for the precipitation analyses are summarized by yearly precipitation totals from 1951 to present day and by total monthly precipitation over the past decade.

Annual habitat condition is assessed by comparing the summaries of cover, height, and sagebrush density values from the current year to corresponding baseline values for sagebrush and recovering habitat types. Results are summarized at two levels of detail. First, mean annual cover and height for sagebrush and perennial grass/forb functional groups and density for sagebrush species are compared to baseline values within each habitat type. Second, cover by species, height by functional group, and more detailed sagebrush juvenile sagebrush frequency results are provided to help us to better understand any changes from previous sample periods. To determine whether annual summary values deviate from baseline values, each metric is compared to the baseline mean and its range of variability ($\bar{x} \pm 1$ SE). Beginning this year, the annual results are compared to an extended baseline; the previous baseline encompassed five years (2013–2017), and the updated baseline has been adjusted to include an additional five years (2013–2022).

The baseline was extended from five to ten years, to expand its statistical robustness, reduce variability around the mean, and improve the detectability of meaningful deviations. For example, the baseline value from the five-year mean for annual sagebrush density was artificially inflated due to mass sagebrush germination events in 2016 and 2017, which resulted in a baseline that was higher than would be expected for the habitat type (e.g. Connelly et al. 2000). It also resulted in an annual comparison result indicating that current conditions were below baseline even though this result was not ecologically meaningful. The expanded ten-year baseline is statistically more robust because it captures these mass germination events within the temporal context of expected recruitment events, substantially improving both the accuracy and precision of the mean.

Additionally, the ten-year habitat condition baseline better encompasses the decadal precipitation patterns that are reflected in the regional records (Abatzoglou et al. 2021), thereby accounting for the disproportional impacts that episodic precipitation events can have on plant community responses (Osmond et al. 1987). The ten-year baseline overlaps both a peak and a trough in the INL Site sage-grouse population cycle. This provides better context for evaluating how weather conditions influence habitat for a period that is ecologically meaningful when applied to sage-grouse populations. Maintaining accurate and meaningful habitat condition baseline values remains central to understanding site-specific data and aligns with regional sage-grouse conservation guidance (Connelly et al. 2000).

Trend analyses are used to summarize cover data and evaluate directional changes in habitat condition from 2013 through the current season for both sagebrush and recovering habitat plots. Plant cover data are summarized by habitat type, nativity, and plant functional group. The mean cover for each functional group is compared across sample years using One-way Repeated Measure of Analysis of Variance (Zar 1999). Habitat monitoring plots impacted by wildland fire have been reclassified as recovering habitat plots, which changes yearly sample sizes within each habitat type; however, the number of plots for each habitat type remain adequate for meaningful interpretation of statistical results (Zar 1999). Significance was determined at the $\alpha = 0.05$ level and multiple pairwise comparisons were evaluated using the Holm-Šidák method (Šidák 1967).

Annual precipitation totals are summarized from 1951 through the current year to provide historical context and total monthly precipitation is summarized from the last decade to provide more recent information about the seasonality of precipitation, amount, and timing. Precipitation data are from the Central Facilities Area (CFA, available at [https://niwc.noaa.inl.gov/climate.htm]) and are summarized by water year. The total precipitation of a water year is calculated by summing annual precipitation from October 1 of the previous year through September 30 of the current growing season. Monthly precipitation totals are presented in seasonal blocks; fall (October, November, December), winter (January, February, March), spring (April, May, June), and summer (July, August, September).

3.1.3. Results

3.1.3.1. Annual Habitat Condition Assessment

Data were collected on 43 sagebrush habitat plots and 32 recovering habitat plots, totaling 75 annual habitat condition monitoring plots, between May 28 and July 28, 2025 (Figure 3-1). A broad overview of 2025 habitat condition for both sagebrush and recovering habitat plots is presented in comparison to three baseline values: cover, height, and density (Table 3-1). Although summaries from both habitat plot types are presented together, these plot types are assessed independently against their respective baseline conditions.

In sagebrush habitat plots, sagebrush cover exceeded the baseline range and sagebrush height and density remained within baseline ranges. However, perennial grass/forb cover observation was substantially lower than its baseline range, and perennial grass/forb height observation was shorter than baseline.

In recovering habitat plots, sagebrush cover also exceeded the baseline range, and sagebrush height was within its baseline range. Additionally, sagebrush density was considerably greater than its baseline range. However, observed perennial grass/forb cover was substantially lower than baseline, while perennial grass/forb height observation was within the baseline range.

Table 3-1. Average cover (%), height (cm), and sagebrush density (individuals/m^2) values for sagebrush (n = 43) and recovering (n = 32) habitat plots on the Idaho National Laboratory Site during 2025. Baseline ranges represent ten years (n = 10) of vegetation monitoring data (2013-2022) for average cover, height, and sagebrush density values for plots in sagebrush and recovering habitat types. Colors indicate when the 2025 summary value is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean ($\bar{x}$).

	Cover (%)		**Height (cm)**		**Density (individuals/m^2)**	
Sagebrush Habitat	Baseline ($\bar{x}$ ± SE)	2025	Baseline ($\bar{x}$ ± SE)	2025	Baseline ($\bar{x}$ ± SE)	2025
Sagebrush	22.75 (±0.55)	**25.31**	47.67 (±2.05)	47.17	3.47 (±0.37)	3.30
Perennial Grass/Forb	15.70 (±2.08)	**10.58**	21.79 (±0.86)	**16.90**	——	—
Recovering Habitat						
Sagebrush	0.44 (±0.10)	**1.50**	37.88 (±5.03)	41.55	0.09 (±0.01)	**0.26**
Perennial Grass/Forb	21.52 (±1.27)	**18.41**	25.88 (±1.25)	25.76	——	—

Sagebrush Habitat Plots

Total plant cover in sagebrush habitat plots dipped below baseline ranges (Table 3-2) but was primarily comprised of native species (45.9%). Introduced species contributed minimal cover (6.3%) and they were represented by a small number of non-native species.

Among native functional groups, total shrub and succulent cover exceeded baseline ranges, but the total cover from the remaining herbaceous groups was below their respective baseline ranges. The native shrub functional group provided the most cover in sagebrush habitat plots in 2025. Big sagebrush (*Artemisia tridentata*) contributed the most cover by species and was more abundant than its baseline. Green rabbitbrush *(Chrysothamnus viscidiflorus*) had the second highest cover among shrubs, though cover was still below its baseline. Total perennial graminoid (i.e. grasses and sedges) cover was noticeably below baseline. The perennial graminoid species that have historically been the most abundant, bottlebrush squirreltail (*Elymus elymoides*) and Sandberg bluegrass (*Poa secunda*), were observed at approximately two-thirds and one-third of baseline cover, respectively. While Douglas' sedge (*Carex douglasii*) was twice its baseline cover, all the other graminoids contributed less than half of their baseline cover values. Finally, native forbs had less cover than baseline, with species richness dropping to less than half the number of species contributing to baseline cover. Introduced functional groups were substantially below their baseline ranges. Cheatgrass (*Bromus tectorum*) provided the most cover of the introduced species, but it contributed relatively little to total plant cover in sagebrush habitat plots. Introduced perennial grasses consisted of a single species, crested wheatgrass (*Agropyron cristatum*), which was also below its baseline range (Table 3-2).

Table 3-2. Absolute cover (%) for observed species within 43 annual sagebrush habitat plots on the Idaho National Laboratory Site. Baseline cover ranges are compared to 2025 cover values by species and functional groups. Baseline means and ranges were calculated from ten years of data (2013–2022). Colors indicate when the 2025 cover is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean (x̄) for the corresponding plant functional group. If the baseline cover and current year cover values of a species are both less than 0.05%, these values are summed up and reported under the 'others' category within their respective functional group. A dash (—) indicates that species were undetectable using the point-frame sampling method.

Scientific Name	Common Name	Baseline Cover (%)	2025 Cover (%)
Native Shrubs			
Artemisia tridentata	big sagebrush	19.16	22.06
Chrysothamnus viscidiflorus	green rabbitbrush	6.11	4.78
Artemisia tripartita	threetip sagebrush	1.93	2.31
Atriplex confertifolia	shadscale saltbush	0.97	1.02
Artemisia nova	black sagebrush	0.92	0.95
Artemisia arbuscula	low sagebrush	0.77	—
Krascheninnikovia lanata	winterfat	0.63	0.37
Linanthus pungens	granite prickly phlox	0.28	0.26
Eriogonum microthecum	shrubby buckwheat	0.09	0.12
Tetradymia canescens	spineless horsebrush	0.05	0.07
Others (n = 6, 2)		0.05	0.03
Total Native Shrub Cover		**30.95 (±0.51)**	**31.98**
Native Succulents			
Opuntia polyacantha	plains pricklypear	0.09	0.12
OTHERS (n = 1, 0)		0.00	—
Total Native Succulent Cover		**0.09 (±0.01)**	**0.12**
Native Perennial Graminoids			
Elymus elymoides	bottlebrush squirreltail	4.18	2.58
Poa secunda	Sandberg bluegrass	3.68	1.33
Achnatherum hymenoides	Indian ricegrass	1.87	1.91
Pseudoroegneria spicata	bluebunch wheatgrass	1.34	1.23
Elymus lanceolatus	thickspike wheatgrass	0.96	0.58
Hesperostipa comata	needle and thread grass	0.43	0.25
Carex douglasii	Douglas' sedge	0.17	0.37
Pascopyrum smithii	western wheatgrass	0.14	0.01
Others (n = 2, 0)		0.01	—
Total Native Perennial Graminoid Cover		**12.78 (±1.82)**	**8.27**

Table 3-2. Continued.

Scientific Name	Common Name	Baseline Cover (%)	2025 Cover (%)
Native Perennial Forbs			
Phlox hoodii	Hood's phlox	0.43	0.33
Schoenocrambe linifolia	flaxleaf plainsmustard	0.22	0.01
Astragalus filipes	basalt milkvetch	0.11	0.30
Sphaeralcea munroana	Munro's globemallow	0.08	——
Erigeron pumilus	shaggy fleabane	0.06	0.04
Phlox longifolia	longleaf phlox	0.05	0.02
Others (n = 30, 10)		0.22	0.13
Total Native Perennial Forb Cover		**1.16 (±0.14)**	**0.83**
Native Annual and Biennial Forbs			
Lappula occidentalis	flatspine stickseed	0.33	——
Descurainia pinnata	western tansymustard	0.32	0.01
Cordylanthus ramosus	bushy bird's beak	0.12	0.01
Chenopodium leptophyllum	slimleaf goosefoot	0.07	——
Others (n = 13, 0)		0.10	——
Total Native Annual and Biennial Forb Cover		**0.93 (±0.37)**	**0.02**
Total Native Cover		**45.93 (±2.50)**	**41.11**
Introduced Perennial Grasses			
Agropyron cristatum	crested wheatgrass	1.76	1.48
Others (n = 0, 0)			
Total Introduced Perennial Grasses		**1.76(±0.21)**	**1.48**
Introduced Annual and Biennial Grasses and Forbs			
Bromus tectorum	cheatgrass	2.40	1.43
Alyssum desertorum	desert alyssum	1.50	0.09
Halogeton glomeratus	saltlover	0.52	0.15
Sisymbrium altissimum	Jim Hill mustard	0.05	——
Others (n = 6, 1)		0.04	< 0.00
Total Introduced Annual and Biennial Grasses & Forbs		**4.51 (±1.42)**	**1.67**
Total Introduced Cover		**6.26 (±1.51)**	**3.15**
Total Plant Cover		**52.19 (±3.89)**	**44.26**

Within the shrub functional group, the mean height of sagebrush was within baseline ranges, while the mean height of the other shrub group was shorter than the baseline. Although there were differences in height, each group contributed nearly the same proportion when compared to baseline (Table 3-3).

All herbaceous functional groups were shorter than their respective baseline height means. Compositional changes were also evident: the proportion of perennial grasses exceeded their baseline proportion, while perennial forbs remained consistent. Annual grasses contributed slightly more than baseline, but annual forbs fell below their baseline proportion.

Sagebrush density remained within baseline ranges; however, the spread between the minimum and maximum density values across all plots was substantially wider than the baseline spread (Table 3-4).

Table 3-3. Vegetation height by functional group for 43 annual sagebrush habitat plots on the Idaho National Laboratory Site in 2025. Baseline values are summarized by functional groups for height (cm) and were calculated using ten years of data (2013–2022; n = 10). Colors indicate when the 2025 height is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean (x̄) for the corresponding plant functional group.

	Baseline		2025	
Functional Group	**Mean Height (cm) (±1 SE)**	**Proportion of Sample**	**Mean Height (cm)**	**Proportion of Sample**
Shrubs				
Sagebrush	47.67 (±2.05)	0.73	47.17	0.74
Other Shrubs	25.88 (±0.86)	0.27	**24.61**	0.26
Herbaceous				
Perennial Grasses	22.78 (±0.93)	0.67	**17.61**	0.78
Perennial Forbs	11.35 (±1.00)	0.08	**8.71**	0.07
Annual Grasses	15.46 (±0.79)	0.08	**10.02**	0.10
Annual Forbs	11.37 (±0.81)	0.17	**7.11**	0.05

Table 3-4. Sagebrush density (individuals/m^2) and juvenile frequency (%) from sagebrush habitat plots (n = 43) on the Idaho National Laboratory Site in 2025 compared to baseline values. The baseline means (x̄) are ± 1 Standard Error (SE) and were calculated using ten years of data (2013–2022; n = 10). Colors indicate when the 2025 density is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean (x̄).

	Baseline (x̄)	**2025**
Density (x̄ ± 1 SE)	3.47 (±0.34)	3.30
Minimum Density	1.98	0.80
Maximum Density	5.54	9.28
Juvenile Frequency (x̄ ± 1 SE)	0.35 (±0.05)	**0.42**

Recovering Habitat Plots

Total plant cover in recovering habitat plots remained within baseline ranges (Table 3-5). The majority of cover (33.4%) was composed of native species, with introduced species contributing a smaller but ecologically relevant portion (21.4%). Among native functional groups, total shrub cover exceeded baseline ranges, while native perennial graminoids and perennial forbs were both substantially below their respective baselines. Introduced perennial grasses and forbs exceeded their baseline ranges, while introduced annual and biennial grasses and forbs remained consistent with their baseline ranges.

The native shrub functional group provided the most cover in recovering habitat plots. Green rabbitbrush was the dominant species in this group, with several species of sagebrush (*Artemisia* spp.) also contributing notable cover. Total cover from native perennial graminoids was much lower relative to baseline, despite a few species having above-baseline values. The species-level gains were insufficient to offset native perennial graminoid's overall deficit in cover. Native perennial forb cover was below baseline, but native annual and biennial forb cover was within baseline ranges. However, species richness was relatively low for both groups, with only 33 species recorded in 2025 compared to 55 species contributing to baseline values.

Among introduced species, crested wheatgrass exceeded its baseline range, while the introduced annual and biennial grasses and forbs group—dominated by cheatgrass, saltlover (*Halogeton glomeratus*), and Jim Hill mustard *(Sisymbrium altissimum*)—were within baseline levels.

Table 3-5. Absolute cover (%) for observed species within 32 annual recovering habitat plots on the Idaho National Laboratory Site. Baseline cover ranges are compared to 2025 cover values by species and functional groups. Baseline means and ranges were calculated from ten years of data (2013–2022). Colors indicate when the 2025 cover is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean (x̄) for the corresponding plant functional group. If the baseline cover and current year cover values of a species are both less than 0.05%, these values are summed up and reported under the 'others' category within their respective functional group. A dash (—) indicates that species were undetectable using the point-frame sampling method.

Scientific Name	Common Name	Baseline Cover (%)	2025 Cover (%)
Native Shrubs			
Chrysothamnus viscidiflorus	green rabbitbrush	10.76	12.01
Artemisia tridentata	big sagebrush	0.39	1.36
Atriplex confertifolia	shadscale saltbush	0.36	0.40
Tetradymia canescens	spineless horsebrush	0.17	0.22
Artemisia tripartita	threetip sagebrush	0.05	0.10
Linanthus pungens	granite prickly phlox	0.05	0.02
Gutierrezia sarothrae	broom snakeweed	0.05	< 0.001
Eriogonum microthecum	shrubby buckwheat	0.04	0.06
Krascheninnikovia lanata	winterfat	0.03	0.06
Ericameria nauseosa	rubber rabbitbrush	0.01	0.09
Others (n = 4, 2)		0.03	0.07
Total Native Shrub Cover		**11.94 (±0.28)**	**14.38**
Native Succulents			
Opuntia polyacantha	plains pricklypear	0.10	0.10
Others (n = 0, 0)		—	—
Total Native Succulent Cover		**0.10 (±0.01)**	**0.10**
Native Perennial Graminoids			
Pseudoroegneria spicata	bluebunch wheatgrass	4.58	3.18
Poa secunda	Sandberg bluegrass	3.96	1.72
Hesperostipa comata	needle and thread grass	2.31	3.33
Achnatherum hymenoides	Indian ricegrass	2.20	2.22
Elymus lanceolatus	thickspike wheatgrass	2.05	2.97
Elymus elymoides	bottlebrush squirreltail	1.86	1.52
Pascopyrum smithii	western wheatgrass	1.60	0.53
Leymus flavescens	yellow wildrye	0.73	0.47
Carex douglasii	Douglas' sedge	0.06	0.03
Others (n = 2, 0)		0.03	—
Total Native Perennial Graminoid Cover		**19.37 (±1.18)**	**15.98**
Native Perennial Forbs			
Phlox hoodii	Hood's phlox	0.36	0.24
Crepis acuminata	tapertip hawksbeard	0.20	0.08
Erigeron pumilus	shaggy fleabane	0.12	0.29
Sphaeralcea munroana	Munro's globemallow	0.19	0.01
Astragalus lentiginosus	freckled milkvetch	0.12	0.03
Phlox longifolia	longleaf phlox	0.07	0.08

Table 3-5. Continued.

Scientific Name	Common Name	Baseline Cover (%)	2025 Cover (%)
Astragalus filipes	basalt milkvetch	0.06	0.04
Phlox aculeata	sagebrush phlox	0.06	——
Machaeranthera canescens	hoary tansyaster	0.05	0.03
Pteryxia terebinthina	turpentine wavewing	0.04	0.08
Psoralidium lanceolatum	lemon scurfpea	0.02	0.08
Others (n = 25, 10)		0.22	0.10
Total Native Perennial Forb Cover		**1.44 (±0.20)**	**1.03**
Native Annual and Biennial Forbs			
Lappula occidentalis	flatspine stickseed	0.23	0.24
Descurainia pinnata	western tansymustard	0.17	0.20
Mentzelia albicaulis	whitestem blazingstar	0.15	0.16
Eriastrum wilcoxii	Wilcox's woollystar	0.08	0.01
Gnaphalium palustre	western marsh cudweed	0.04	0.10
Others (n = 14, 7)		0.13	0.06
Total Native Annual and Biennial Forb Cover		**0.80 (±0.21)**	**0.76**
Total Native Cover		**33.65 (±1.55)**	**32.26**
Introduced Perennial Grasses and Forbs			
Agropyron cristatum	crested wheatgrass	0.71	1.39
Others (n = 3, 0)		< 0.00	——
Total Introduced Perennial Grasses and Forbs		**0.71 (±0.06)**	**1.39**
Introduced Annual and Biennial Grasses and Forbs			
Bromus tectorum	cheatgrass	16.32	17.49
Alyssum desertorum	desert alyssum	1.60	0.26
Salsola tragus	prickly Russian thistle	1.23	0.26
Halogeton glomeratus	saltlover	0.75	1.66
Sisymbrium altissimum	Jim Hill mustard	0.59	3.04
Descurainia sophia	herb sophia	0.08	0.01
Others (n = 6, 1)		0.03	0.03
Total Introduced Annual and Biennial Grasses and Forbs		**20.64 (±4.07)**	**22.75**
Total Introduced Cover		**21.35 (±4.11)**	**24.14**
Total Plant Cover		**55.00 (±5.53)**	**56.40**

Mean height of the sagebrush group was within the upper range of its baseline, while the other shrub group exceeded its respective baseline mean (Table 3-6). Perennial grass and forb groups were within their respective baseline height ranges, while annual grasses were shorter than baseline, and annual forbs were nearly twice as tall as their baseline mean. The proportions of perennial and annual forb groups were nearly equivalent to their representative baseline values. Minor shifts were evident in the perennial grasses group, which contributed less than its baseline proportion of the mean height sample, while the proportion of annual grasses in the sample was greater than baseline.

Sagebrush density in recovering habitat plots exceeded baseline ranges (Table 3-7). Although baseline values are very small, increases in these values serve as important indicators of recovery. Notably, the spread between the minimum and maximum density values across all plots was substantially wider than the baseline spread. Juvenile frequency also exceeded its baseline range, indicating the presence of natural recruitment.

Table 3-6. Vegetation height by functional group for 32 annual recovering habitat plots on the Idaho National Laboratory Site in 2025. Baseline values are summarized by functional groups for height (cm) and were calculated using ten years of data (2013–2022; n = 10). Colors indicate when the 2025 height is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean ($\bar{x}$) for the corresponding plant functional group.

	Baseline		2025	
Functional Group	**Mean Height (cm) ($\bar{x}$ ± SE)**	**Proportion of Sample**	**Mean Height (cm)**	**Proportion of Sample**
Shrubs				
Sagebrush	37.88 (±5.03)	0.08	41.55	0.13
Other Shrubs	26.25 (±1.41)	0.92	**29.43**	0.87
Herbaceous				
Perennial Grasses	27.47 (±1.39)	0.55	27.09	0.45
Perennial Forbs	11.83 (±0.93)	0.06	12.44	0.05
Annual Grasses	16.54 (±0.67)	0.26	**15.45**	0.37
Annual Forbs	12.78(±1.56)	0.13	**23.38**	0.13

Table 3-7. Sagebrush density (individuals/m^2) and juvenile frequency (%) from recovering habitat plots (n = 32) on the Idaho National Laboratory Site in 2025 compared to baseline values. The baseline means ($\bar{x}$) are ± 1 Standard Error (SE) and were calculated using ten years of data (2013–2022; n = 10). Colors indicate when the 2025 density is greater than (green), less than (red), or within (black) the baseline range of ± 1 Standard Error (SE) around the baseline mean ($\bar{x}$).

	Baseline ($\bar{x}$)	**2025**
Density ($\bar{x}$ ± SE)	0.09 (±0.01)	**0.26**
Minimum Density	0.04	0.00
Maximum Density	0.14	2.30
Juvenile Frequency ($\bar{x}$ ± SE)	0.01 (±0.01)	**0.12**

3.1.3.2. Habitat Condition Trend Analysis

Sagebrush Habitat Plots

From 2013–2025, cover trends differed among native functional groups (Figure 3-2) in sagebrush habitat plots. Cover from sagebrush species has trended upward in the last eight years, with 5% greater sagebrush cover in 2025 compared to 2013 (Figure 3-2, Table A-1). Differences in sagebrush cover over the past 13 years were significant ($p < 0.001$), and results of pairwise multiple comparisons indicate that mean cover from 2018–2025 was significantly greater compared to values observed during 2013–2015 ($p = 0.023$, Table A-1). When excluding sagebrush species cover, the remaining cover from the other shrub species was the third most abundant functional group in 2025. Cover from this functional group was significantly lower in 2025 than when monitoring began in 2013 ($p < 0.001$, Table A-1). Cover of native perennial graminoids significantly differed between the highest years and lowest years by nearly an order of magnitude (Table A-1), but there was no directional trend in cover for this functional group

(Figure 3-2). Native perennial forb cover was significantly higher from 2017 to 2019 compared to the lowest mean cover observed in 2014 ($p < 0.001$, Table A-1), and cover in 2025 remained significantly lower than the 2017 peak ($p = 0.05$), indicating it has not recovered to the decadal maximum. The cover from native annuals and biennials was bimodal with a peak in 2017–2018 and another from 2022–2023 (Figure 3-2). Cover from this group was significantly greater in 2017 than in all other years ($p = 0.003$, Table A-1).

Cover values contributed by introduced functional groups have remained low on sagebrush habitat plots throughout the monitoring period (Figure 3-3). Introduced annual grass cover was significantly greater in years with the highest cover values than in years with the lowest cover values ($p < 0.001$, Table A-2), but the years with the highest cover values tended to be in the middle of the sample period (Figure 3-3) and 2025 cover was significantly lower than the 2018 high cover value ($p < 0.001$, Table A-2). Introduced annual forb cover was significantly greater in the four years with the highest cover values than in the years with the lowest cover values ($p < 0.001$, Table A-2), but annual fluctuations do not indicate directional trends (Figure 3-3).

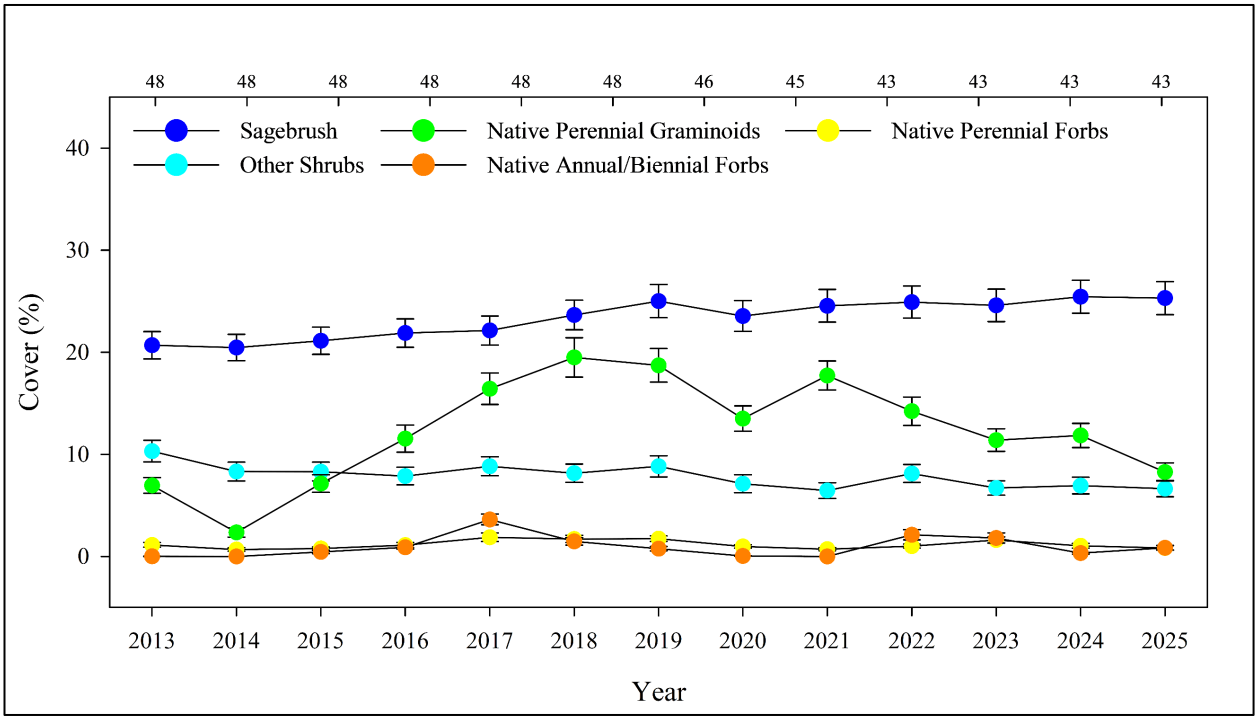

Figure 3-2. Cover from sagebrush habitat plots summarized by native plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover is the absolute mean ($\bar{x}$). Error bars represent ±1 Standard Error (SE). Sample size is denoted along the top at corresponding tick marks.

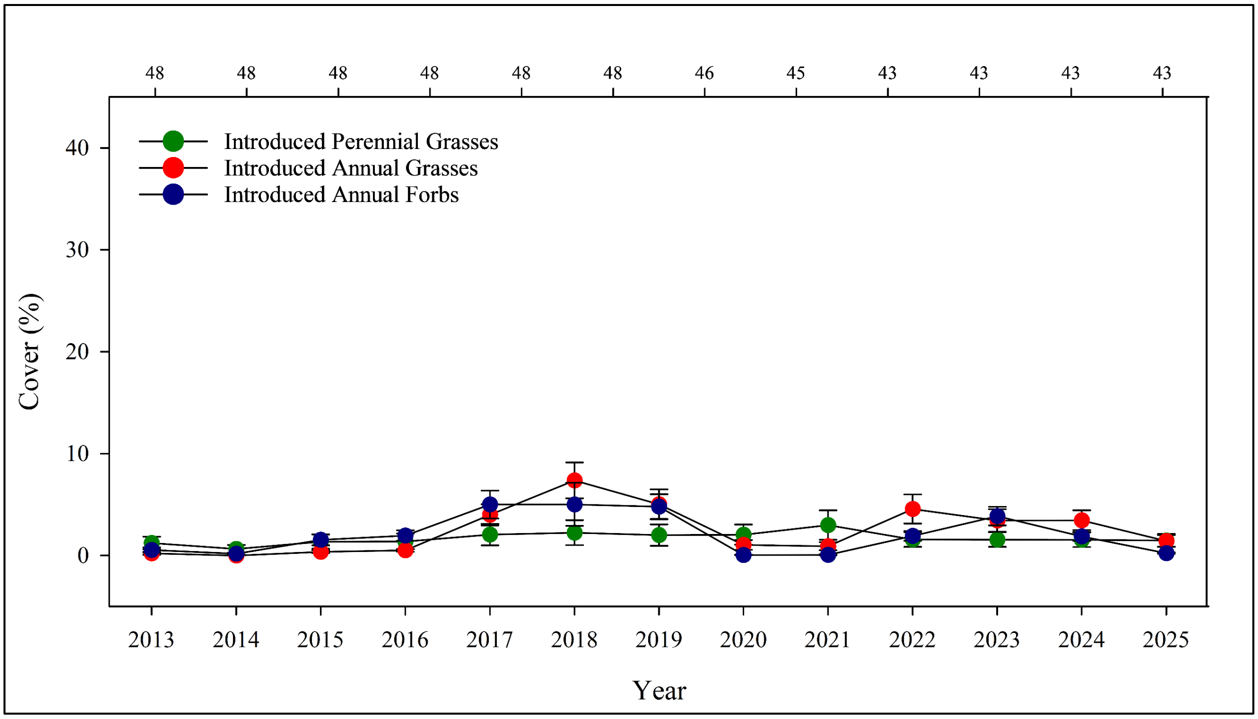

Figure 3-3. Cover from sagebrush habitat plots summarized by introduced plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover is the absolute mean ($\bar{x}$). Error bars represent ±1 Standard Error (SE). Sample size is denoted along the top at corresponding tick marks.

Recovering Habitat Plots

Within the recovering habitat plots, cover from sagebrush species has been increasing since 2013 and was significantly greater in 2025 than in 2013 ($p = 0.007$, Figure 3-4, Table A-3). Cover from native perennial graminoids was significantly lower in 2025 compared to the highest cover value in 2018 ($p = 0.005$, Table A-3). Native perennial graminoids have been the most abundant native functional group throughout the monitoring period, and cover fluctuates from one sample period to the next, but it is not changing directionally (Table A-3). When excluding sagebrush species cover, the remaining cover from the other shrub species have consistently been the second most abundant functional group throughout the monitoring period, and cover has remained relatively stable with no significant differences from one sample period to another ($p = 0.243$, Table A-3). The cover from the native perennial forb functional group has been significantly lower in the last six years when compared to 2013 ($p = 0.009$, Table A-3). Native annual and biennial forb functional group cover was significantly greater in 2022 compared to its lowest cover in 2021 ($p = 0.014$, Table A-3).

Introduced perennial grass cover has remained low and stable throughout the sample period ($p = 0.269$, Table A-4, Figure 3-5). Cover from introduced annual forbs was significantly lower in 2025 compared to the peak in 2023 ($p = 0.045$, Figure 3-5), but annual fluctuations do not appear to be directional. Cover from introduced annual grasses was significantly lower in 2025 than the greatest cover value from 2018 ($p < 0.001$, Table A-4), but do not show a directional trend.

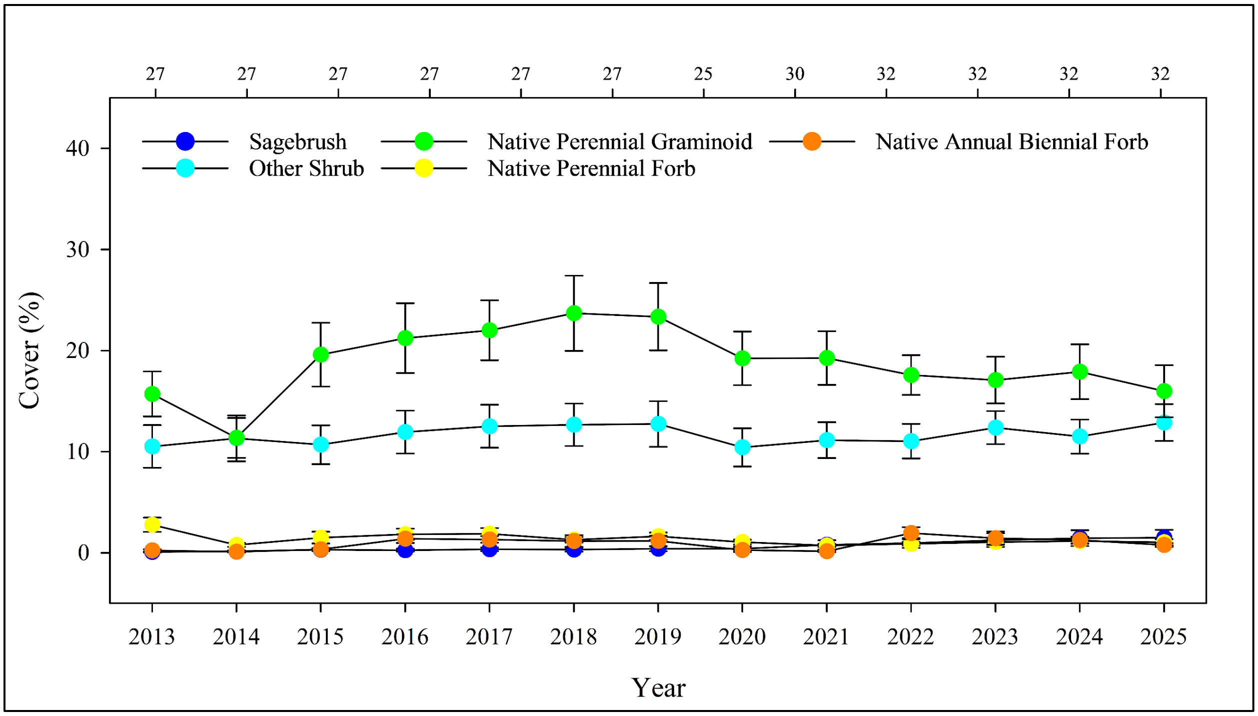

Figure 3-4. Cover from recovering habitat plots summarized by native plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover is the absolute mean (x̄). Error bars represent ± 1 Standard Error (SE). Sample size is denoted along the top at corresponding tick marks.

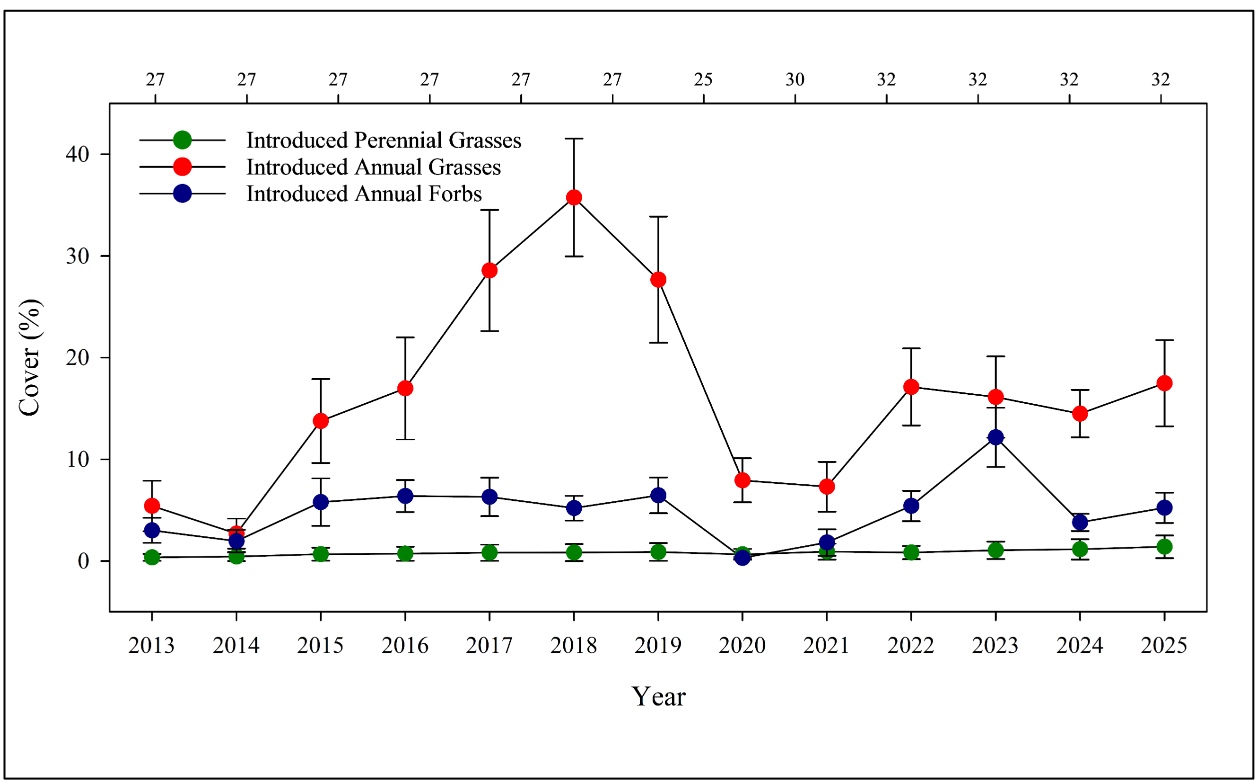

Figure 3-5. Cover from recovering habitat plots summarized by introduced plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover is the absolute mean (x̄). Error bars represent ±1 Standard Error (SE). Sample size is denoted along the top at corresponding tick marks.

3.1.3.3. Precipitation Analysis

The total water-year precipitation (October–September) in 2025 was 135 mm (5.31 in), approximately two-thirds of the 74-year average (Figure 3-6), and seasonal precipitation timing has departed from the long-term seasonal averages over the last decade (Figure 3-7). Precipitation in August, September, and October has been much higher than average several times in the past ten years, and precipitation in June and July has been much lower than average several times in the past ten years. These monthly deviations from the long-term average suggest a shift to less precipitation in the early summer and more precipitation in the late summer and fall months.

During the 2025 water year, the fall season was considerably below average, as October and November received about half of their normal precipitation, while December precipitation was near average but insufficient to bring the fall seasonal total within its normal range. Winter precipitation was also below average overall, despite February receiving nearly twice its typical monthly total. As spring began, below-average precipitation in April and May was followed by a dry spell in June, leaving the landscape drier than normal heading into the typically dry summer season. July received less than half of its normal precipitation, August nearly reached average values, but September tapered off again resulting in precipitation totaling less than 50% of the summer average. Data are from the nearby Central Facilities Area (NOAA Unpublished Data).

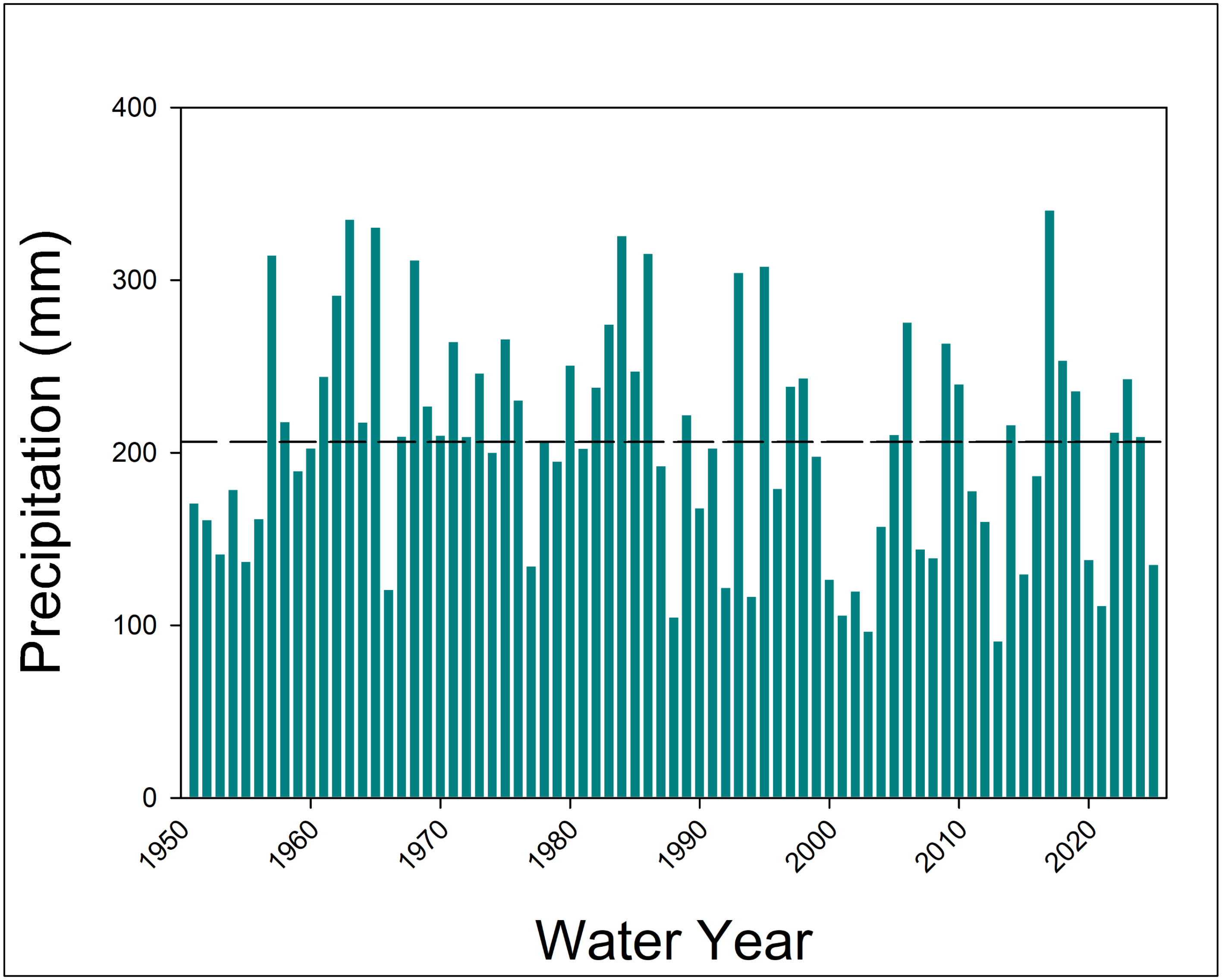

Figure 3-6. Total precipitation by water year (October 1–September 30) from 1951 through 2025 at the Central Facilities Area, Idaho National Laboratory Site. The dashed line represents the mean annual precipitation (206.3 mm).

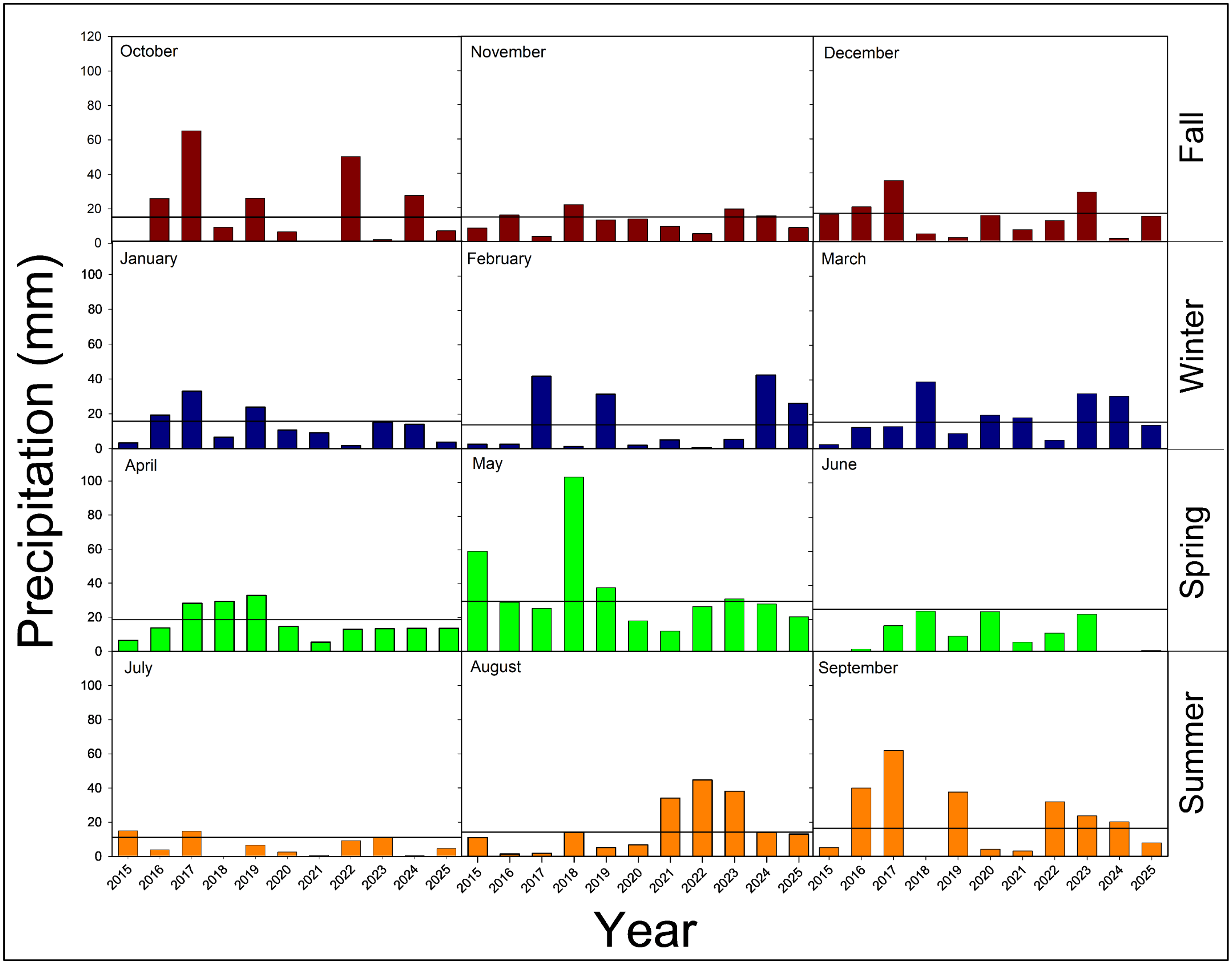

Figure 3-7. Monthly precipitation totals, organized by water year (October 1–September 30), from 2015 to 2025. Means are depicted with a solid line and were calculated from precipitation data collected between 1951 to 2025. Data are from the Central Facilities Area on the Idaho National Laboratory Site and were provided by the National Oceanic and Atmospheric Administration.

3.1.4. Discussion

Structural and compositional shifts in habitat conditions in 2025 were observed across both sagebrush and recovering habitat types, with more apparent changes in recovering habitat than in sagebrush habitat. The most pronounced deviations were in the herbaceous understory, while the shrub canopy exhibited only subtle changes from baseline values. These patterns are consistent with the impacts of low precipitation during critical growth periods, compounded by below-average water-year precipitation (Figure 3-6 and Figure 3-7).

Precipitation is one of the major drivers of change in semi-arid systems (Anderson and Inouye 2001) and because spring is historically the wettest season and marks the peak growing season on the INL Site (Anderson et al. 1996), the 2025 spring dry period (Abatzoglou et al. in press; Idaho Department of Water Resources 2025) likely had an impact on vegetation cover and height. If excessively dry periods had occurred outside of the peak growing season, the lack of precipitation would likely not have as great an impact on vegetation abundance and composition in 2025. Sagebrush habitat plot results indicated less plant cover, reduced species richness, shorter vertical structure, and height measurement proportions for herbaceous functional groups that deviated from baseline proportions. The primary losses in cover were attributed to lower native graminoid abundance because this functional group tends to be more responsive to shifts in precipitation than woody species, like shrubs. However, native perennial graminoids have demonstrated a robust capacity to recover from record breaking droughts as seen in multi-year increases in cover after the 2011–2013 low (Figure 3-2). The reduction in species richness was marked by considerably fewer perennial and annual wildflower species which contributed to overall less plant cover. These patterns are consistent with annual and perennial functional group responses to changes in precipitation timing and amount during peak spring growth (Williams et al. 2025).

Native herbaceous species play critical roles in maintaining habitat function by diversifying resource availability, stabilizing soils, and inhibiting the dominance of introduced species such as cheatgrass. Sagebrush habitats are overwhelmingly composed of native species, which supports observations that overall habitat condition responses demonstrate an adaptive capacity to withstand precipitation variability. The reduced cover and structurally diminutive herbaceous species suggest that habitats are responding to stress. Rather than indicating ecological degradation, this pattern reflects an adaptive strategy that healthy ecosystems respond by minimizing growth during unfavorable conditions, at least in the short-term.

Sagebrush density evaluations within the annual habitat condition assessment suggested structural changes within the shrub layer in sagebrush habitats. These changes were indicated by the larger variability of sagebrush density across plots. While the mean sagebrush density in 2025 remained within the baseline range, the spread between minimum and maximum density values was larger than baseline range of values. The larger variability in the range of values for 2025 indicates that some sagebrush stands are more susceptible to environmental stress than others. However, higher-than-baseline juvenile sagebrush frequency provides evidence that seedlings are successfully establishing after recruitment events and that current sagebrush stand density values are sufficient to support ongoing stand regeneration.

Recovering habitats lacked the stabilizing influence of sagebrush species and exhibited highly variable cover, height, and sagebrush density responses compared to sagebrush habitats. These habitats represent a complex mosaic of recovery stages, where functional group composition and vegetation structure are still in flux. Native perennial graminoids and introduced annual grasses, represented entirely by cheatgrass – a species linked to habitat degradation – are the most abundant herbaceous functional groups. From 2024 to 2025, native perennial graminoid cover decreased, while cheatgrass cover increased. The proportion of height measurements from the herbaceous functional groups also shifted in favor of annual grasses over perennial grasses in 2025.

While recent results remain a concern in recovering habitats, it is important to consider cheatgrass abundance in the broader context. Cheatgrass does not yet dominate large expanses of the INL Site (Shive et al. 2019, Shive 2024). Trend analyses indicate that recovering habitats are more susceptible to annual compositional shifts in plant functional group abundance with nearly all groups exhibiting greater variability – most notably the nondirectional trends in cheatgrass abundance, particularly in response to climatic stressors (Figure 3-5). While cheatgrass was a substantial component of the recovering plant community in 2025, it can fluctuate dramatically from one year to the next and may be a less abundant component of recovering habitat in other years (Figure 3-4, Figure 3-5). This variability highlights the elevated risk of cheatgrass dominance in plant communities recovering from wildfire. Yet, native functional groups have established strong footholds despite competitive and environmental pressures, indicating that post-fire plant communities retain the capacity to recover. Continued monitoring of habitat conditions is important to detect changes in cheatgrass abundance and to inform conservation strategies aimed at reducing invasive species and promoting native plants to maintain the ecological integrity of these habitats (Boyd et al. 2024).

The abundance of sagebrush species is low within recovering habitats, but their cover, height, and density were substantially greater than baseline ranges in 2025 (Table 3-1). Sagebrush abundance has been trending upward as cover has generally increased since this monitoring effort began in 2013, and cover in 2024 and 2025 was significantly greater than that of the first year (Table A-3). Increases in sagebrush abundance is an important early sign of habitat recovery. However, these improvements in sagebrush conditions are not high enough to provide optimal habitat for sage-grouse as they are still considerably below general habitat guidelines (Connelly et al. 2000).

Overall, both habitat types exhibited signs of ecological stress in 2025. The continued dominance of native species in the herbaceous plant functional groups suggests that the integrity of sagebrush habitat remains intact, even under annual climatic variability because native plant communities are well-adapted to natural stressors associated with semi-arid climates. Recovering habitats, while more dynamic and variable, continue to reflect the challenges of reestablishing native dominance in the face of annual grass competition and shifting seasonal weather pattern pressures.

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

3.2.1. Introduction

Loss of sagebrush-dominated habitat has been identified as one of the primary causes of decline in sage-grouse populations (Idaho Sage-grouse Advisory Committee 2006, USFWS 2013, Doherty et al. 2022). Direct loss of sagebrush habitat on the INL Site has occurred through several mechanisms including wildland fire and infrastructure development. We expect the total area and extent of sagebrush habitat to change following wildland fires, as new facilities are developed on the INL Site, and as lands recover naturally or are restored. Changes in land cover can be determined using airborne or satellite imagery that is readily available at little or no cost. Battelle Energy Alliance Natural Resources Group geographic information system (GIS) analysts routinely compare new imagery as it becomes available with results from the most current vegetation classification and mapping project. Ground-based point surveys and changes in plant species cover and composition documented through Task 5 (Section 3.1) are also used to provide spatial information to assist with periodic map updates needed to monitor the habitat trigger in the CCA.

A 20% loss of sagebrush habitat from the 2013 baseline has been identified as a habitat trigger in the CCA (DOE-ID and USFWS 2014). The purpose of Task 6 is to maintain and update regions of the INL Site vegetation map to accurately document changes in sagebrush habitat area and distribution. This task documents changes in sagebrush habitat following losses due to wildland fire or other disturbances that remove or significantly alter vegetation across the landscape. In addition to documenting losses of sagebrush habitat, this monitoring task is also used to map the addition of sagebrush habitat when sagebrush cover increases within a mapped polygon and warrants a new vegetation map class designation, or to refine existing vegetation map class boundaries when changes in species cover and composition are documented through Task 5. Lastly, this task supports post-fire mapping and allows for modifying existing wildland fire boundaries and unburned patches of vegetation to more accurately reflect post-fire sagebrush distribution.

3.2.2. Methods

Documentation of current sagebrush habitat area and distribution on the INL Site results from updates to the vegetation map following a standardized process. The process of maintaining the INL Site vegetation map following wildland fire involves two steps. The first step is to verify, update, or edit existing wildland fire boundaries using a GIS and remote sensing imagery. Wildland fire boundaries are produced by different contractors or agencies (e.g., Bureau of Land Management [BLM]) using a variety of methods such as collecting Global Positioning System data on the ground or via helicopter, or through manual delineations using digital imagery. The quality and accuracy of wildland fire boundaries can vary considerably depending on the method used to delineate the burned area extent. Prior to delineating new vegetation class boundaries within the burned area, the mapped fire boundaries first need to be generated at similar mapping scales as the original vegetation map to maintain consistency in the dataset.

The second step requires an adequate number of growing seasons for vegetation communities to reestablish before recently burned areas are updated with new, remapped vegetation class polygons representative of the recovering post-fire classes. New wildland fires are sampled to identify the vegetation classes present across the burned area. It can be difficult to assess which vegetation classes establish immediately after a fire, especially during drought years. Identifying and delineating post-fire communities occurs after two growing seasons, and possibly longer if the years following fire were excessively dry and delayed normal reestablishment of vegetation communities. Field surveys also commence when a map polygon or burned area begins to show signs (i.e., via habitat condition monitoring data) that the current vegetation class has changed to another class and warrants reassignment. When it becomes available, either through the National Agriculture Imagery Program (NAIP) or from INL Site specific acquisitions, high resolution imagery is used as the source data layer to delineate new vegetation class boundaries within recent wildland fire boundaries.

The mapped wildland fire boundaries are used to directly calculate losses in sagebrush habitat. ArcGIS geoprocessing tools are used to clip and remove areas mapped as sagebrush habitat that have recently burned. In addition to documenting losses from wildland fire, any loss of sagebrush habitat from infrastructure expansion is also included in the summary of total sagebrush habitat removed.

3.2.3. Results

There were no wildland fires that burned on the INL Site in 2025, and there was no work performed on the Infrastructure Expansion task in 2025 to document sagebrush habitat loss. Therefore, the total area of sagebrush habitat in the SGCA on the INL Site remains unchanged from 2024 with 71,322.2 ha (176,240.9 ac; Figure 3-8). 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 outside the SGCA also remains unchanged with 28,056.7 ha (69,329.6 ac).

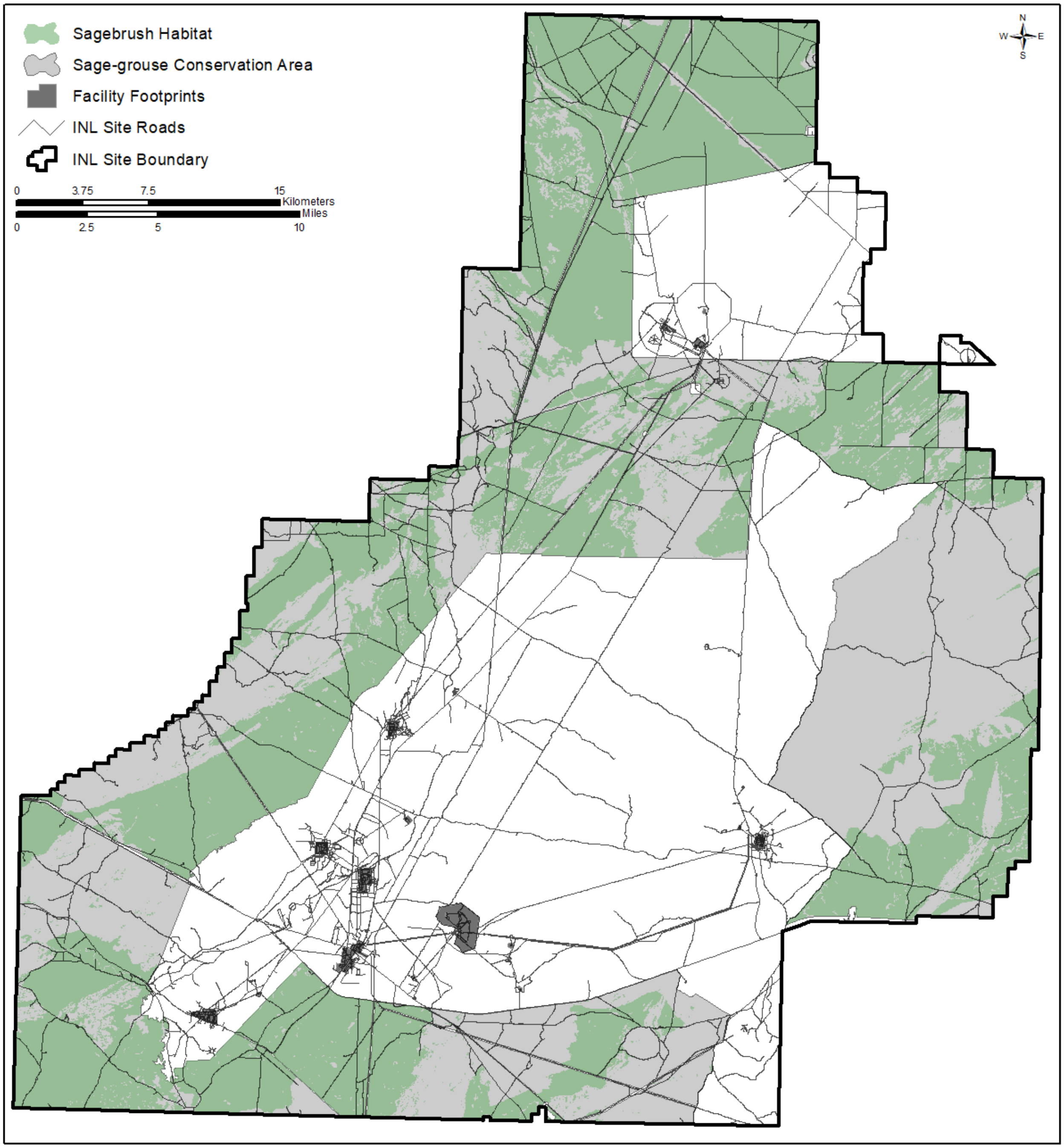

Figure 3-8. Current sagebrush habitat distribution within the Sage-grouse Conservation Area on the Idaho National Laboratory Site.

4. Threat Monitoring

The CCA identified and rated eight threats that potentially impact sage-grouse and its habitat on the INL Site (ratings updated in Shurtliff et al. 2019). Most are addressed by Conservation Measures DOE-ID has implemented or continues to implement (see Section 5.0). Others, including raven predation, infrastructure development, wildland fire, livestock, and annual grasslands, have been or are currently monitored regularly to inform DOE-ID of changing conditions and to allow evaluation of results after mitigation or other treatments are applied.

Section 4 summarizes results of threats that are regularly monitored and provides updates on actions taken by DOE-ID and its contractors to reduce threats. Raven predation and infrastructure development are addressed in Sections 4.1 and 4.2. The condition of habitat affected by wildland fires and livestock grazing are evaluated in Section 4.3. Although annual grasslands are recognized as a medium-level threat to sage-grouse on the INL Site, cheatgrass control is currently being addressed as a component of post-fire restoration by the INL Wildland Fire Management Committee (WFMC). Continued monitoring of the abundance of cheatgrass (Section 3.1) through CCA habitat condition monitoring is necessary to continue to understand the abundance of cheatgrass in areas that have not recently burned.

4.1. Task 4—Address Raven Predation

4.1.1. Introduction

Common ravens (*Corvus corax*; hereafter, ravens) are effective nest predators of sage-grouse (Coates et al. 2008, Coates and Delehanty 2010, Lockyer et al. 2013). Raven predation is considered a medium-ranked threat to sage-grouse on the INL Site because raven abundance has been linked to declines in sage-grouse lek count trends (Peebles et al. 2017) and nest survival (Gibson et al. 2018, Kohl et al. 2019, Coates et al. 2020, Owens et al. In Review). Due to concentrated foraging around nests, breeding ravens likely have a larger impact on nest survival of sensitive species like sage-grouse than non-breeding or transient individuals (Brussee and Coates 2018, Sanchez et al. 2021). Therefore, the management of raven nests is a possible tool for conserving local sage-grouse populations.

Ravens nest on multiple anthropogenic structures on the INL Site including buildings, equipment, and power infrastructure (Coates et al. 2014, Howe et al. 2014, Williams et al. 2025, Shurtliff and Whiting 2021). Nests on buildings and infrastructure may be removed during the breeding season when they pose health or safety risks as permitted by the Migratory Bird Treaty Act. Nests may also be removed after the conclusion of breeding season to deter future nesting attempts. To prevent nesting on power poles, three types of nest deterrent devices are used on the INL Site – inverted 'V' structures that are placed along the double crossarms of distribution line poles (Figure 4-1 [A]), a pyramid cap which is placed on the top of the pole when crossarms are not available (Figure 4-1 [B]), or replacing double crossarms of transmission or distribution line poles with a single crossarm made of either wood or fiberglass (Figure 4-1 [C]). Retrofitting of existing power infrastructure is directed by INL Power Management and generally occurs when maintenance is required for specific poles. Approximately 32% of transmission structures (n = 282) do not support nesting because they are either a single vertical structure (Figure 4-1 [D]) or are a multipole structure that lacks crossarms.

4.1.2. Raven Nest Monitoring

Nest monitoring is the only way to track trends in the breeding population of ravens on the INL Site. As power poles are retrofitted with nest deterrents it is important to track whether the breeding population is stable, increasing, or decreasing. Furthermore, it is imperative to track whether the spatial pattern of raven nesting is changing. Since retrofitting of power poles occurs only when maintenance is required, and because INL does not own all distribution and transmission lines on site, ravens may move nest sites to poles that are not retrofitted in areas closer to sage-grouse leks. This movement could increase predation on sage-grouse nests in the short-term until poles are retrofitted.

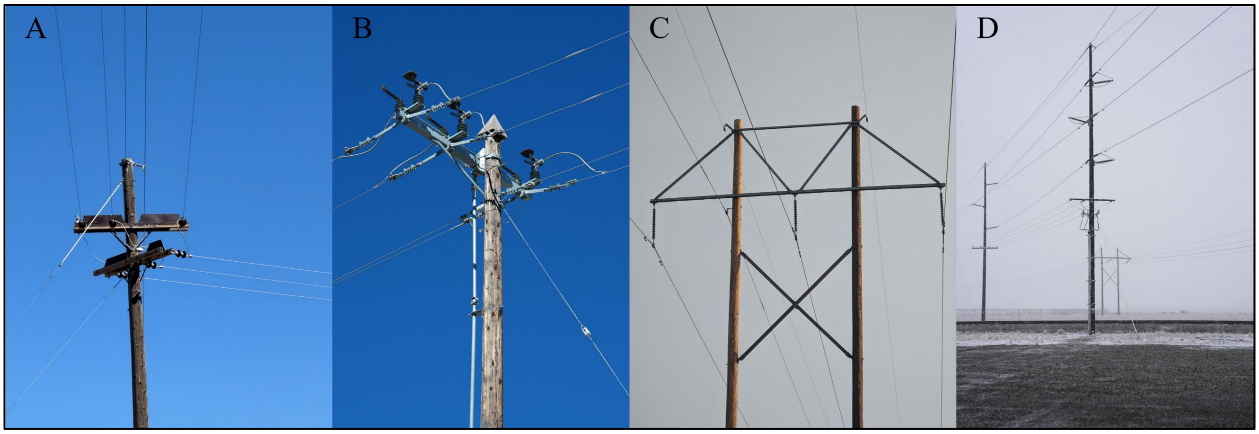

Figure 4-1. Nest deterrents used on power infrastructure maintained by Idaho National Laboratory Power Management located on the Idaho National Laboratory Site including inverted ‘V’ structures (A) and pyramid caps (B) on distribution poles, single crossarms on H-frame transmission structures (C) and vertical transmission structures that do not support nesting (D).

We resumed raven nest monitoring on all infrastructure present on the INL Site in 2025. Buildings and other infrastructure present at INL facilities (except RWMC and the Idaho Nuclear Technical and Engineering Center), all towers, and all powerlines were inspected on May 6–7, 2025, to correspond with both raven and sage-grouse nesting seasons. Naval Reactors Facility and Specific Manufacturing Capability facility were not inspected during these surveys but Environmental Personnel for each facility were contacted to determine if any nests were present. Surveys began no earlier than 30 minutes after sunrise and ended no later than 30 minutes before sunset. Surveys were completed when there was no precipitation and low wind speeds (< 25 mph) to ensure higher detection of active nests. Surveys at nest structures lasted no longer than 30 minutes but were concluded earlier if nest status was determined. Incidental detections of raven nests not found during the initial survey effort were recorded through the end of June.

A total of 41 active raven nests were recorded, 40 during the initial survey effort, and one additional nest was found on May 28, 2025. Of these, 19 nests were found on INL-owned power infrastructure, 17 on power infrastructure not owned by INL, and one each at the Advanced Test Reactor, the Materials and Fuels Complex, the Transient Reactor Test Facility, Gate 1, and the North Tower on Highway 20 (Figure 4-2). The total number of raven nests found during sage-grouse nesting season in 2025 fell within the range (29–44) reported for the eight years of surveys completed from 2014–2021 (INL 2023). This indicates that the number of breeding ravens using infrastructure on the INL Site likely has not increased during the interim period between monitoring efforts. Additionally, observers noted that most of the distribution powerlines, both INL-owned and non-INL owned, are structures that do not support raven nesting (single poles with no crossarms or only a single crossarm). No nests were found on retrofitted power infrastructure. Raven nest monitoring will be completed again within the next five years.

4.1.3. Activities to Reduce or Deter Raven Nesting

4.1.3.1. Retrofits of Electrical Power Transmission Lines

H-frame transmission structures are comprised of 2–3 poles which are individually tracked by INL Power Management. In FY25, two H-frame transmission structures were retrofitted with single crossarms that prevent future nesting. The total number of H-frame transmission structures now retrofitted on the INL Site is 68. The number of structures varies annually on the INL Site as they are removed from or added to the landscape.

4.1.3.2. Removal of Raven Nests and Installation of Exclosures

A raven nest in the SW1 building was removed on June 3, 2025, at the Naval Reactors Facility as part of scheduled demolition activities. A raven nest was removed from the shelter structure at CFA Gate 1 in early April prior to egg-laying. However, the ravens were able to rebuild this nest and lay eggs before netting could be installed. This nest was removed again, on July 7, 2025, after all chicks had fledged and the nest was no longer active.

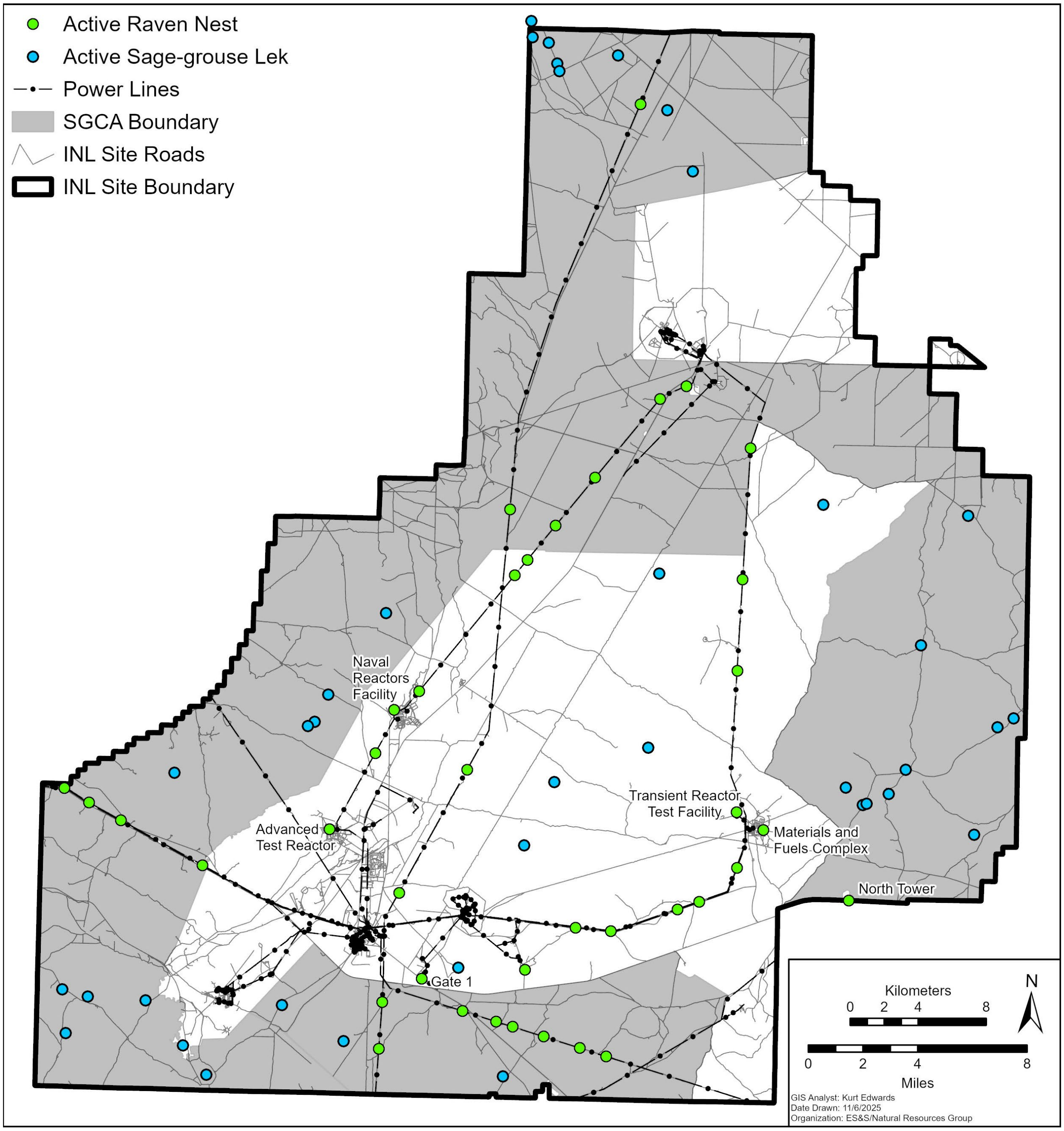

Figure 4-2. Locations of active greater sage-grouse (*Centrocercus urophasianus*) leks and active common raven (*Corvus corax*) nests found on infrastructure on the Idaho National Laboratory Site in May 2025.

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

4.2.1. Introduction

Infrastructure development is a medium-ranked threat to sage-grouse on the INL Site (DOE-ID and USFWS 2014). The expansion of infrastructure footprint leads to habitat fragmentation, and construction of new infrastructure nearly always disturbs soil. If proper controls are not in place, soil disturbance can facilitate the introduction and spread of invasive weeds, which in turn can increase the risk of wildland fire. Weeds may also replace native plants and reduce plant diversity in localized areas, which negatively impacts habitat condition.

Prior to the start of an INL Site construction project that may affect undeveloped land, a National Environmental Policy Act (NEPA) analysis is conducted on the proposed footprint of the project. NEPA approved projects that remove sagebrush habitat can offset long-term impacts through the implementation of Best Management Practices and compensatory mitigation, however short-term losses are likely. Evidence from remotely sensed images of the INL Site suggests that sometimes infrastructure footprints expand beyond what was originally reviewed during the NEPA process. Thus, there is a possibility that an unplanned impact to sagebrush habitat and other native plant communities could occur following infrastructure development. Occasionally, soil stabilization or revegetation efforts following the completion of a construction project fails to meet its objectives. If no overarching plan for soil stabilization or revegetation is developed and successfully completed, infrastructure footprints may continue to slowly expand, without new structures and disturbances being considered as new or additional scope.

Inappropriate vehicle use associated with trespass and livestock grazing management can also cause habitat degradation in localized areas. Remote sensing imagery shows that the number of linear features (e.g., two-track roads) on the INL Site, especially within grazing allotments, continues to increase since the establishment of baseline condition for this monitoring task (unpublished data; Shurtliff et al. 2020). It is likely that many of these two-tracks were established by grazing allotment permittees to strategically distribute water troughs and mineral salt stations, create shortcuts between roads, and avoid areas with deep ruts that might be impassable during wet conditions. Once a new two-track appears, other drivers may follow it, further establishing a new unauthorized road. Although many named two-track roads are marked with small signs on the INL Site, no official road map has been developed to unambiguously identify authorized roads.

The primary goal of this task is to update sagebrush habitat distribution (see Section 3.2) by identifying where expansion of infrastructure has removed sagebrush habitat within the SGCA and other areas of existing sagebrush habitat. For example, there have been approved expansions at facilities (e.g., Materials and Fuels Complex [MFC] Relocatable Storage Unit Area) that were not present when the previous INL Site vegetation map was published (Shive et al. 2019). Changes in sagebrush habitat distribution are generated from the vegetation map, and areas like these were originally mapped as sagebrush habitat, which is not reflective of current ground conditions and needs to be updated periodically. Updates like these represent losses that have been evaluated through the NEPA process and mitigated using Best Management Practices.

An important secondary goal of Task 8 is to continually monitor the increase in linear features (e.g., two-tracks) across the INL Site landscape, specifically within sagebrush habitat and the SGCA. New linear features can provide vehicle access to formerly undisturbed areas. Vehicle use can serve as a vector for non-native species and can also result in direct disturbance to sagebrush habitat by damaging or removing sagebrush. When numerous two-tracks begin to appear in areas previously void of road access, it can serve as an early indication that further habitat degradation is possible.

Although the effects of wildland fire on sagebrush habitat are reported in Section 3.2, the linear features created from fire suppression are documented under this monitoring task. On June 26, 2024, the Dry Channel Fire started east of State Highway 22 from a reported lightning strike. A water tender and BLM resources were used to aid in suppression while INL dozers bladed a containment line around the perimeter of the fire.

The Dry Channel Fire resulted in a patchy burn across the fire footprint with numerous unburned patches of vegetation left following the fire. The total mapped burned area was 46 ha (113.7 ac) and there was a smaller area outside the fire where 708 m2 (0.2 ac) of vegetation was bladed and removed. The results associated with sagebrush habitat losses were presented in last year's annual report (Williams et al. 2025). There were many two-tracks created during suppression and post-suppression activities, but due to the late timing of drone imagery acquisition, mapping all the two-track features was not completed until 2025. Only the Dry Channel Fire two-track mapping results are reported this year, and the next comprehensive evaluation of infrastructure expansion will be conducted in 2026 on the routine two-year reporting cycle.

4.2.2. Methods

On November 6, 2024, high resolution imagery was collected via drone across the area impacted by the Dry Channel Fire. The drone was a Quantum Systems Trinity F90+ eVTOL fixed-wing mapping platform. The onboard sensor was a Sony RX1 RII 42-megapixel RBG digital camera. The spatial resolution of the imagery was 1.7 cm (0.67 in) and all individual tiles were mosaicked into a single image dataset and orthorectified using Pix4D Mapper software version 4.6.4.

The drone imagery served as the basemap dataset used to delineate two-track linear features associated with the Dry Channel Fire. Because Idaho NAIP sitewide imagery will not be available until 2026, this mapping effort was only to document the Dry Channel Fire and not assess new linear features elsewhere on Site. Given the high spatial resolution of the drone imagery and amount of clear detail captured, two-track features were manually digitized at 1:500 scale in a GIS which is a finer scale than is typically used for this task.

4.2.3. Results

A total of 56.5 km (35.1 mi) of new two-tracks were created inside the burned area and outside the fire perimeter as access points (Figure 4-3). There were numerous places where two-tracks were observed and mapped directly adjacent and overlapping other newly established two-tracks (Figure 4-4). This scenario was also observed outside the burned area where new two-tracks used to access the containment line or fire interior were mapped throughout unburned sagebrush habitat. New two-tracks were also mapped going through unburned patches of intact sagebrush habitat within the burned area.

4.2.4. Discussion

The cumulative linear distance and density of new two-tracks associated with the Dry Channel Fire exceeds what is normally observed and mapped following a wildland fire on Site. The distance along the longest axis from top to bottom of the Dry Channel Fire is approximately 2 km (1.2 mi), which highlights the need to evaluate the necessity of establishing 56.5 km (35.1 mi) of new two-tracks for fire suppression and post-fire mop-up activities, many of which could be minimized by consolidating single access pathways.

The drone imagery has substantially higher spatial resolution than the typical image datasets used for post-fire mapping (i.e., 1.7 cm pixels compared to 0.6 m pixels). There is a possibility that due to the increased resolution, many more two-tracks are visible in the drone imagery. If some of the observed two-tracks are no longer detectable in the 2025 Idaho NAIP imagery, it would suggest this amount of two-track creation following a wildland fire event was overestimated.

There were numerous examples where unburned and intact sagebrush habitat patches were driven through, presumably during mop-up activities. This creates disturbance to habitat that otherwise was not affected by the fire and could have been avoided by driving around those undisturbed patches. Driving through unburned patches increases the chances of non-native weed establishment and habitat degradation.

It will be important to monitor some of the new access roads created to ensure there has not been continued use following the fire. With new two-tracks branching from State Highway 22 or bisecting established T-roads, there is a chance some may be mistaken for established roads. If evidence of continues use is documented, there may be a need to sign or barricade access points to deter further use and allow for natural recovery.

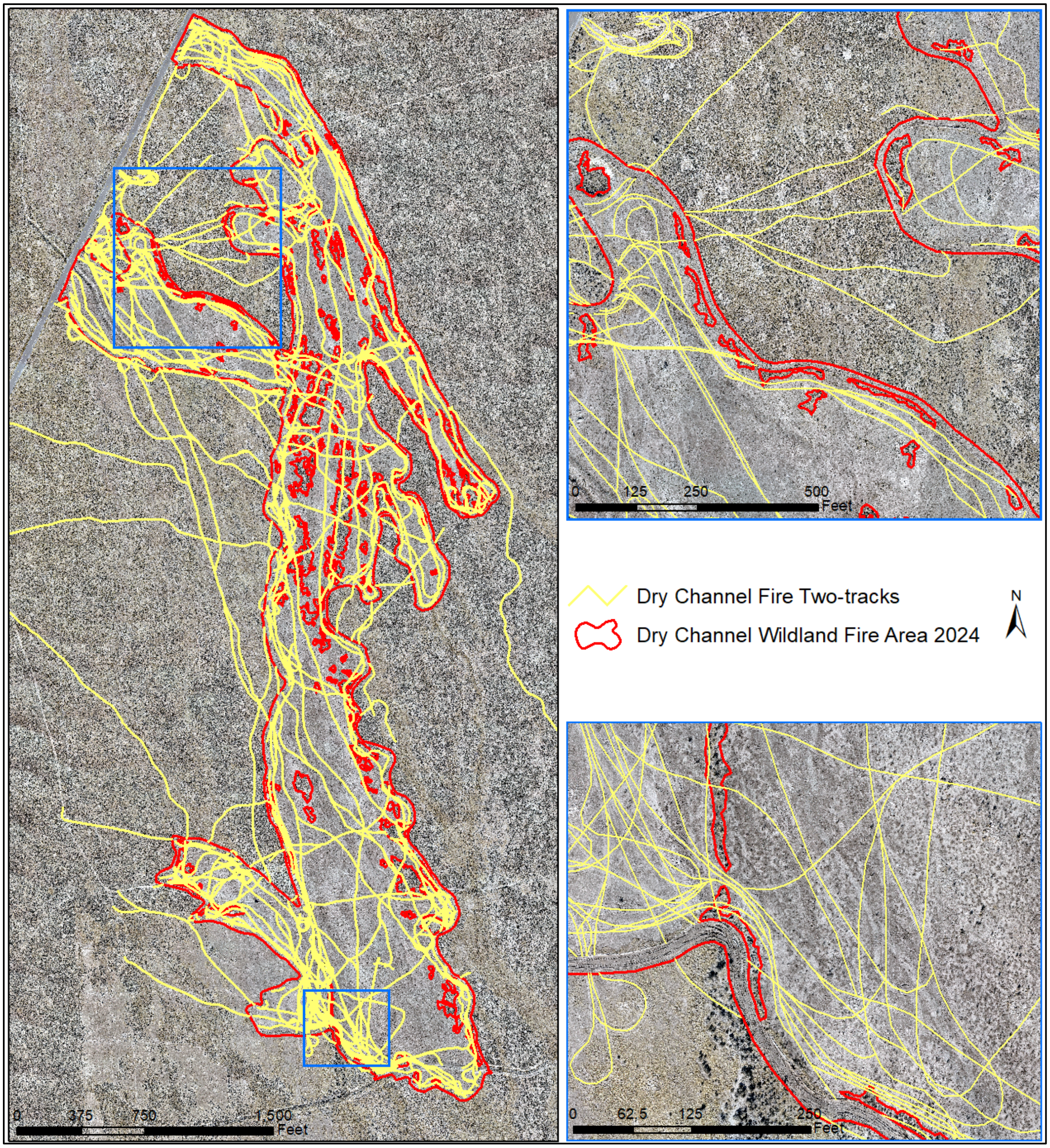

Figure 4-3. Mapped two-track features associated with the 2024 Dry Channel Fire suppression and post-suppression mop-up activities on the Idaho National Laboratory Site. The two inset boxes are shown at finer scales to show additional mapping details.

Figure 4-4. Example of two-track density and overlapping routes within a portion of the 2024 Dry Channel Fire on the Idaho National Laboratory Site. A bladed containment line is visible across the bottom of the image.

4.3. Task 5—Assessment of Potential Threats to Sagebrush Habitat

4.3.1. Introduction

Wildland fire is ranked as a high-level threat and livestock operations is ranked as a low-level threat to sage-grouse and their habitat on the INL Site (DOE-ID and USFWS 2014). The primary goal of this task is to assess habitat condition with respect to the potential threats of wildland fire and livestock operations on habitat at the INL Site. Vegetation abundance is compared among fire footprints, grazing allotments, and areas where both disturbances have occurred. The analysis uses vegetation monitoring plot data from 75 annual and 150 rotational plots and is conducted over a five-year cycle. Vegetation monitoring plots are distributed such that the number of plots in each burned area, allotment, or combination thereof are roughly proportional to the amount of area they occupy (Figure 4-5, Figure 4-6). Data are binned into their respective sample period and differentiated by their habitat status for the analyses.

4.3.2. Methods

In 2013, we established 225 permanent habitat condition monitoring plots across the INL Site and allocated them into groups that are sampled on either an annual or a rotational basis. There are 75 annual plots and an additional 150 rotational plots. The rotational plots are subdivided into three subsets of 50 plots, and each set of 50 plots is sampled per year over a three-year sample period. Sample period one for rotational plots occurred from 2013–2015 and data collected from the annual plots in 2015 were also included in the first set of analyses. Sample period two for rotational plots occurred from 2018–2020 and analyses from this second period also include data from the annual plots collected in 2020. Further sample periods will continue to follow this pattern. A complete description of our sample site selection and our plot sampling methodology can be found in the study plan and sample protocol for our monitoring project in Appendix B within Shurtliff et al. (2016).

We use these data to address progress toward habitat recovery in specific burned areas and the potential effects of livestock operations on habitat condition in burned and unburned areas. Cover is summarized by vegetation functional groups (e.g., shrubs, perennial grasses, introduced forbs, etc.). Comparisons are made among plots potentially affected by fire and/or livestock through time using those functional group abundance values. We compare burned habitat with unburned habitat over multiple sample periods using Two-way Repeated Measure of Analysis of Variance (One Factor Repetition) and Holm-Šidák (Šidák 1967) tests for all pairwise comparisons. The same statistical approach is used to compare functional groups within allotments and ungrazed areas outside of allotments.

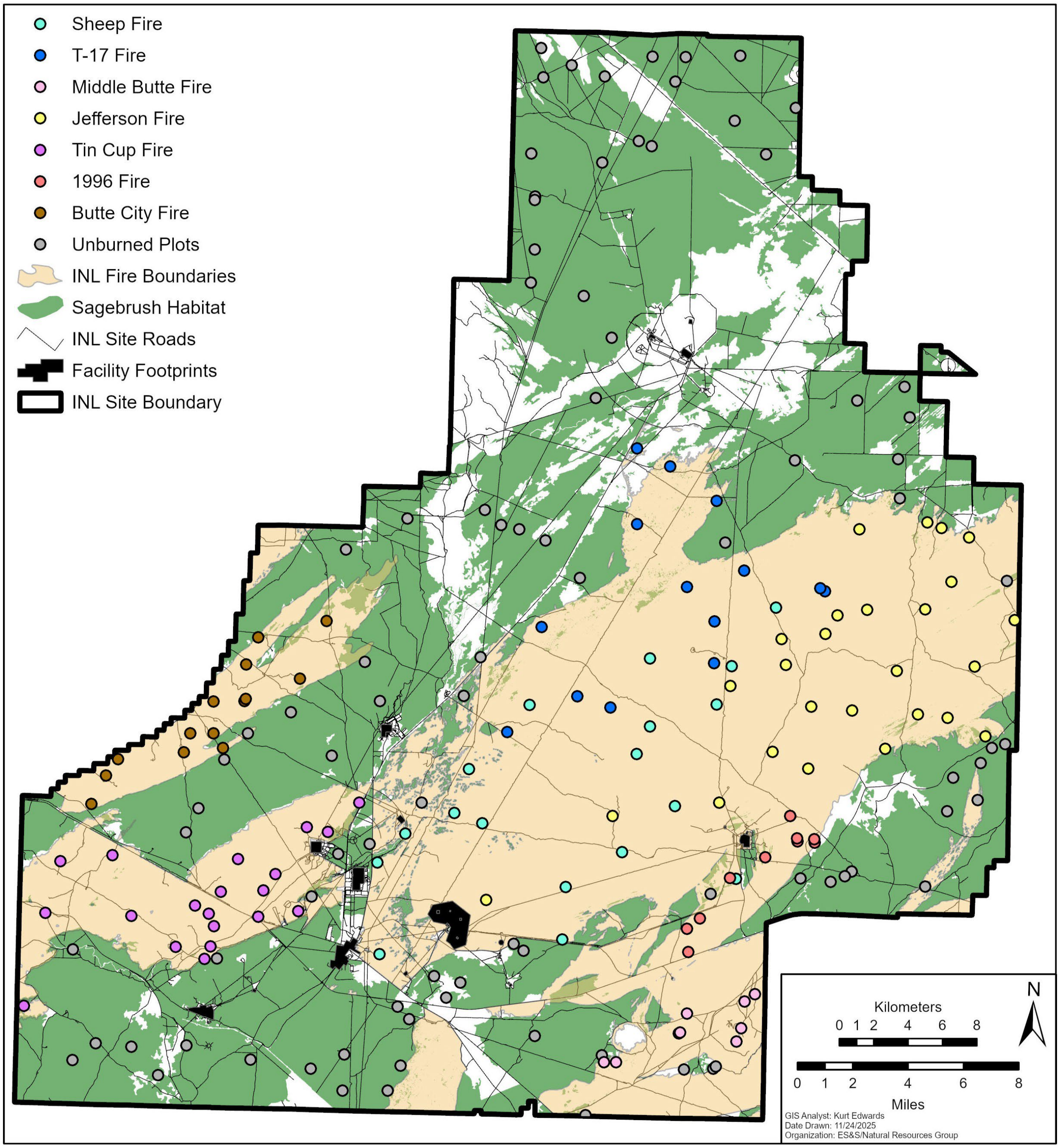

Figure 4-5. Distribution of sage-grouse habitat condition monitoring plots sampled on the Idaho National Laboratory Site with respect to areas burned since 1994.

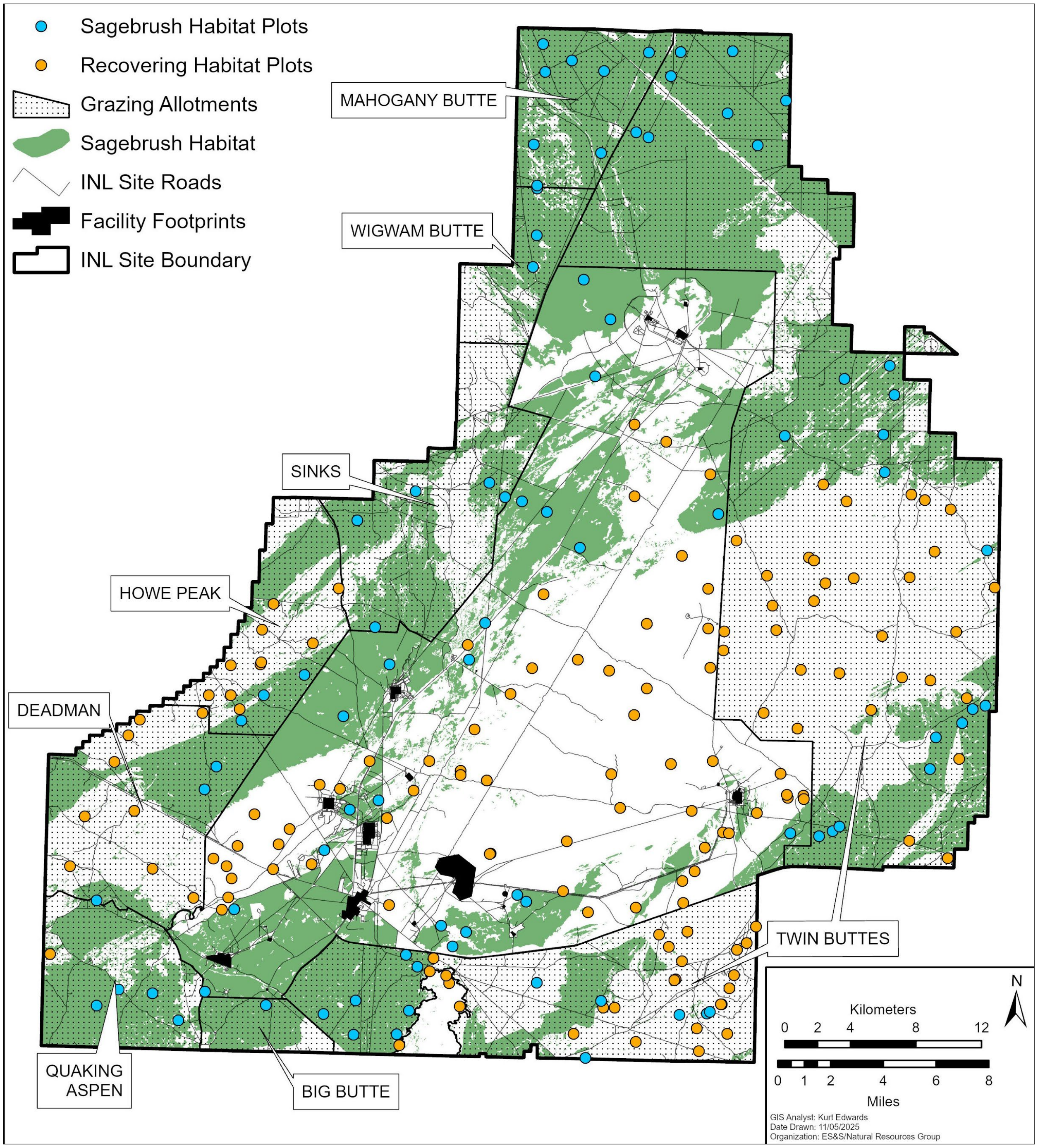

Figure 4-6. Distribution of sage-grouse habitat condition monitoring plots sampled on the Idaho National Laboratory Site with respect to boundaries of grazing allotments administered by the Bureau of Land Management.

4.3.3. Results and Discussion

To support this task, 50 rotational plots were sampled in 2025 (Figure 4-7). Once the vegetation monitoring data is completed for the third sample period from 2023 to 2025, we will conduct the assessment on potential threats to habitat condition and those results will be presented in 2027 (Table 4-1).

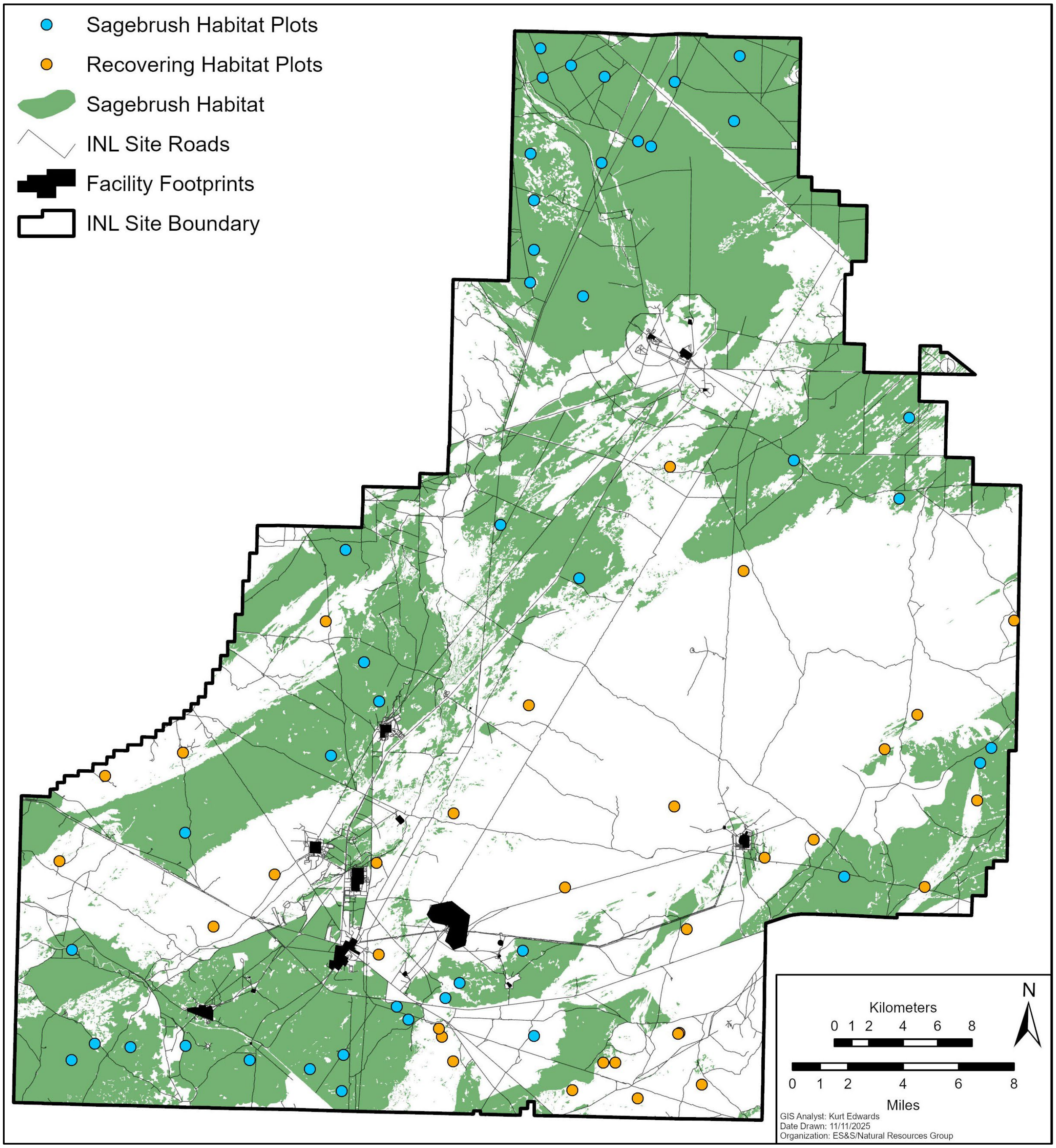

Figure 4-7. The 50 habitat condition monitoring plots sampled on the Idaho National Laboratory Site in 2025 to support the Candidate Conservation Agreement in relation to potential threats to habitats important to Greater Sage-grouse.

Table 4-1. Schedule for assessment of potential threats to habitat condition monitoring, vegetation sampling, and reporting results for the third and fourth (‡) sample period at the Idaho National Laboratory Site.

Year	Vegetation Sampling Efforts	Reporting Efforts
2025	Annual + Rotational Set III	Sagebrush Habitat Condition Trends
2026	Annual	Sagebrush Habitat Condition Trends
2027	Annual	Sagebrush Habitat Condition Trends and Assessment of Potential Threats to Habitat
2028‡	Annual + Rotational Set I	Sagebrush Habitat Condition Trends
2029‡	Annual + Rotational Set II	Sagebrush Habitat Condition Trends
2030‡	Annual + Rotational Set III	Sagebrush Habitat Condition Trends

5. Implementation of Conservation Measures

5.1. Summary of 2025 Implementation Progress

Conservation measures are used at the INL to mitigate and reduce certain threats identified in the CCA (DOE-ID and USFWS 2014). The Agreement also articulates DOE-ID's desire to achieve no net loss of sagebrush due to infrastructure development. The following sections are organized by threat and outline the objective when addressing each threat, Conservation Measures mitigating or reducing the threat, and the accomplishments of DOE-ID, contractors, and stakeholders associated with each Conservation Measure.

5.1.1. Wildland Fire

The objective when addressing this threat is to minimize the impact of habitat loss due to wildland fire and firefighting activities. This objective is met largely by adhering to Conservation Measure 1;

> Conservation Measure 1: *Prepare an assessment for the need to restore the burned area. Based on that assessment, DOE-ID would prepare an approach for hastening sagebrush reestablishment in burned areas and reduce the impact of wildland fires >40 ha (99 ac). Primary habitat recovery objectives include: soil stabilization, cheatgrass and noxious weed control, maintaining a healthy herbaceous understory, and sagebrush restoration.*

1) Although no new fires burned on the INL site in 2025, several actions were taken for previous fires. Actions include seeding containment lines for soil stabilization, treating annual grass, monitoring herbaceous recovery within an area affected by a recent fire, and seeding sagebrush within an older fire footprint. Details for these activities are covered in Section 5.2.

5.1.2. Infrastructure Development

The objective when addressing this threat is to avoid new infrastructure development within the SGCA and within 1 km (0.6 mi) of active leks and to minimize the impact of infrastructure development on all other seasonal habitat and areas potentially used by sage-grouse on the INL Site. This objective is met by adhering to Conservation Measures 2 and 3;

> Conservation Measure 2: *Adopt best management practices outside facility footprints for new infrastructure development.*

1) In 2025, 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 or sited so that the total distance of habitat edge caused by construction activities was minimized:
    a) Biomass Preprocessing to Sustainable Fuel Pilot Plant (ECP INL-24-107) was sited within the previously developed footprint at CFA.
    b) CFA Main Distribution Frame (MDF)/Data Center (ECP INL-24-101) infrastructure was all sited within the disturbed footprint of the previous cafeteria building at CFA.
    c) Power Management Training Space (ECP INL-25-029) was sited within the previously disturbed footprints at CFA.
    d) Demonstration of and Idaho Based Antimony Trisulfide Domestic Supply Chain (ECP INL-25-018) was proposed to be sited in only previously disturbed areas at multiple facilities.
    e) PBF Seismic Station (ECP INL-25-012) was sited within a previously disturbed area within the Critical Infrastructure Test Range Complex.
    f) Antares Commercial Reactor Program Umbrella (ECP INL-23-119) was sited immediately adjacent to CFA.
    g) Aalo Site Characterization and Pre-Construction (ECP INL-24-084) was sited immediately adjacent to the existing MFC perimeter road.
2) The following projects designed towers, utility poles, and other vertical structures to minimize the opportunity for perching and nesting by ravens or raptors:

a) Hunting Boundary Signage (ECP INL-25-020) project reduced perching by ensuring the sign was mounted above the height of the post.

b) National Security Test Range (NSTR) Radiological Dispersal Shot (ERP 3515) designed their signs to reduce perching.

c) Replacing Jeffery-Goodale Cutoff Trail Markers (ERP 4505) ensured that the markers used did not present supplemental perching area.

d) INL Power Management Activities (ECP INL-21-067) included the installation of avian protection devices where possible.

3) In 2025, we completed compensatory mitigation for two infrastructure projects on the INL Site, the Carbon Free Power Plant activities that were discontinued in 2024 and a storage area to the north of MFC completed in 2024. Details on the planting of these sagebrush seedlings are in Section 5.2.2. Additionally, multiple projects currently in progress on the INL Site will be required to carry out compensatory mitigation for existing and recovering sagebrush habitat destruction. We will assess these projects following their activities to determine the amount of area requiring compensatory mitigation per the INL compensatory mitigation strategy. Among these projects, the 2025 wildland fire mowing along T-25 was completed and will be funding compensatory mitigation in 2026.

<u>Conservation Measure 3</u>*: 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) There were no infrastructure projects that took place within the SGCA in 2025.

5.1.3. Livestock

The objective when addressing this threat is to limit direct disturbance of sage-grouse on leks by livestock operations and to promote healthy sagebrush and native perennial grass and forb communities within grazing allotments. This objective is met largely by adhering to Conservation Measures 5 and 6;

<u>Conservation Measure 5</u>*: Encourage the Bureau of Land Management (BLM) to seek voluntary commitments from allotment permittees and to add stipulations during the permit renewal process to keep livestock at least 1 km (0.6 mi) 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.*

1) We observed one instance of livestock on a lek in 2025. We communicated that situation to DOE-ID.

<u>Conservation Measure 6</u>*: 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.*

1) DOE-ID and BLM updated their Memorandum of Understanding for management of land currently occupied by the INL Site in 2025.

2) Bipartisan Infrastructure Law (BIL) funding was allocated for a local sagebrush seed collection to take place on the INL Site and within surrounding BLM land in 2023 in collaboration between INL, BLM and USFWS. We planted the collected seed using mechanical means on previously burned areas on the INL Site and BLM planted on adjacent lands to promote the recovery of sagebrush habitat. This mechanical seeding effort was initiated on BLM in 2023 and on the INL in mid-October 2024 and was continued throughout the fall of 2025 by both parties.

5.1.4. Seeded Perennial Grasses

The objective when addressing this threat is to maintain the integrity of native plant communities by limiting the spread of crested wheatgrass. This objective is met largely by adhering to Conservation Measure 7;

<u>Conservation Measure 7</u>*: 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.*

1) We assisted projects by recommending a project-specific native perennial seed mix list for revegetation work. It is mandatory that all seed mixes exclude intentional use of crested wheatgrass

seed. Crested wheatgrass is not native, so it is never included as acceptable plant materials in INL Site revegetation plans.

5.1.5. Landfills and Borrow Sources

The objective when addressing this threat is to minimize the impact of borrow source and landfill activities and development on sage-grouse and sagebrush habitat. This objective is met largely by adhering to Conservation Measures 8 and 9;

<u>Conservation Measure 8</u>*: 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).*

1) INL crews complied with seasonal and time-of-day restrictions associated with sage-grouse. Per "Idaho National Laboratory Gravel/Borrow Pits (Overarching) Environmental Checklist [EC]" (EC INL-19-155), 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. The borrow sources at Adams Blvd, Lincoln Blvd, Monroe Blvd, Ryegrass Flats, T-12, and T-28 South are covered by this Environmental Checklist. Historically, sage-grouse leks have been observed in three borrow pits: T-12, Adams Blvd, and Ryegrass Flats. Source material was removed from the Ryegrass Flats, T-12, and Adams Blvd borrow pits after 9 a.m. and before 6 p.m., complying with seasonal restrictions.

<u>Conservation Measure 9</u>*: Ensure that no net loss of sagebrush habitat occurs due to new borrow pit or landfill development. DOE-ID accomplishes this measure by:*

- *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.*

1) No new borrow pits or landfills were opened in 2025.
2) Expansion of existing borrow sources and landfills in 2025 were limited to footprints approved in Appendix C of the Spent Nuclear Fuel Environmental Impact Statement (DOE-EIS-0203) or the EA for Silt/Clay Development and Use (DOE-EA-1083) with the exception of the Adams Blvd pit. The Adams Blvd pit was proposed to be expanded an additional 40 ha (100 ac) beyond its current approved footprint.
3) All landfills and borrow sources are planned to have reclamation activities completed when they are deemed to be no longer of use.
4) All noxious weeds are treated when encountered and other invasive species are treated or removed when defensible space is required around infrastructure and equipment within landfills and borrow sources in accordance with INL's Sitewide Noxious Weed Management Plan, PLN-611.

5.1.6. Raven Predation

The objective when addressing this threat is to reduce food and nesting subsidies for ravens on the INL Site. This objective is met largely by adhering to Conservation Measures 10 and 11;

<u>Conservation Measure 10</u>*: DOE-ID 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.*

1) During 2025, two INL-controlled transmission structures were retrofitted with single crossarms, permanently excluding future raven nesting at these sites (Section 4.1.1). In total, 68 INL-controlled transmission structures have been retrofitted.

Conservation Measure 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.

1) Conservation measure 11 has been completed and implemented.

5.1.7. Human Disturbance

The objective when addressing this threat is to minimize human disturbance of sage-grouse courtship behavior on leks and nesting females within the SGCA and within 1 km (0.6 mi) Lek Buffers. This objective is met largely by adhering to Conservation Measures 12 and 13;

Conservation Measure 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):

- *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 lb) will only occur at the National Security Test Range (NSTR) from 9 a.m.–6 p.m.*
- *No non-emergency disruptive activities allowed within Lek Buffers March 15–May 15.*

1) All unmanned aerial vehicle flights conducted at the UAS runway or at the NSTR met all CCA requirements by conducting flights above 305 m (1,000 ft), after 9 a.m. and before 6 p.m., or beyond the 1 km (0.6 mi) sage-grouse active lek buffer distance. All other overflights planned their flight paths to avoid sage-grouse leks and lek buffers.
2) Detonations of explosives greater than 1,225 kg (2,700 lb) did not occur at the NSTR between 6 p.m. and 9 a.m. from March 15 to May 15.

Conservation Measure 13: Seasonal guidelines (April 1–June 30) for human-related activities within the SGCA (exemptions apply—see Section 10.9.3):

- *Avoid non-emergency disruptive activities within the SGCA.*
- *Avoid erecting mobile cell towers in the SGCA, especially within sagebrush-dominated plant communities.*

1) No non-emergency disruptive activities took place within the SGCA in 2025.
2) On no account were meteorological, sound detection and ranging, or other cell towers erected within 1 km (0.6 mi) of a sage-grouse lek nor within the SGCA during 2025.

5.2. Reports on Projects Associated with Conservation Measures

Since the CCA was signed, DOE-ID and contractors have implemented activities on an as-needed or recurring basis to reduce impacts to sage-grouse habitat and to support the objectives of all Conservation Measures.

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

5.2.1.1. Background

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 across their range (Federal Register 2010). Wildland fire impacts sage-grouse habitat by removing sagebrush and by making the recovering plant communities less resistant to invasion and dominance by non-native weeds like cheatgrass (Bradley 2010, Connelly et al. 2011). Annual grasslands were ranked as a medium-level threat to sage-grouse in the CCA. Cheatgrass is currently the primary introduced annual grass of concern on the INL Site. Although cheatgrass can become dominant under a variety of conditions, post-fire plant communities are particularly susceptible (see Section 3.1), making the threats of wildland fire and cheatgrass interrelated.

Wildland fires on the INL Site were relatively infrequent prior to 1994; only a few large fires were known to have occurred or could be seen in imagery prior to that time (Shive et al. 2011). Over the past 25 years, several large fires (>40 ha [>99 ac]) have burned across the INL Site. Potential effects of wildland fire on natural resources were initially addressed in the Wildland Fire Management Plan and Environmental Assessment (hereafter, INL Wildland Fire EA; DOE-ID 2003), which was drafted after four notable fires. The CCA represented the next major effort to address the effects of wildland fire on natural resources, and it included a Conservation Measure by which DOE-ID committed to prepare an assessment evaluating the need for post-fire restoration and present options for hastening sagebrush reestablishment on fires larger than 40 ha (99 ac; Section 5.1.1).

After the CCA was signed, the INL Site did not experience any wildland fires meeting the Conservation Measure criteria for nearly five years. In 2019, the Sheep Fire burned more than 40,000 ha (98,842 ac), which prompted the development of the first ecological resources recovery plan for the INL Site since the CCA was signed. The recovery plan was designed to address the CCA wildland fire Conservation Measure and to comply with the INL Wildland EA. This plan was phased for implementation over five years and allowed the WFMC flexibility in prioritizing recovery actions based on available funding and other wildland fire management priorities. The Sheep Fire Recovery Plan (Forman et al. 2020) expired at the end of FY 2024, and it resulted in the largest sagebrush restoration effort within the footprint of any wildfire on the INL Site to-date.

To standardize and streamline the process of developing natural resource recovery plans moving forward, we developed a Wildland Fire Recovery Framework for the INL Site (Forman et al. 2024). This framework identifies INL's fire recovery goals, defines the fire recovery planning process, describes a post-fire ecological resource assessment process for quantifying fire impacts, presents all potential post-fire treatments that may be considered for improving natural resource recovery, establishes the basis for an annual post-fire monitoring program, and provides a template for future fire recovery plans. Post-fire recovery goals addressed in each fire recovery plan are: (1) To stabilize soils and minimize erosion, (2) to limit cheatgrass dominance and control the spread of noxious weeds, (3) to facilitate the recovery of a resilient native herbaceous layer, and (4) to speed the recovery of functional sagebrush habitat.

In addition to the Wildland Recovery Framework, INL updated the Wildland Fire Management Plan (INL 2025) and DOE-ID issued a Finding of No Significant Impact (FONSI) on an EA for the Wildland Fire Management Program at Idaho National Laboratory (DOE-ID 2025), which was intended to augment the 2003 Wildland Fire EA. The 2025 EA evaluated proposed restoration actions from the Wildland Fire Recovery Framework as well as fuels management activities that were either not evaluated or were excluded by the FONSI for the 2003 EA. The most notable restoration action that was not evaluated in 2003, but was addressed in 2025, was the aerial application of herbicide for non-native vegetation. In 2003, road upgrades and roadside mowing for unimproved roads were evaluated but excluded. To improve access and firefighter safety, many of the road upgrades and roadside mowing actions were reevaluated in the 2025 EA and included in the FONSI.

This section of the report contains a summary of current fire recovery plans and any ongoing treatment activity for older wildland fires, including results from the associated monitoring of each. The size of the 2024 Dry Channel Fire was initially estimated at 58 ha (142 ac), so the WFMC requested a recovery plan for this fire. We drafted the Dry Channel Fire Natural Resources Recovery Plan and presented it to the WFMC in the spring of 2025. We also collaborated with Facilities and Site Services to complete restoration activities in areas impacted by wildland fires that occurred more than five years ago, for which the wildland fire recovery plan has expired, or for which a plan was never drafted. Finally, mowing and road improvement activities associated with the 2025 Wildland Fire EA were conducted in 2025, and we summarize the extent of those activities below.

5.2.1.2. Dry Channel Fire

The Dry Channel Fire burned on June 26, 2024, and was likely caused by a lightning strike. Some actions taken prior to the completion of a fire recovery plan are used for the planning effort and for addressing emergency stabilization goals; they include acquiring imagery of the fire and recontouring containment lines. We finalized the recovery plan (Forman et al. 2025) for this fire after we presented it to the WFMC during the spring 2025 meeting. In addition to the post-fire actions described above, the WFMC prioritized several restoration activities to be conducted over the five-year recovery period as outlined in the plan. Restoration priorities identified by the WFMC include seeding containment lines with a mix of native herbaceous species, signing containment lines to prevent ongoing disturbance from vehicle traffic, monitoring cheatgrass abundance and herbaceous recovery to inform the need for chemical treatment or revegetation, and planting portions of the containment lines with sagebrush seedlings.

Fire Summary and Post-Fire Restoration Planning

Imagery was collected for the Dry Channel Fire in November 2024, and mapping was completed shortly thereafter (Williams et al. 2025). We used the mapped fire footprint and existing biological monitoring data to assess impacts of fire and fire suppression activities on natural resources. In summary, the total mapped burned area was 46 ha (113.7 ac) and there was a smaller area outside the fire where 708 m^2 (0.2 ac) were bladed and vegetation was removed. There was approximately 8.1 km (5 mi) of containment line, averaging 4.6–6.1 m (15–20 ft) wide. The combined area impacted from the fire and fire suppression activities resulted in a loss of 35.1 ha (86.8 ac) of sagebrush habitat. There were extensive two-track roads created inside the burned area and for access points around the fire perimeter resulting in 56.5 km (35.1 mi) of new roads associated with suppression activities.

We applied the ecological resources impacts assessment to select appropriate restoration treatment options and locations for addressing INL's wildland fire recovery goals and objectives. Due to the excessive amount of soil disturbance associated with fire suppression and mop up activities, many of the recommended post-fire treatments are focused on stabilizing the impacted soils and associated vegetation. Finally, we designed a monitoring plan to evaluate natural recovery as well as the efficacy of post-fire treatments. A summary of the treatments completed each year, and the results of monitoring activities are included in an annual monitoring report. The 2025 Dry Channel Fire Annual Monitoring Report was not yet completed at the time this report was published.

Soil Stabilization and Erosion Control

As part of emergency stabilization actions, the Dry Channel Fire containment lines were recontoured on October 29 and 30, 2024. Because the depth of the containment lines was sufficient to remove all perennial vegetation, including root masses, and to disrupt the soil structure of the uppermost soil horizons, approximately 5.1 ha (12.5 ac) of containment lines and staging areas were drill seeded with a commercially available mix of locally appropriate native herbaceous species on October 20 and 21, 2025. Planting details will be available in the Dry Channel Fire Annual Monitoring Report. Additional soil stabilization recommendations from the fire recovery plan include placing signs or barriers where they bisect existing roads to prevent vehicular travel on the recovering lines over the short-term, and planting sagebrush seedlings within the containment lines adjacent to the highway to decrease the visibility of the containment lines from Highway 22 as a long-term solution.

Cheatgrass and Noxious Weed Control

Though not dominant in plant communities across most of the area affected by the Dry Channel Fire, cheatgrass was abundant prior to the fire and fire suppression activities, which increases the risk of post-fire cheatgrass dominance. The amount of soil disturbance related to vehicle traffic during, and post-fire adds to that risk (see Section 4.2 for details). To detect any significant post-fire increases in cheatgrass abundance within the fire footprint, the footprint and adjacent areas will be monitored annually. If after at least two years of natural recovery monitoring data indicates that cheatgrass abundance is significantly greater in the fire footprint, then we will recommend cheatgrass treatment.

Disturbed soils associated with fire suppression activities are vulnerable to weed invasion and linear features can become vectors for spread. The area impacted by the Dry Channel Fire and fire suppression activities was added to the Facilities and Site Services noxious weed treatment list. Inventory and treatment efforts were conducted periodically throughout the summer and fall of 2024. We inventoried weeds again during summer 2025 vegetation monitoring efforts, and there were no noxious weeds requiring treatment documented at that time.

Native Herbaceous Recovery

In addition to the containment lines that were planted to address soil stabilization, facilitated post-fire recovery may also include planting areas within the fire footprint that are recovering poorly. The need to plant areas within the fire footprint will be evaluated after at least two growing seasons. We will use monitoring data to identify areas that are recovering poorly and to prioritize any herbaceous planting efforts within the fire footprint.

Sagebrush Habitat Restoration

Because the Dry Channel Fire was patchy and relatively small, the overall impact to populations of species that depend on sagebrush habitat is likely to be minimal. The potential for natural sagebrush recovery is high because patches of mature, seed-bearing shrubs are distributed throughout the fire footprint. For these reasons, widespread sagebrush habitat restoration is not recommended. As discussed above, targeted sagebrush reestablishment in containment lines that terminate at Highway 22 should be considered to discourage vehicular use of the containment lines and to reduce introduction and establishment of invasive and noxious plant species from roads.

Monitoring

Monitoring is a fundamental component of land stewardship because it provides timely insight regarding the progress toward a desired final condition or the necessity of implementing additional actions when and where conditions are deteriorating. Post-fire ecological monitoring informs an adaptive management approach to natural and assisted post-fire recovery and will be used for the Dry Channel Fire specifically to evaluate the results of containment line stabilization actions and to determine whether cheatgrass treatment or further herbaceous planting are needed. The Dry Channel Fire monitoring plan will cover the duration of the post-fire recovery plan and will be accompanied by annual reports to summarize monitoring results and identify suitable adaptive management responses when appropriate. We began monitoring in 2025 and the annual monitoring report will be available prior to the spring 2026 WFMC meeting.

5.2.1.3. Older Fires

There is ongoing treatment activity on several older wildland fires for which recovery plans were not written or have expired. As the final recommendation from the 2020 Fires Recovery Plan (Forman et al. 2021), containment line signage is scheduled to be completed on the 2020 Telegraph Fire in 2026. Noxious weeds continue to be treated and monitored across the INL Site, and previously burned areas are typically prioritized because areas lacking sagebrush tend to be less resistant to weed invasion and dominance. Occasionally, sagebrush is also planted in areas that burned more than five years ago. The funding sources and related initiatives for planting within older burned areas may vary, but the goal of sagebrush planting is restoring important habitat.

In 2022, DOE-ID, INL, USFWS, and BLM partnered to pursue BIL funding to support sagebrush habitat restoration in the Tractor Flats area of the INL Site and adjacent BLM land, some of which burned most recently in the 2010 Jefferson Fire. This area is recognized as a high-priority habitat restoration location because long-term lek count data and more recent movement data from radio collared sage-grouse indicate that despite declines in habitat condition, Tractor Flats continues to be used for breeding, nesting, and overwintering.

Funding was awarded to the multiagency partnership beginning in 2023. Mechanical sagebrush planting began on BLM land adjacent to the eastern INL Site border during fall of 2023, and a commercial seed collection vendor collected sagebrush seed within the unburned areas of the INL Site and within similar unburned areas managed by BLM. The seed was cleaned and stored to be used for mechanical planting of approximately 810 ha (2,000 ac) on the INL Site in 2024 as well as a slightly larger area on adjacent BLM land. By the end of the 2024 planting window, seeding was completed on approximately 280 ha (700 ac) of the INL Site using a broadcast spreader followed by an imprinter. Seed was applied at a rate of approximately 0.7 kg (1.5 lb) of pure live seed per 0.4 ha (1 ac) in 7.3 m (24 ft) wide strips, with a spacing of 14.6 m (48 ft) between planted strips. Using the same technique, an additional 787 ha (1,900 ac) were seeded in 2025 (Figure 5-1).

The area seeded in 2024 was monitored during the late summer of 2025. Approximately 25 km (15 mi) of belt transects were established perpendicular to planting transects (Figure 5-1). We surveyed belt transects for current year seedlings. When we encountered seedlings, we recorded the location, the estimated number of seedlings, and information about the proximity of nearby mature sagebrush individuals. There were several groups of seedlings recorded during the monitoring effort; however, they were all within proximity of mature sagebrush individuals. Therefore, it is not possible to determine definitively whether the seedlings resulted from the seeding effort. After seeding, it can take five or more years for seedlings to germinate and grow large enough to be detectable, so monitoring will be conducted again five years post-planting.

Along with the sagebrush restoration efforts at Tractor Flats, DOE-ID and INL requested BIL funding for Rejuvra © (liquid) Indaziflam herbicide for cheatgrass-dominated areas in the Sheep Fire. The funding would be sufficient to treat a total of 3,683 ha (9,100 ac); this represents about 40% of the area on the INL Site that has been mapped as cheatgrass-dominated. The treatment area was divided into four polygons, approximately 810 ha (2,000 ac) each, and the polygons were prioritized according to the probability of a successful outcome without additional restoration efforts. The treatment would be phased in over four years, and the areas with the greatest potential for a successful outcome would be treated first. In 2024, INL received sufficient herbicide to treat the highest-priority 810 ha (2,000 ac) polygon. Fixed-wing aerial herbicide application was completed on October 30, 2025. In addition to improving local sagebrush habitat, fostering collaboration among agencies, and continuing to demonstrate INL's commitment to land stewardship, benefits of this partnership include knowledge and skills transfer which will ultimately facilitate developing backcountry land management capabilities at INL.

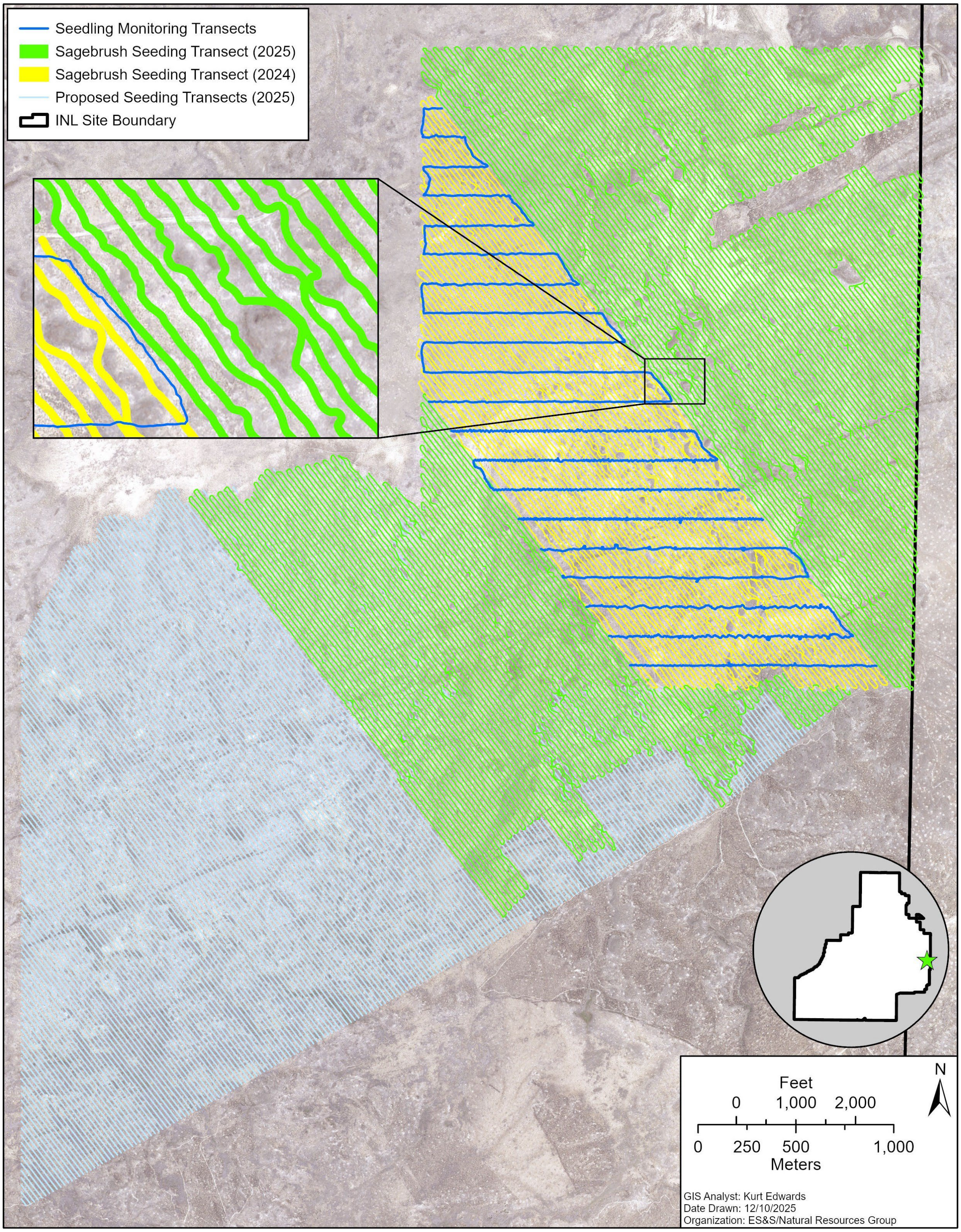

Figure 5-1. Mechanical seeding locations for sagebrush habitat restoration efforts within the Tractor Flats area of the Idaho National Laboratory Site.

5.2.1.4. Additional Activities Wildland Fire Management Activities

Road upgrades and roadside mowing actions that were included in the FONSI for the recent Wildland Fire EA (DOE-ID 2025) began in 2025. Approximately 29.6 km (18.4 mi) of T-25, which is oriented north/south along the eastern portion of the INL Site, was identified by the INL Fire Department as the highest priority to improve firefighter safety. Roadside mowing was conducted in September and October along both sides of T-25, though there were some avoidance areas associated with cultural resources, active bird nests, and the Sagebrush Steppe Ecosystem Reserve. Road improvements began after mowing was completed in October 2025. The total amount of habitat impacted by these activities will be summarized and reported as a component of the next cycle of the infrastructure expansion task in 2026. Compensatory sagebrush mitigation for 2025 mowing and road upgrade activities is anticipated to be completed in 2026.

5.2.2. Sagebrush Seedling Planting for Habitat Restoration—Conservation Measure 1 and 2

5.2.2.1. Introduction

The objective of Conservation Measure 1 is to minimize the impact of habitat loss due to wildland fire and firefighting activities, and the objective for Conservation Measure 2 is to minimize the impact of habitat loss due to infrastructure development and disturbance (Section 5.1.2). The CCA includes three related strategies for addressing sagebrush habitat loss. The first is periodic sagebrush seedling planting to address legacy habitat loss from fires that occurred prior to signing the CCA. The second strategy is developing a post-fire ecological recovery plan, specific to each new wildland fire, that includes reestablishing sagebrush. These two strategies relate directly to Conservation Measure 1. The final strategy for minimizing sagebrush habitat losses on the INL Site includes compensatory mitigation for infrastructure development, which relates directly to Conservation Measure 2. To address potential impacts from infrastructure development on sagebrush habitat distribution, DOE-ID has a no net loss sagebrush habitat goal (DOE-ID and USFWS 2014). It states that for every acre of sagebrush habitat or recovering sagebrush habitat that is impacted, BEA will contribute funds to replant approximately 1,000 sagebrush seedlings as compensatory mitigation (INL 2022). Seedlings from all funding sources are grown concurrently and planted in priority restoration areas identified in the CCA (DOE-ID and USFWS 2014) and in post-fire ecological recovery plans.

The Battelle Energy Alliance Natural Resources Group oversees the planting of sagebrush seedlings and monitors their survivorship to evaluate the effectiveness of this sagebrush restoration strategy. The target density at which seedlings are planted varies depending on project restoration goals, and the actual planting density can vary due to weather conditions, topography, planting conditions, travel, and planter ability. The intent of sagebrush restoration is not to plant sagebrush at densities that typify sage-grouse habitat but rather to establish sagebrush seed sources over larger priority areas to shorten the time interval between a fire and the reestablishment of sagebrush habitat. To achieve this target, planting rates on the INL Site range from approximately 198 to 494 seedlings/hectare (80 to 200 seedlings/acre).

5.2.2.2. Methods

We contracted Desert Sage Farms, LLC, located in Oakley, Idaho, to grow and plant 42,600 sagebrush seedlings from seed collected on the INL Site in 2021. Seedlings were grown by Desert Sage Farms, LLC, in a greenhouse environment using a soil medium containing perlite, compost, peatmoss, and vermiculite. They added vermiculite to the medium after we reviewed the results of the 2023 methods testing, in which the addition of vermiculite showed increased survivorship compared to other soil mediums (Williams et. al. 2025). Seedlings were funded by and acquired for compensatory mitigation in response to two projects on the INL Site, the Carbon Free Power Plant activities that were discontinued in 2024 and a storage area to the north of MFC completed in 2024. We selected the planting location based on predefined priority restoration areas; we identified priority restoration areas using the SGCA boundary, recovering habitat distribution, and sage-grouse lek locations. Additional information like soil type, and logistical constraints, such as accessibility, were also considered during planting site selection. During the planting, we recorded GPS coordinates of approximately 500 seedlings for future monitoring, which we will revisit at one and five-years post planting to assess survivorship.

In addition to planting seedlings in 2025, we completed monitoring on seedlings planted in previous years. During the fall 2024 planting, we collected Global Positioning System locations of 520 seedlings. In late July 2025, we revisited those seedlings and determined whether each seedling was healthy, stressed, dead, or missing. Stressed individuals are considered alive, while missing individuals are considered dead for assessment purposes. After five years, seedlings are again revisited to evaluate the planting's longer-term seedling survivorship. For seedlings planted in the fall of 2020, we conducted revisits in late July and early August of 2025 to assess survivorship at five years. One-year survivorship of these seedlings was initially assessed in 2021 and then revisited in 2025, regardless of whether they were determined missing or dead on the initial revisit.

5.2.2.3. Results

On October 9 and 10, 2025, 42,600 sagebrush seedlings were planted on approximately 110.1 ha (271.9 ac; Figure 5-2). The 2025 planting was located within the Tin Cup fire that burned in 2000. In 2025, a planting crew from MP Forestry of Medford, OR installed the seedlings over a two-day period using hodads traveling on foot from existing roads and utilizing a single pass of a utility terrain vehicle to transport seedlings further from the road. For future monitoring, we recorded GPS coordinates of 500 seedling locations during and following installation.

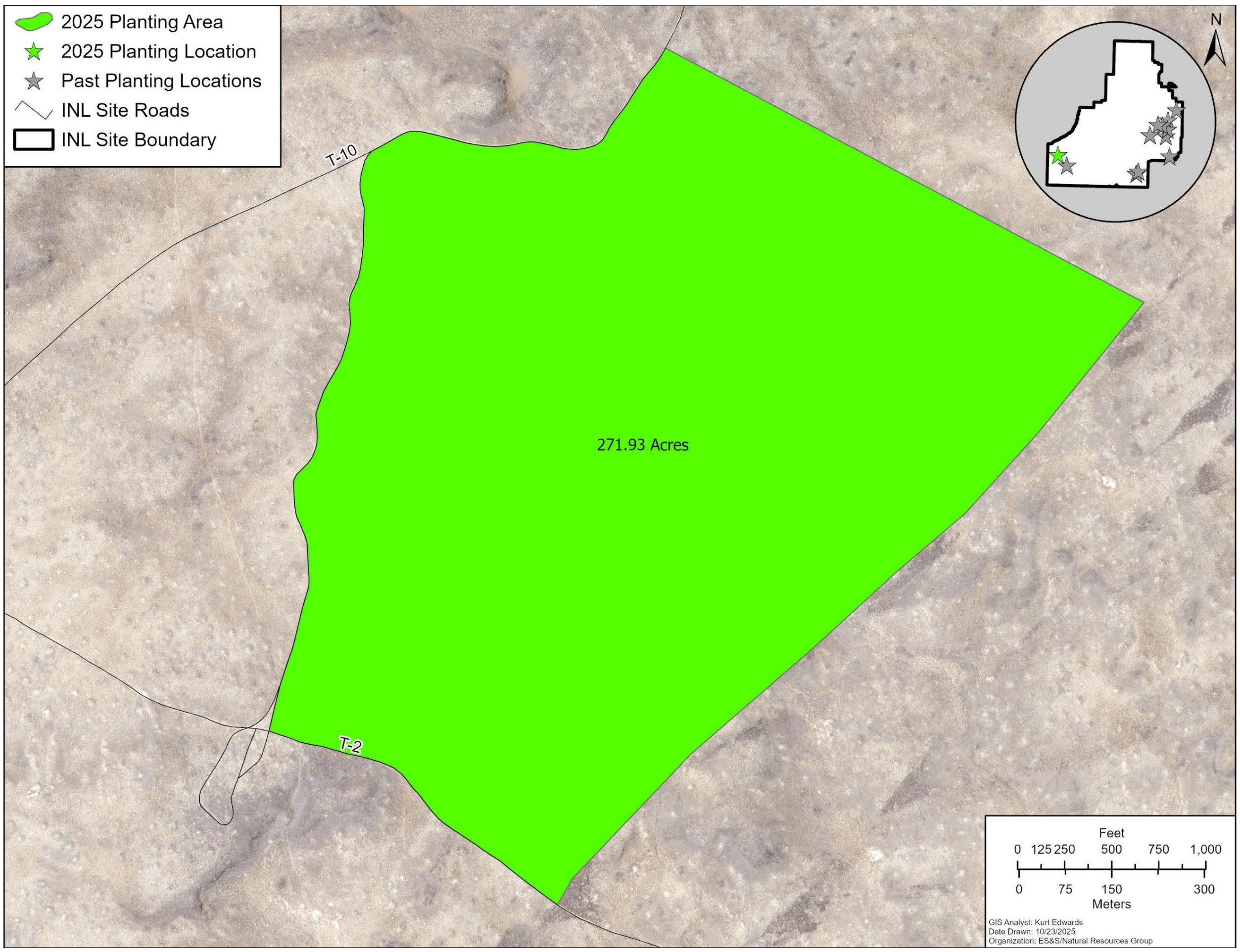

Figure 5-2. Areas planted with big sagebrush (*Artemisia tridentata*) seedlings in 2025 with reference to previous years plantings on the Idaho National Laboratory Site.

Survivorship surveys of the subset of seedlings planted in 2024 indicated that 64 seedlings were healthy, 85 were stressed, 52 were dead, and 319 were missing. Assuming the missing seedlings were dead, approximately 28.7% of all seedlings planted in 2024 survived the first year. This result is highest survivorship value since the 2018 planting (see Figure 5-3).

Water year precipitation following the 2024 seedling planting was lower than the previous three planting years and was about two thirds annual average precipitation for the INL Site (Figure 5-5). During the 2025 water year, monthly precipitation was atypical in both timing and seasonal amount compared to the long-term seasonal averages (Figure 3-7). Winter and early spring precipitation were slightly less than average, June precipitation was far below average, and summer precipitation was only about 50% of average.

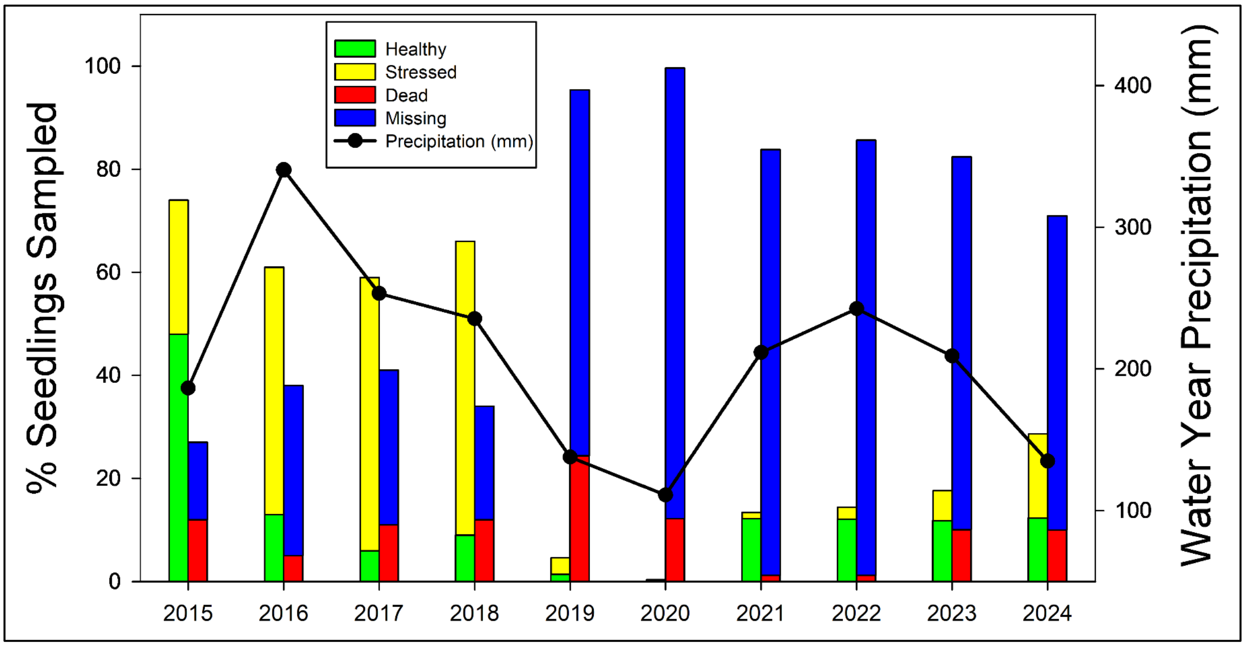

Figure 5-3. Sagebrush seedling survivorship one year after planting on the Idaho National Laboratory Site. The yellow and green bar represents the observed living seedlings. The blue and red bar represents seedlings presumed to be dead. The black dots indicate the total water year precipitation, and the black line denotes precipitation trends. Water year is calculated as precipitation received in October of the planting year to September of the following year.

In late July and early August of 2025, we evaluated five-year seedling survivorship by revisiting 539 seedlings that were planted in the fall of 2020. In total, we located 10 seedlings, of which four were healthy, one was stressed, and five were dead. This means that over the last five years, five (0.9%) of the marked seedlings continued to grow. Initial one-year results of the 2020 planting indicated that 0.37% of the seedlings had survived to the fall of 2021 (Shurtliff et al. 2021). The higher survivorship from the five-year survey, compared to the one year, is likely an artifact of the difficulty in locating the small seedlings one year after planting. Comparing survivorship rates between one-year and five-year monitoring efforts suggests that seedlings will continue to persist as long as first-year survival is successful.

Since 2015, sagebrush seedling planting on the INL Site has been conducted on 1,312.9 ha (3,244.3 ac). Over the past ten years, a total of 395,275 seedlings have been planted.

5.2.2.4. Discussion

Young sagebrush plants experience the highest mortality during the first year (Dettweiler-Robinson et al. 2013). In a review of 24 projects where containerized sagebrush seedlings were planted and survivorship was measured after one year, researchers reported first year survival of stock ranged from 14% to 94% (median = 59%, weighted average = 57%; Dettweiler-Robinson et al. 2013). Prior to the five most recent plantings, sagebrush establishment one and five-years post planting on the INL Site was above average, with an average survivorship of 65% (2015–

2018). It is unfortunate that the 2019–2023 plantings have deviated from this trend of successful plantings. INL continues to explore methods for improving the planting process by using new techniques or approaches, such as those tested in 2023, to increase the success of future planting efforts. Based on the results of the 2023 tests, the greenhouse growth medium of the seedlings was adjusted. Higher initial survivorship in 2024 is encouraging, especially considering the below average precipitation totals. Precipitation conditions were similar in 2019 and 2020, yet survivorship in those years were more than an order of magnitude lower than in 2024.

One reason INL and DOE-ID continue to plant seedlings over a relatively small area each year, rather than drilling or broadcasting sagebrush seeds over a much larger area, is that successful seed germination and establishment are influenced by several climatic factors, including the timing and amount of precipitation (Young et al. 1990; Boudell et al. 2002). The suite of factors that facilitate successful germination of seed and establishment of new plants in burned areas fluctuates from year to year (Colket 2003; Blew and Forman 2010). In many years, few or no seeds may germinate and survive the summer (Forman et al. 2020; Brabec et al. 2015). The decision to plant containerized seedlings in recovering burned areas, rather than broadcasting or drilling seed, was previously justified based on consistently high seedling survivorship. However, after recent years of lower survivorship, alternative seeding and planting methods are being evaluated to determine if there are better options or alternatives to the current annual sagebrush seedling planting efforts (Forman et al. 2020). With assistance from multiple agency partners, INL has begun testing sagebrush seeding through mechanical means. Details about these efforts are described in Section 5.2.1.

6. Synthesis and Adaptive Management Recommendations

6.1. Trends and Threats in a Regional Context

The IDFG annually compiles data and shares results from hundreds of sage-grouse lek counts conducted by its staff and partners. The INL contributes to this dataset by providing lek and route count information on an annual basis (i.e., IDFG lek routes, Figure 2-1). Comparing these two data sets allows us to evaluate if trends observed on the INL Site are like those observed on statewide and/or regional levels. The peak male count of 931 for 2025 was 11% higher than in 2024 and was the highest recorded on the INL Site since monitoring efforts for the CCA began in 2011. Direct comparisons to populations trends in Idaho were not completed because IDFG has not issued their 2025 sage-grouse report. However, Montana (MFWP 2025), Oregon (Vold 2025), and Wyoming (WDFG 2025) reported statewide increases of 28%, 15%, and 11%, respectively, which suggests that populations increased in many areas range wide. Sage-grouse populations vary between high and low abundances on six to ten-year cycles and populations on the INL Site, in the State of Idaho, and in many places across the range, are clearly in the upward portion and are likely reaching the peak of this cycle after a low (i.e., nadir) from 2020–2021. It is important to note that a single major increase in males on lek does not indicate recovery. Because sage-grouse populations cycle naturally, population trend estimates should not be calculated year to year but instead should be calculated peak-to-peak or nadir-to-nadir, otherwise estimates may indicate false declines or increases (Coates et al. 2023). Overall, sage-grouse populations are still declining throughout their range (Coates et al. 2023), and accurate trend estimates for the INL Site cannot be evaluated until the population reaches the next peak and then begins naturally cycling downward again.

Although the State has established habitat distribution triggers (Idaho 2021) like the INL Site, and the State recommends managing habitat condition so that it meets the same general guidelines as those used for the INL Site, results of local and/or regional summaries are not annually published for management areas at a fine enough scale to facilitate direct comparisons of habitat distribution and/or condition every year. The most recent summaries were published in 2020 as part of a causal factor analysis (Idaho Adaptive Management Team 2020). Of the fine scale management areas that overlap the INL Site, the adaptive management team reported that a soft habitat trigger (i.e., a decrease in distribution of >10% but < 20%) was tripped in the Mountain Valley Important Habitat Management Area, which extends onto approximately the northern one-quarter of the INL Site. This trigger was tripped due primarily to two wildland fires that did not directly affect the INL Site.

No habitat triggers were tripped within the Desert Conservation Area, which includes the southern three-quarters of the INL Site. Within the Desert Conservation Area, much of the INL Site is included in the Twin Buttes Target Fine Scale Area. The landscape cover of sagebrush across this Fine Scale Area was estimated to be between 60% and 70% across all seasonal habitat types, which is comparable to the distribution of sagebrush habitat across the INL Site. The Idaho Adaptive Management Team has identified the Tractor Flats area within the Twin Buttes Target Fine Scale Area as an important winter habitat. They have recommended considering top management priorities such as minimizing any further loss of sagebrush and restoring sagebrush where it has been lost, particularly from the 2010 Jefferson Fire. They have also recommended identifying priority areas where cheatgrass control can be used to improve nesting habitat. INL habitat condition data and spatial vegetation distribution data (Shive et al. 2019) indicate the most extensive cheatgrass-dominated areas within the Jefferson Fire footprint are also within Sheep Fire footprint, located west of Tractor Flats. Four potential cheatgrass treatment areas have been identified within the overlapping footprints of these two fires. Section 5.2.1 includes a summary of sagebrush restoration and cheatgrass treatment efforts proposed and in progress for in this area.

Although habitat condition data from the INL Site indicates that cheatgrass is more abundant in burned areas than intact sagebrush habitat, post-fire areas on the INL Site are still largely dominated by native, perennial species. Cheatgrass cover can fluctuate considerably from one year to the next and a decrease in cover is as likely as an increase (Forman and Hafla 2018), so it is important to interpret annual changes within the context of longer-term patterns. Because cheatgrass cover generally does not increase at the expense of cover from native perennial species, it does not appear to be affecting overall habitat condition. There are localized areas on the INL Site where cheatgrass has become dominant (Shive et al. 2019), but they are limited in extent and are not yet widespread enough to influence the fire regime. Although the fire regime at the INL Site is not driven by cheatgrass dominance, fires have been more frequent in the past 30 years when compared to the previous 30 years, most likely due to changes in weather patterns and other anthropogenic influences. Therefore, the INL continues to prioritize reducing wildland fire impacts to habitat by minimizing fire size and by implementing post-fire recovery strategies.

The CCA and resulting relationship between its signatories have helped DOE-ID and its contractors take proactive, focused measures (Section 5.1) to conserve sage-grouse while still pursuing DOE-ID's mission. The Agreement and Conservation Measures therein have also been the key to strengthening relationships with natural resource partners to collaborate on projects relevant to sage-grouse. For example, in 2023, BIL funding was awarded to USFWS, BLM, and DOE-ID to facilitate a large-scale sagebrush seed collection effort on the INL Site and adjacent BLM property. The seed will be used to support sagebrush restoration in important winter habitat that spans DOE-ID/BLM boundaries. Additionally, DOE-ID shares habitat data with BLM when allotments are reassessed, and BLM invites DOE-ID to participate in grazing allotment assessments on the INL Site. This increased collaboration and pursuit of common land management goals are among the benefits that have resulted from DOE-ID's efforts, via the CCA, to join with Federal and State partners to conserve sage-grouse and sagebrush lands in eastern Idaho.

6.2. Proposed Changes to the CCA

No changes to the CCA were proposed during 2025.

6.3. Adopted Changes

No changes to the CCA were adopted during 2025.

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Appendix A

Table A-1. Cover from sagebrush habitat plots summarized by native plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover (%) is the absolute mean ($\bar{x}$). Minimum significant difference (MSD) is the smallest distance between two $\bar{x}$ that is significant at $\alpha < 0.05$.

Year	Sagebrush (%)	Other Shrubs (%)	Native Perennial Grasses (%)	Native Perennial Forbs (%)	Native Annual/Biennial Forbs (%)
2013	20.7	10.3	7.0	1.1	0.0
2014	20.5	8.3	2.4	0.7	0.0
2015	21.1	8.3	7.1	0.8	0.4
2016	21.9	7.9	11.5	1.1	0.9
2017	22.1	8.8	16.4	1.9	3.6
2018	23.7	8.2	19.5	1.7	1.5
2019	25.0	8.8	18.7	1.7	0.8
2020	23.6	7.1	13.5	1.0	0.0
2021	24.6	6.5	17.7	0.7	0.0
2022	24.9	8.1	14.2	1.0	2.1
2023	24.6	6.7	11.4	1.6	1.8
2024	25.4	6.9	11.8	1.0	0.3
2025	25.3	6.6	8.3	0.8	0.0
MSD	**2.3**	**1.9**	**4.1**	**1.0**	**1.3**

Table A-2. Cover from sagebrush habitat plots summarized by introduced plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover (%) is the absolute mean ($\bar{x}$). Minimum significant difference (MSD) is the smallest distance between two $\bar{x}$ that is significant at $\alpha < 0.05$.

Year	Introduced Perennial Grasses (%)	Introduced Annual Grasses (%)	Introduced Annual Forbs (%)
2013	1.2	0.2	0.5
2014	0.7	0.0	0.2
2015	1.4	0.4	1.5
2016	1.4	0.5	2.0
2017	2.1	4.0	5.0
2018	2.2	7.4	5.0
2019	2.0	5.0	4.8
2020	2.1	1.0	0.1
2021	3.0	0.9	0.1
2022	1.6	4.6	1.9
2023	1.6	3.4	3.9
2024	1.6	3.5	1.9
2025	1.5	1.4	0.2
MSD	**2.2**	**3.4**	**3.0**

Table A-3. Cover from recovering habitat plots summarized by native plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover (%) is the absolute mean ($\bar{x}$). Minimum significant difference (MSD) is the smallest distance between two $\bar{x}$ that is significant at $\alpha < 0.05$.

Year	Sagebrush (%)	Other Shrubs (%)	Native Perennial Grasses (%)	Native Perennial Forbs (%)	Native Annual/Biennial Forbs (%)
2013	0.1	10.5	15.7	2.8	0.2
2014	0.1	11.3	11.4	0.8	0.1
2015	0.3	10.7	19.6	1.5	0.3
2016	0.3	11.9	21.2	1.8	1.4
2017	0.3	12.5	22.0	1.9	1.3
2018	0.3	12.7	23.7	1.3	1.2
2019	0.4	12.7	23.3	1.6	1.2
2020	0.4	10.4	19.2	1.1	0.3
2021	0.8	10.4	19.6	0.7	0.1
2022	1.0	11.0	17.6	0.9	1.9
2023	1.2	10.8	17.1	1.1	1.4
2024	1.4	11.5	17.9	1.2	1.3
2025	1.5	12.9	16.0	1.0	0.8
MSD	**0.8**	**N/A**	**6.3**	**1.7**	**1.8**

Table A-4. Cover from recovering habitat plots summarized by introduced plant functional groups on the Idaho National Laboratory Site from 2013 through 2025. Cover (%) is the absolute mean ($\bar{x}$). Minimum significant difference (MSD) is the smallest distance between two $\bar{x}$ that is significant at $\alpha < 0.05$.

Year	**Introduced Perennial Grasses (%)**	**Introduced Annual Grasses (%)**	**Introduced Annual Forbs (%)**
2013	0.4	5.4	3.0
2014	0.4	2.7	2.0
2015	0.7	13.8	5.8
2016	0.7	17.0	6.4
2017	0.8	28.6	6.3
2018	0.8	35.8	5.2
2019	0.9	27.7	6.5
2020	0.6	7.9	0.3
2021	0.9	7.3	1.8
2022	0.8	17.1	5.4
2023	1.1	16.1	12.2
2024	1.1	14.5	3.8
2025	1.4	17.5	5.2
MSD	N/A	11.1	7.2