Oregon All Counties CCAA Steering Committee

Strategic Action Plan

OACSC

UPDATED OCTOBER 2023

Table of Contents

1. Executive Summary

The sagebrush country of Central and Eastern Oregon provides countless benefits to the plants, animals, and people that call it home. Spanning eight counties, the Oregon All Counties Steering Committee (OACSC) works toward aligning management actions on private lands intended to improve sagebrush habitats, increase sage-grouse populations, and maintain working landscapes.

Livestock and hay production dominate the landscape on private lands in the area and drive the management of working lands. Economies of Eastern Oregon continue to diversify, adding tourism, recreation, technology, energy development, and other uses which add to vibrant rural communities and present new opportunities and challenges for land managers.

OACSC coalesced in response to a series of listing decisions for the greater sage-grouse under the Endangered Species Act as a proactive response to maintain the viability of working lands and rural communities in Eastern Oregon. In response to this potential listing, the Partners developed Candidate Conservation Agreements with Assurances to accelerate the pace and scale of sage-grouse habitat improvement on private land while documenting the contribution of working lands to sage-grouse habitat conservation. This serves to protect both sage-grouse and the working lands that anchor their habitat. Our partnership is committed to sagebrush habitats and the plants, animals, and people that rely on them for survival. We work with a host of other entities to maximize the benefits of private land conservation by working across property boundaries and using the most cutting-edge available data to inform our management actions, ensuring that vibrant, connected, and sustainable sagebrush landscapes are maintained and enhanced long into the future.

2. Introduction

The Oregon All Counties CCAA (Candidate Conservation Agreements with Assurances) Steering Committee (OACSC) is a collaboration of local and federal partners including Crook, Harney, Lake, and Malheur Soil and Water Conservations Districts (SWCDs), along with Powder Basin Watershed Council (PBWC; covering Baker and Union counties), and U.S. Fish and Wildlife Service (USFWS). The OACSC is committed to working with private landowners to reduce or eliminate threats to greater sage-grouse (Centrocercus urophasianus), hereafter sage-grouse, a species of conservation concern inhabiting eight Eastern Oregon counties. The OACSC conducts its work through the framework of six Programmatic CCAAs which are formal agreements between the USFWS and permit holders (the SWCDs and PBWC). Under the Programmatic CCAAs, permit holders engage private landowners in voluntary conservation actions in exchange for certain assurances should sage-grouse be listed under the Endangered Species Act (ESA).

Sage-grouse habitat across Oregon is threatened by historic and ongoing changes to native plant communities and the impact of catastrophic wildfires. Native shrubs and grasses have largely been replaced by invasive annual grasses and historical fire suppression encouraged expansion of juniper. Invasive grasses provide inadequate cover for sage-grouse nesting, and are highly flammable, promoting more frequent and more severe wildfire. Both the abundance of invasive grasses and the increased

frequency and severity of wildfire prevents the re-establishment and persistence of native plant species. These impacts along with other historical land practices have altered sage-grouse habitat and therefore, sage-grouse populations. The primary focus of this document is to strategically plan conservation measures that will improve critical sage-steppe ecosystems, and ultimately increase and/or sustain sage-grouse populations.

To address sage-steppe habitat issues, the OACSC developed a strategic plan based on Oregon Department of Fish and Wildlife's (ODFW) comprehensive statewide assessments, which indicate that habitat loss is the primary threat to sage-grouse in the state. We specifically focus on habitat loss resulting from the ecological processes of juniper encroachment, spread of invasive annual grasses, and increasing frequency, intensity, and extent of wildfire. Threats that may be important, though localized, include habitat loss, fragmentation, or a reduction in quality due to: 1) multiple types of development (urban and ex-urban development, renewable energy, electrical and natural gas transmission lines, mining, roads, communication towers, and other infrastructure); 2) sagebrush elimination and agricultural conversion; 3) improper grazing management (including both legacy effects of past management and current grazing regimes; 4) recreational uses (off-highway vehicles); 5) fences; 6) isolated or small populations sizes; and 7) free roaming equids (Sage-Grouse Conservation Partnership 2015). In addition, extreme weather conditions, drought, west Nile virus, excessive flooding, predation, hunting, insecticides, sagebrush defoliation moth, and other noxious weeds contribute to a decline in habitat quality or sage-grouse mortality.

In 2011, ODFW established Sage-grouse Local Implementation Teams (LITs) throughout Eastern Oregon. Efforts by local teams helped identify threats to sage-grouse within each county in a spatially explicit manner with the goal of applying conservation measures with a high degree of coordination. By 2015, the Oregon Sage-grouse Action Plan called for further invigoration of these teams, which led to local strategic work plans and coordinated conservation efforts (Sage-Grouse Conservation Partnership 2015). At the same time, the OACSC formally came together to develop a strategic action plan (SAP) for CCAA implementation for the 30-year duration of the agreements (2015-2045).

The OACSC's SAP is the partnership's roadmap for implementing CCAAs on privately owned sage-grouse habitat in Oregon over the course of three decades. It also serves as a guide for recruiting landowner participation, developing Site Specific Plans (SSPs) for those interested, and implementing identified conservation actions designed to achieve the intended benefits for sage-grouse and rangeland health. This SAP establishes both the administrative and conservation strategies that the OACSC will pursue over the next 30 years. The plan provides the background regarding species and habitat decline and how the issue came to a head years ago. It identifies and defines the roles of the OACSC, and shares target goals, objectives, and future planned outcomes. The SAP is a "living document" and as such has been updated periodically to represent the most recent snapshot of OACSC's progress and incorporate new goals and objectives reflective of our efforts toward continued success.

3. Partnership Roles

The sage steppe ecosystem is large and incredibly complex with a long history of management and ownership changes that all have a bearing on the ecological state of the land. In order to make meaningful progress toward achieving our desired ecological outcomes it is essential that we work with all of the stakeholders who have a hand in shaping these lands. The private lands CCAA program is available to all private rangelands with sage-grouse habitat in Oregon and therefore we work closely with the multitude of managers, organizations, and agencies who work on these lands in order to coordinate funding and project implementation. Additionally, we need to coordinate with other land managers who are working in this ecosystem to coordinate cross-boundary treatments and grazing systems to fully address threats at the landscape scale. Finally, we are working in a changing environment and the science and technology to address the threats to the landscape are evolving quickly. Therefore we must also rely on technical partners to advise on our methods and drive effectiveness. This array of partners is split into three groups according to their level of involvement in the CCAA program.

The OACSC consists of three Partnership categories all of which must be committed to the shared vision:

> *Our vision is to increase landscape and community resilience by fully implementing the Sage-Grouse CCAA program on private lands across Oregon's sagebrush ecosystem. Through the CCAA program, we will improve sage-grouse habitats and increase populations using methods that benefit working lands, wildlife populations, intact plant communities, and restoration economies so that they are viable long into the future.*

All three partnership categories agree to use best practices to enhance sage-grouse habitat because the sagebrush steppe is a brittle ecosystem that becomes more challenging and expensive to restore as resilience declines. Due to the need to balance agricultural production, real estate value, big game habitat, and sage-grouse habitat, restoration goals can add complexity to conservation decision-making. All partners seek to achieve this balance in project design and implementation and to use the best available science to guide conservation efforts. The OACSC expects that while over time individual representatives may pursue other career opportunities, each participating organization will continue to engage in the partnership and other highly qualified individuals will successfully assume the responsibilities necessary for the continued success of the OACSC.

The Partnership utilizes a Coordinator to facilitate and convene the group's quarterly meetings, maintain the CCAA database structure, provide training opportunities, and assist in funding and communication strategies. The CCAA Coordinator is selected by the Core Partners on a biennial basis. The coordinator signs a non-disclosure agreement with all of the counties in order to work with their location data and monitoring inventory. This facilitates coordination across counties, prioritization of work and investment, and cumulative progress monitoring.

The partnership categories are shown in Figure 1 and they are described in more detail in the Partnership Governance Document *Section 3: Roles and Responsibilities.*

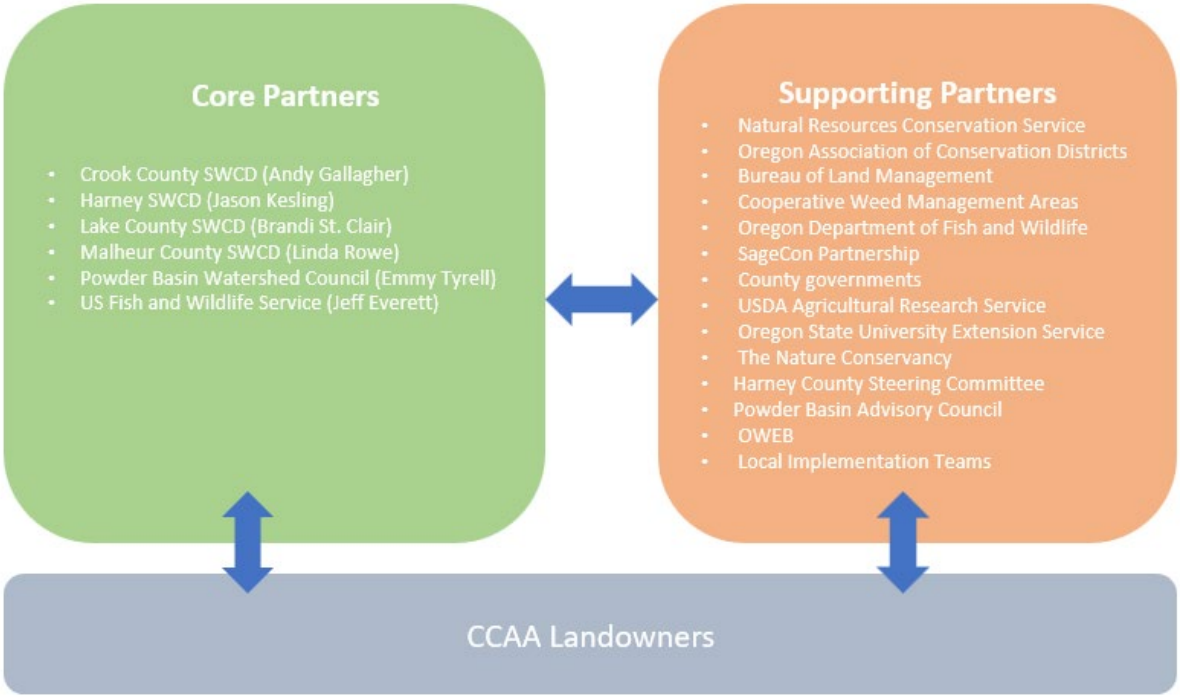


Figure 1: OACSC Partnership Categories

4. Geographic Scope and Timeline

Geographic Scope

The scope of the project area is all occupied sage-grouse habitat in Oregon which includes areas of Baker, Crook, Deschutes, Grant, Harney, Lake, Malheur, and Union Counties (Figure 2). There are nearly 18 million acres of sage-grouse habitat within the CCAA geography; approximately 69% is BLM-owned, 24% is privately-owned, and the remaining 7% is split among lands managed by the State of Oregon, U.S. Forest Service (USFS), Bureau of Indian Affairs, Bureau of Reclamation, USFWS, and the U.S. Department of Agriculture. Agreements with other counties allow Crook and Harney SWCDs to administer CCAA enrollments on lands within Deschutes and Grant counties respectively.

The primary focus of the OACSC is the development and implementation of CCAAs on the nearly 3.5 million acres of privately-owned sage-grouse habitat in the CCAA geography. However, the majority of livestock operations in Eastern Oregon rely on grazing permits or leases on public lands in addition to their private holdings. Therefore, coordination with the appropriate management agencies (BLM, USFS, and Oregon Department of State Lands [DSL]) is necessary to ensure that CCAA SSPs for private lands are developed in a manner that accounts for management considerations and restrictions on associated public lands, such that the final SSPs are workable and compatible with the livestock operations as a whole. This comanagement of the rangelands in Oregon also emphasizes the need to work with these

entities and with the Local Implementation Teams to develop implementation strategies that account for the cross boundary nature of threat-based land management.

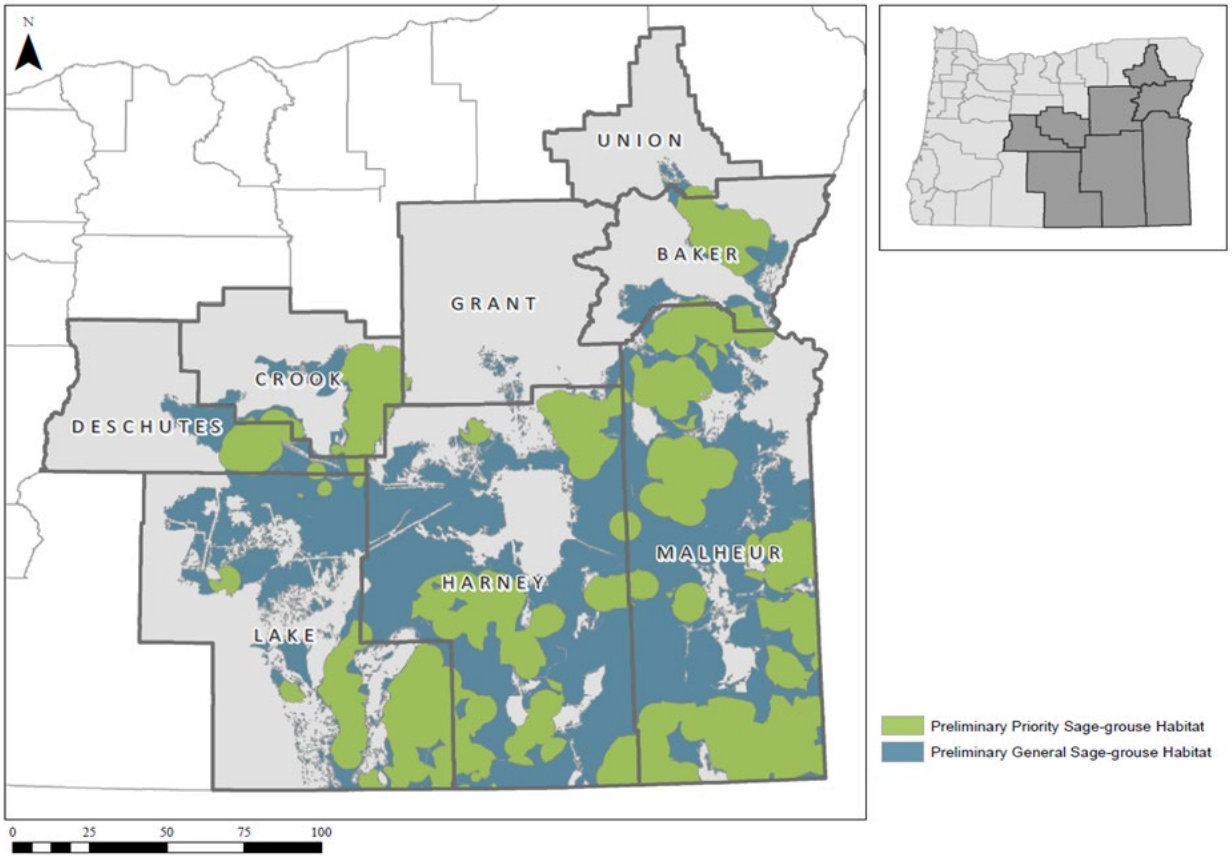


Figure 2: Sage-grouse habitat in Oregon is located in the sage steppe ecosystem of the southeastern counties. This is designated by Oregon Department of Fish and Wildlife based on lek locations, brood routes and GPS collar data.

In addition, the OACSC will continue to look for opportunities for enrolled landowners to implement conservation measures in their SSPs in a coordinated and collaborative manner to achieve landscape scale conservation with greater efficiency. For example, where partners such as BLM, Cooperative Weed Management Areas (CWMAs), or others are planning restoration projects, the SWCDs and PBWC will facilitate participation of enrolled landowners in the project vicinity - providing coordination, and technical and financial assistance – resulting in larger scale restoration projects that are more economically efficient.

Physical Geography

The geography aligns very closely with three Major Land Resource Areas (MLRAs); MLRA 10 – Central Rock and Blue Mountain Foothill, MLRA 23 – Malheur High Plateau, and MLRA 25 – Owyhee High Plateau. MLRA 10 covers the northern geography, including portions of the Deschutes, Crook, Grant, Harney, Malheur, Baker and Union Counties. This MLRA is typified by gently rolling to steep hills, plateaus, and low mountains. MLRA 23 covers the majority of the southern portion, including parts of Deschutes, Crook, Lake, Harney, and Malheur Counties. MLRA 23 consists primarily of nearly level to moderately steep

plateaus, basins, and valleys bordered by long, gently sloping alluvial fans. MLRA 25 covers the southeastern portion of the geography in Malheur County. This MLRA is characterized by uplifted fault-block mountain ranges separated by narrow desert plains and deep narrow canyons draining into the Snake River.

Timeline

This SAP is currently intended to be maintained and effective through 2045 which is the temporal extent of the CCAAs. Future efforts are being discussed and will depend on future potential listing decisions and the potential to renew or rewrite the CCAA when it expires. OACSCs objective with regards to long term viability is to support the future goals of landowners to restore and maintain sage steppe habitat. This goal does not necessarily call for our partnership to end in 2045, but instead to respond to the needs of landowners and other partners to provide support associated with sage steppe habitat restoration and maintenance.

The OACSC's geography is very large. Because this sage-steppe region is so vast, we incrementally partitioned our efforts to work in selected portions of our overall geography. During 2016-2021, the Harney, Lake, and Malheur SWCDs focused work in their OWEB Focused Investment Partnership focal area (FIP Phase 1 Focal Area, Figure 3), while the Crook SWCD and Baker SWCD/PBWC continued the CCAA effort throughout Crook/Deschutes and Baker/Union counties, respectively. With significant accomplishments in the FIP Phase 1 geography and ongoing demand for CCAA enrollment in additional areas, the OACSC prioritized a new sub-portion of the overall focus area for work during 2024-2030 (FIP Phase 2 Focal Area, Figure 3). Work will continue in Baker and Union counties with OWEB funding through 2024 provided to the PBWC through the Baker Sage-grouse Focused Investment Partnership. The profile included below describes the overall OACSC area of work. Future work is intended using funding through partners including but not limited to private landowners, OWEB, NRCS, BLM, USFWS, ODFW and NFWF.

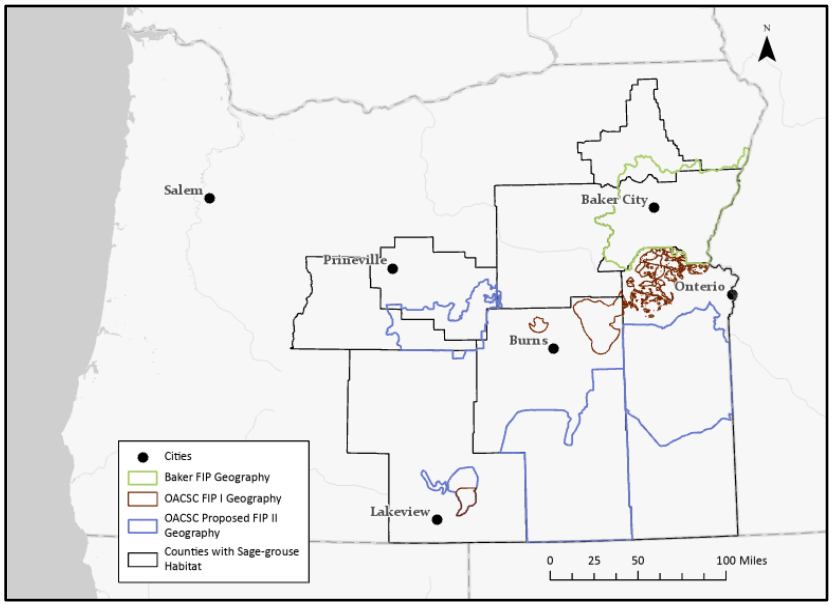


Figure 3. OACSC FIP Phase I focal area, 2016-2021 (brown), Baker LIT FIP 2019-2025 (green) and Proposed OWEB Phase II FIP focal area, 2024-2030 – (blue).

5. Vision

Our vision is to increase landscape and community resilience by fully implementing Sage-Grouse CCAA program on private lands across SE Oregon's sagebrush ecosystem. Through the CCAA program, we will improve sage-grouse habitats and increase populations through methods that benefit working lands, wildlife populations, intact plant communities, and restoration economies so that they are viable long into the future.

Figure 4. Collaboration among many partners is essential to accomplishing the vision of the Oregon All Counties CCAA Steering Committee.

6. Ecological Priorities and Goals

The overarching ecological outcome of the Partnership is to strategically plan and implement conservation treatments on a landscape scale to increase the quantity and quality of sage-grouse habitat and ultimately increase sage-grouse populations statewide. This Strategic Action Plan has evolved since 2015 to include new and/or revised strategies, goals, and objectives that reflect the OACSC's progress, accomplishments, and lessons learned. Some former goals and objectives have been restructured or removed to more clearly articulate and measure progress towards the overall aim of the OACSC.

The Strategic Action Plan establishes OACSC's plan of work for a thirty-year period and is organized according to four goals with corresponding sub-categories. An overview of the SAP is provided in Table 1 and a comprehensive version of the SAP is included in Appendix B: Detailed Work Plan. This work plan documents actions, anticipated outputs, metrics, and baseline and effectiveness monitoring for documenting the OACSC's progress. Additionally, Appendix B conveys how each objective operates within our Theory of Change (Figure 7) to ultimately accomplish our overarching ecological outcome.

Figure 5. Removing encroaching junipers increases the amount of quality sagebrush habitat available. Private landowners, NRCS, BLM, SWCDs, USFWS and other partners have cooperated to treat hundreds of thousands of acres of sagebrush habitat since 2010.

Table 1: Overview of Oregon All Counties CCAA Steering Committee Strategic Action Plan.

GOAL 1: Ensure the administrative framework and capacity exists for Programmatic CCAA throughout the life of the CCAA.			
Strategy 1	This strategy focuses on ensuring the **administrative framework and capacity** to enroll private lands in the Greater Sage-grouse Programmatic CCAAs and execute site specific plans. Aspects of this strategy include ensuring adequate staffing within each county, providing All County CCAA Coordination, maintaining the CCAA database, and communication/coordination with state-wide external partners to relay CCAA progress and accomplishments to remain engaged with state-level partners and funders.	**Sub-categories**	**Administrative capacity** **Administrative framework** **Statewide communication and outreach**
GOAL 2: By 2045, a minimum of 40% of eligible acres will be enrolled with a signed SSP, USFWS letter of concurrence, and issuance of a certificate of inclusion			
Strategy 2	This strategy focuses on **Landowner Outreach and enrollment and supporting partner communication.** Actions will increase the number of enrollments by direct outreach from core partners and additional outreach through the advocacy of supporting partners.	**Sub-categories**	**Landowner outreach and supporting partner communication** **Landowner enrollment**
GOAL 3: By 2045, implement 90% of the conservation measures that are prescribed in signed SSPs to guide conservation measures to address threats to sage-grouse on enrolled lands.			
Strategy 3	This strategy focuses on implementation actions **to grow and defend core sage-grouse habitat by reducing threats.** The actions are focused on treatments that will maintain or improve the ecological condition of sage-grouse habitat and reduce direct and indirect sources of sage-grouse mortality. This may include assisting landowners to apply for funding to implement conservation measures.	**Sub-categories**	**Technical assistance** **Wildfire Threat** **Invasive Annual Grass Threat** **Juniper Threat** **Grazing Management**
GOAL 4: Monitor 100% of SSPs for the life of the CCAA and complete required reporting to assess effectiveness.			
Strategy 4	This strategy focuses on the work that is required for ongoing **monitoring and reporting** of enrolled properties, not only a requirement per the terms of the Programmatic CCAAs, but also to document progress towards the goals stated above and to guide adaptive management of conservation measures.	**Sub-categories**	**Monitor** **Report** **Changed circumstances**

7. Conservation Context

a. Biophysical Context

The CCAA geography in Oregon includes portions of Baker, Crook, Deschutes, Harney, Lake, Malheur, and Union Counties. There are portions of nine river basins in the CCAA geography with nearly all of these river basins dominated by sagebrush steppe uplands, with higher elevations and headwaters containing forested landscapes and steeper slopes. Most of the precipitation falls during the winter as snow, and all of these basins are fed by snowmelt. Snowpack-fed stream flows are an important source of water for irrigation, fish, wildlife, livestock, domestic water supply and other uses (ODFW 2016).

Our current area of focus falls within the Blue Mountains and the Northern Basin and Range geological regions. The Blue Mountains region formed thousands of years ago by lava flowing from cracks in the earth's crust and covers most of Eastern Oregon and extends into Washington and Idaho. Most of the Blue Mountain region is rugged with the Blue Mountains and the Wallowa Mountains in the northeast. The Snake River flows within Hells Canyon and creates the border between Oregon and Idaho with the average depth of this gorge being 5,500 feet. Predominantly forested, mountainous ecological regions surround arid sagebrush steppe and grassland. It consists of arid tablelands, intermontane basins, dissected lava plains, and widely scattered low mountains (ODFW 2016).

The Northern Basin and Range ecoregion covers the southeastern portion of the state from Burns south into Nevada and Christmas Valley east into Idaho. The landscape is made up of numerous flat basins separated by isolated mountain ranges. This is Oregon's driest ecoregion with extreme daily and seasonal temperature fluctuations. Desert-like conditions exhibit a precipitation range of 8-12 inches per year. Sagebrush plant communities dominate the landscape. The isolated mountain ranges contain few forests and woodlands with primarily aspen and mountain mahogany stands at the higher elevations. The soils are typically rocky, low in organic material, and high in minerals (ODFW 2016).

Sage-grouse are an indicator species which occupy Eastern Oregon's landscapes for their abundant sagebrush habitats and grassland systems (Figure 6). Much of this area consists of contiguous sagebrush habitats which span private and public ownership, totaling over 18 million acres of sagebrush habitat in Oregon alone. According to the ODFW's Conservation Strategy, wetlands provide important habitat for migrating and breeding waterfowl, shorebirds, water-birds, songbirds, mammals, amphibians and reptiles (ODFW, 2016). Water is extremely limited throughout much of Eastern Oregon, including much of the range occupied by sage-grouse. As a result, there is competition for water resources, particularly in late summer. According to research conducted by Intermountain West Joint Venture, 80% of the existing brood-rearing wetland habitat is located on private land. These areas are of particular importance during late brood rearing when water is limited in sagebrush habitats (Donnelly et al. 2016). Historically, sage-grouse were commonly found on these landscapes, however, in the early 1900's their numbers were reduced dramatically in comparison to historic levels (ODFW 2020). Although sage-grouse population numbers have dropped 98% from historic numbers, it is not an ESA-listed species. The species is currently categorized as a "sensitive species" and considered "near threatened" with predictions that the population levels will continue to trend downward (Endangered Species Coalition 2020).

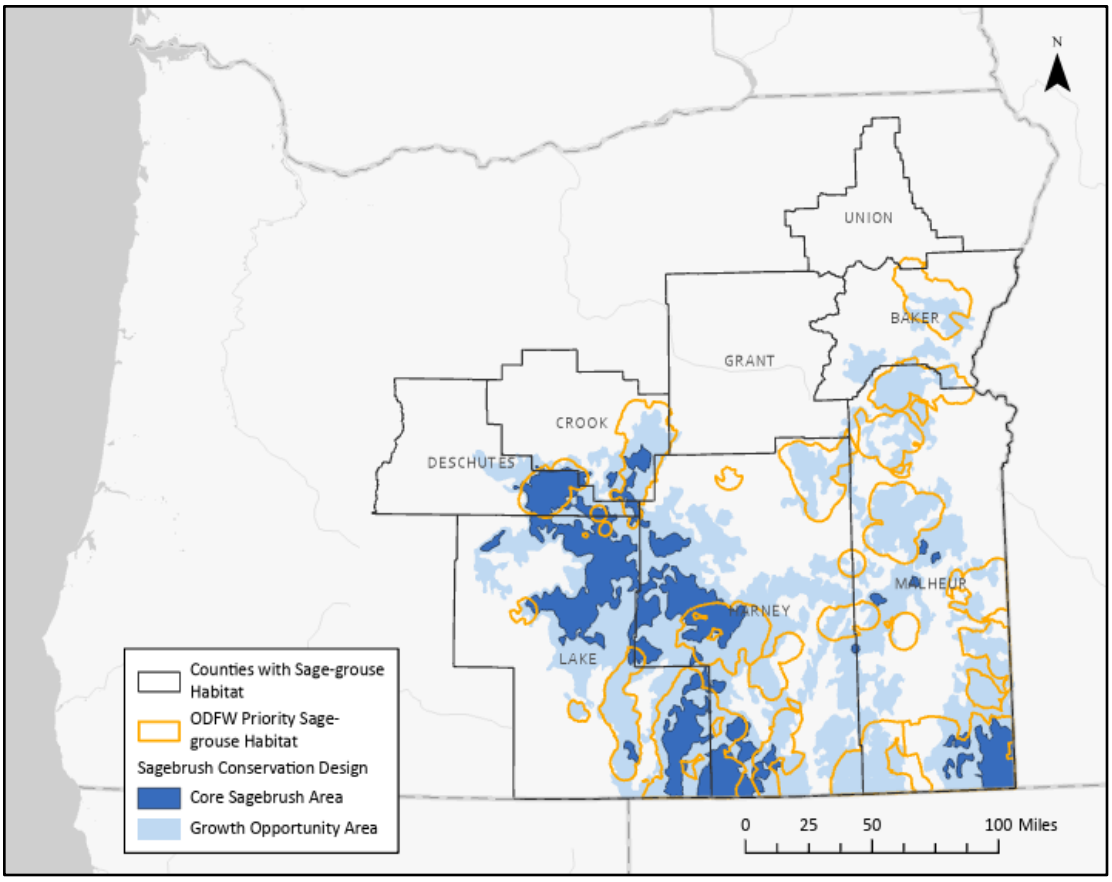


Figure 6. Habitat designated by ODFW as priority areas for sage-grouse overlaps largely with the areas identified in the Sagebrush Conservation Design (Dougherty et. al 2022) as Core Sagebrush or Growth Opportunity Areas. Emphasizing the need for and ecosystem based approach to sage-grouse habitat restoration.

Although the focus of the Programmatic CCAAs is sage-grouse, numerous other wildlife species inhabit the sagebrush ecosystems of the OACSC geography. These other species are discussed in this section. The mix of shrubs and herbaceous plants found in sagebrush ecosystems and associated communities provides habitat for a large number of other vertebrates. Table 2 lists species associated with sagebrush ecosystems and their status in Oregon along with their federal listing.

Table 2. Terrestrial and aquatic vertebrate species associated with sagebrush ecosystems and status[1] in Oregon.

	Common Name	Scientific Name	ODFW Status	USFWS Status
Birds	Ferruginous hawk	*Buteo regalis*	S	NL
	Burrowing owl	*Athene cunicularia*	SC	NL
	Short-eared owl	*Asio flammeus*	NL	NL
	Vesper sparrow	*Pooecetes gramineus*	NL	NL
	Lark sparrow	*Chondestes grammacus*	NL	NL
	Brewer's sparrow	*Spizella breweri*	NL	NL
	Black-throated sparrow	*Amphispiza bilineata*	NL	NL
	Sage sparrow	*Artemisiospiza nevadensis*	NL	NL
	Grasshopper sparrow	*Ammodramus savannarum*	NL	NL
	Western meadowlark	*Sturnella neglecta*	NL	NL
	Greater sage-grouse	*Centrocercus urophasianus*	S	NL
	Sage thrasher	*Oreoscoptes montanus*	NL	NL
	Loggerhead shrike	*Lanius ludovicianus*	S	NL
	Green tailed towhee	*Pipilo chlorurus*	NL	NL
	Yellow-billed cuckoo	*Coccyzue americanus*	NL	LT
Mammals	Preble's shrew	*Sorex preblei*	NL	NL
	Pygmy rabbit	*Brachylagus idahoensis*	S	NL
	Sagebrush vole	*Lemmiscus curtatus*	NL	NL
	Black-tailed Jackrabbit	*Lepus californicus*	NL	NL
	White-tailed Jackrabbit	*Lepus townsendii*	S	NL
	Kit fox	*Vulpes macrotis*	LT	NL
	Pronghorn	*Antilocapra Americana*	NL	NL
	Mule Deer	*Odocoileus hemionus*	NL	NL
Reptiles	Northern Sagebrush Lizard	*Sceloporus graciosus graciosus*	NL	NL
	Mojave black-collared lizard	*Crotaphytus bicinctores*	NL	NL
	Longnose leopard lizard	*Gambelia wislizenii*	NL	NL
	Striped whipsnake	*Masticophis taeniatus*	NL	NL
	Ground snake	*Sonora semiannulata*	NL	NL
Aquatic	Bull trout	*Salvelinus confluentus*	SC	LT
	Warner sucker	*Catostomus warnerensis*	LT	LT
	Hutton spring tui chub	*Siphateles bicolor* ssp	LT	LT
	Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	LT	LT
	Redband trout	*Oncorhynchus mykiss*	S	LT
Amphibians	Long-toed salamander	*Ambystoma macrodactylum*	NL	NL
	Northwestern salamander	*Ambystoma gracile*	NL	NL
	Great Basin spadefoot toad	*Spea intermontana*	NL	NL
	Western toad	*Anaxyrus boreas*	S	NL

	Woodhouse's toad	*Bufo woodhousii*	NL	NL
	Columbia spotted frog	*Rana luteiventris*	SC	NL
	Northern leopard frog	*Rana pipiens*	NL	NL
	Pacific tree frog	*Pseudacris regilla*	NL	NL
	American bullfrog	*Lithobates catesbeinus*	NL	NL
	Tiger salamander	*Ambystoma tigrinum*	NL	NL
	Oregon spotted frog	*Rana pretiosa*	NL	LT

[1]Sensitive species codes begin with "S" and are further defined as follows: S = sensitive; SC = critical. Listed species codes: LE = listed as endangered and LT = listed threatened. NL Denotes a species not listed as sensitive by the Oregon Department of Fish & Wildlife or the United States Fish & Wildlife Service (Source: ODFW 2021, USFWS 2023).

b. Social Context

The eight counties within the CCAA geography make up a large portion of the Eastern Oregon landscape. Land ownership is split with 68% being privately held, 32% owned by state and federal government, and >1% owned by indigenous nations. Most of the private land within occupied sage-grouse habitat are Approximately 3.5 million acres of sage-grouse habitat occurs on private land. Many of these lands are zoned Exclusive Farm Use. This zoning designation specifies a minimum parcel size of 160 acres and 80 acres for irrigated parcels. This minimum parcel size helps to conserve large contiguous tracts of sagebrush habitat. The most prevalent development type on these lands, besides agricultural, is housing related to farm use. Other uses may be permitted either administratively (e.g. accessory dwellings in conjunction with farm use) or by conditional use permit (e.g. mining operations); (Harney County 2013).

Land use on private lands is dominated by agriculture with only small portions in private timberlands, mining, and urban areas. Federal and State holdings are also largely agriculturally driven but are considered multiple use lands with recreation, conservation, and other values being considered in management decisions. Livestock grazing and irrigated agriculture for livestock feed are the primary driving factors in agriculture within our area of interest. Timber management, mining, and tourism also contribute to the economic base for much of the area, with visitors drawn to the area for hunting, fishing, skiing, and other outdoor activities.

The increased cost of land and associated increases in the cost of living threaten the economic viability of agricultural operation in Eastern Oregon. Most areas are undergoing a slow shift from family owned and operated farms and ranches to corporate and absentee ranches. Additionally, pressure from the conservation community is driving a shift from agricultural operations to areas managed exclusively for watershed resources, habitat, open space and non-agricultural land uses. These shifts are not negative by themselves but when taken together they do place increasing economic pressure on locally owned and stewarded working lands which are important for the conservation of vast open areas necessary for sage-grouse conservation. Increased economic pressure also contributes to landowners struggling to fund large-scale restoration projects. This is illustrated by considering that Malheur, Lake, Baker, Harney, Union, Crook, and Grant Counties represent the #1, #4, #6, #8, #10, #12, and #13 are of Oregon counties with the lowest per capita personal income, respectively. Deschutes County is ranked #33 which is not

unexpected considering Deschutes County contains some of the largest population centers within the CCAA area (State of Oregon, 2022).

Renewable energy like wind and solar power are also beginning to creep into the planning discussions on both public and private lands. This emerging industry would likely present challenges to managers concerned with conserving sage-steppe habitats, especially for species in need of large areas of habitat like sage-grouse.

The sage-steppe area of Eastern Oregon is relatively sparsely populated when compared to other areas of the state. Cities and towns that drive land use and economic activity within sage-grouse habitat include Bend, Redmond, Prineville, Baker City, Ontario, Vale, Lakeview, and Burns/Hines. Many other smaller agricultural communities are spread throughout the area but their impacts tend to be relatively minor. According to the U.S. Census, the eight counties which currently encompass all occupied sage-grouse habitat within Oregon combine for a population of just over 350,000 which is less than 9% of the population of the state. Those eight counties also represent over 44% of the land area of the state putting the population density at just over eight people per square mile on average, with the majority concentrated in a few urban areas.

Although we will not be working in partnership with any tribal governments within our focus area, the Burns Paiute Tribe does reside in Harney County and the Fort McDermitt Indian Reservation is on the Oregon-California border in Malheur County. Other tribal governments have ceded lands which overlap with our area of interest where traditional hunting and gathering rights are protected.

c. Historical Context

Greater sage-grouse conservation efforts are taking place across a 165-million-acre expanse of sage-grouse habitat that includes areas within eleven western states. In Oregon, the All Counties Steering Committee (SWCDs, PBWS and USFWS) is focused on 18 million acres and eight Eastern Oregon counties.

Within the CCAA geography, there is a long history implementing conservation actions to improve limiting factors associated with sage-grouse and sage-grouse habitat. Targeted restoration began with the Sage-Grouse Initiative (SGI), which was formed in 2010 as a partnership of ranchers, agencies, universities, and nonprofit groups working together with a shared vision of achieving wildlife conservation through sustainable ranching (Oregon State University 2018). The Natural Resource Conservation Service (NRCS), along with ODFW, USFWS, and the SWCDs in each county worked together to utilize funding opportunities through the Farm Bill to implement conservation projects on private land that would benefit sage-grouse and enhance habitat conditions. These Sage-Grouse Initiative (SGI) projects, which focused on removing juniper and treating invasive annual grasses, led to thousands of acres being treated to improve the sage-grouse dilemma.

As of 2022, the estimated sage-grouse population in Oregon is 17,508 individuals and has increased by 9.9% since 2021, representing the third year of statewide population increase following three consecutive years of decline (2017-2019; Oregon Department of Fish and Wildlife 2021). However, the 2022 estimate

is still the seventh lowest estimated sage-grouse population in Oregon during the analysis period of 1980-2022. During 2021-2022, population increases occurred in the Burns and Vale BLM Districts, and the population within the Lakeview and Prineville BLM Districts declined but remained above survey goals for the districts. The population in the Baker BLM Resource Area decreased slightly but this is being attributed to reduced survey efforts from limited or no access to some leks on private land and this survey reduction difficulties is expected to continue in future years. ODFW's population management objective is a minimum of 30,000 individuals (Oregon Department of Fish and Wildlife, 2022).

Baseline conditions and threats to sage-grouse within the scope of our SAP geography are characteristic of those that are documented across the range of sage-grouse in Oregon and the western United States. These conditions are described in key documents that are listed by their geographic scope from the entire range of sage-grouse to state and local levels:

- U.S. Fish and Wildlife Service, Conservation Objectives Team Report (COT Report, 2013) - summarizes the current status of sage-grouse and threats across the range and conservation objectives.
- Oregon Department of Fish and Wildlife Sage-grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat (ODFW Conservation Strategy, 2011) - includes a description of sage-grouse habitat and factors related to habitat loss in Oregon circa 2011.
- Oregon Sage-Grouse Action Plan (State Action Plan, SageCon, 2015) - provides a comprehensive inventory of all threats to sage-grouse and estimates the spatial extent of the primary limiting factors compromising habitat condition in Oregon as of 2015.
- SageCon Annual Rangeland Conditions Report (SageCon, 2021) - provides an annual assessment of the ecological state of rangelands across Eastern Oregon.
- SageCon Invasive Geographic Strategy (SageCon, 2021) - provides maps of intact, transitioning, and degraded habitat, each representing increasing degrees of invasive annual grasses and provides a framework for prioritizing work to address this threat within Eastern Oregon.
- Candidate Conservation Agreement with Assurances (CCAA, 2015) - each programmatic CCAA describes the habitat, water resources and quality, land uses and ownership, and socio-economics at the scale of the corresponding county(ies) for which it provides coverage.
- Oregon All Counties CCAA Steering Committee Strategic Action Plan (SAP, 2016 and 2022) - synthesizes data from the aforementioned plans to comprehensively discuss baseline conditions across the entire CCAA program area within eight counties.

The OACSC collaborates with other organizations involved in conservation actions within sage-grouse habitat. What separates the OACSC from other organizations is that core partners are focused on conservation actions that improve sage-steppe and sage-grouse habitats, within the Programmatic CCAAs, while other organizations may administer additional programs or address other watershed concerns outside of the Partnership's purview. In each county, public land management agencies such as the BLM, Department of State Lands, and US Forest Service are also addressing sagebrush steppe habitat needs, and other agencies, such as the NRCS (EQIP), conduct complementary work on private lands often

in coordination with work identified in the SSPs. The following includes some highlights of activities undertaken by other organizations operating in the CCAA geography:

1) *Crook/Deschutes Counties:* Habitat in Crook and Deschutes County is administered under the same CCAA with Crook SWCD holding the permit and handling all enrollment within Deschutes County. Deschtues SWCD sometimes partners on projects to restore sage-grouse habitat as part of this effort. The Crooked River Watershed Council identified restoration activities, which complement the activities of the OACSC and the watershed as a whole, but have focused on goals and ecological priorities that include more fish and instream priorities. To support these actions, they will be applying for OWEB Open Solicitation grants to fund these efforts. The Prineville LIT worked within our CCAA geography to engage stakeholders and create a Threats Reduction Plan to encompass future conservation work to be implemented by all stakeholders in the region. The Crooked River Weed Management area has been working on invasive plant control within the CCAA geography and will continue to do so.

2)*Harney County:* Harney County has a complex group of entities that work together in the management and conservation of natural resources with special consideration given to its rural communities and economic impacts. An example of one such group is the Harney County Wildfire Collaborative. The Collaborative works to address wildfire concerns in the county and has been focused in the Lone Pine area to create a large-scale fuel break and fire management plan to protect the livelihoods of the local community and preserve existing healthy wildlife habitats. As part of the collaborative, Harney County Watershed Council and the High Desert Partnership are proposing a project that would encompass the Stinkingwaters treatment area, and a portion of our proposed FIP. This project has been proposed for funding available through Oregon Senate Bill 762 (SB762), legislation directed to address wildfire risk throughout the state, and other sources and would complement the efforts proposed in our FIP.

3)*Lake County:* The Lake County All Lands Initiative is planning and implementing strategic actions to reduce the risk of wildfire by proactively thinning conifer and juniper forest stands and addressing invasive annual grasses within priority areas identified as a state limiting factor “Dry Forest Type FIP geography”. The partnership is applying for a FIP Initiative focused on upper watershed conditions. The Initiative’s treatments are strategically designed to reduce the risk of wildfire using actions that are less relevant in sagebrush steppe habitats.

4) *Malheur County:* The Owyhee Watershed Council works in the same areas as the CCAA program in Malheur County. The Council’s ecological priorities are focused on aquatic habitat, instream restoration, and agricultural conversion projects that will improve riparian area function. The Council’s work is complementary to the OACSC effort because of its aquatic versus upland focus. The Council is currently in a partnership with NRCS to implement a Regional Conservation Partnership Program (RCPP) to conduct these activities. The Council may apply for Open Solicitation funding through OWEB to complement these efforts in the coming years. The Malheur LITs are also in the process of coalescing around future conservation work to be implemented by all stakeholders in the region.

5) *Baker/Union counties:* Implementation of the Programmatic CCAA in Baker and Union counties occurs with strong coordination and partnership with the Baker LIT. This highly functional collaborative includes

stakeholders from ODFW, Tri-County Cooperative Weed Management Area, NRCS, USFWS, BLM, PBWC, and private landowners. The LIT's targeted ecological outcome is an increase in the quantity and quality of sage-grouse habitat and ultimately an increase in the Baker sage-grouse population. With FIP funding, the group is currently implementing several actions in its Comprehensive Sage-grouse Threat Reduction Plan (TRP): 1) treat invasive annual grass/noxious weeds; 2) augment understory vegetation; 3) enhance mesic habitat; 4) reduce anthropogenic subsidies to sage-grouse predators; and 5) remove juniper.

6) *Grant County:* Grant County contains roughly 100,000 acres of identified sage-grouse habitat. Harney SWCD, as the permit holder, has partnered with Grant SWCD to complete their site specific plans for CCAA enrollments. Grant SWCD works cooperatively with other agencies and landowners to treat conifer encroachment and invasive annual grasses on private lands across the county. Programs include the USFS Collaborative Forest Landscape Restoration Program, Landscape Resiliency Project, Southern Grant County Hazardous Fuels Reduction, and an NRCS Regional Conservation Partnership Program.

d. Climate Impacts

Climate change in combination with management practices including fire suppression, poor resource practices, and development have eroded ecosystem resilience as evident in the increasing frequency and severity of wildfires, as well as drought and water scarcity. Weather records detailing long term temperatures over the past three decades reveal a slow but steady rise in summer temperatures across Oregon and our focal geography. Specifically, a recent review projected the Northern Great Basin will experience increased temperatures, drier summers and more variable and unpredictable annual precipitation (Mote et al. 2012). Some research suggests that annual precipitation may increase overall, but summers are projected to be drier with 5-10 percent less precipitation than present averages. With warmer winter temperatures, winter precipitation will more commonly fall as rain instead of snow, with a corresponding degree in the amount of water stored in the snowpack and the amount of time the snowpack is present on the landscape. While this warming trend is clear, the data also highlight considerable year to year variability – which complicates management decisions when it comes to conservation strategies.

These weather patterns have important effects on sage-grouse ecosystems. While climate change does not create all the problems sage-grouse are facing, it tends to exacerbate existing issues, making conditions worse than they already are. Existing threats like wildfire, invasive annual grasses, and juniper encroachment are increasing across the landscape, directly impacting sage-grouse habitat. While these issues pose the greatest threat for sage-grouse, there are other concerns as well. Warming trends also reduce the number of "growing days" for forbs and native grasses. Vegetation is drying out and senescing earlier than it was historically. This results in lower digestible energy for sage-grouse and other sage-steppe obligate species. Stream flow is also impacted as seasonal snowpack is less reliable with current weather patterns. Each of these concerns is strongly linked to unusually warm and dry summers. These threats are interrelated and cumulatively contribute to sage-grous habitat loss and fragmentation (Miller et al. 2005; Miller et al. 2008).

The following addresses threats and how proposed conservation actions will improve ecosystem resilience:

Wildfire: Several climate models predict that parts of Oregon will experience more frequent high severity fires over the next several decades. Wildfire is one of the primary factors linked to population declines of greater sage-grouse because of the long-term loss of sagebrush and conversion to invasive annual grasses (Connelly and Braun 1997, Johnson et al.).

Strategies for reducing the negative effects of wildfire include reducing juniper fuels, improved fire-fighting tactics, promoting sound grazing management, and limiting the extent of invasive annual grasses. Several conservation actions can help improve plant community recovery after wildfire. These include restoring impacted areas by seeding with approved mixtures, treating invasive species, and encouraging grazing rest until burned areas are recovered.

Annual Invasive Grasses: Climate change is expected to increase productivity of invasive grasses in response to elevated nitrogen and CO2 and increased nutrient and water use efficiency (Ziska and George, 2004), exacerbating and increasing the scale of an already serious ecological issue. Invasive grasses are well equipped to spread into areas where conditions become drier and warmer. Most invasive annual grasses easily disperse and can produce vegetative shoots in the same growing season in which they emerge, thus their likelihood of becoming a successful plant invader, even in very cold ecosystems, may be increased over noninvasive plants (Kerns et al. 2020).

The Initiatives conservation actions employ a 3-pronged approach to improving the ecosystem resiliency with regard to invasive annual grasses; 1) maintain plant community composition through proper management, 2) inventory and mapping of infestations and intact plant communities, and 3) treatment of infestations starting with areas with the highest likelihood of recovery. The SageCon invasives geographic strategy maps spatially represent these approaches in a spatial context for landscape-scale conservation. Strategies to address the impacts of drought as a result of climate change include maintaining vegetation composition. This is accomplished through grazing management and drought planning in order to maximize the benefit of the plants that are already established. Additional actions would include addressing invasive species and seeding desirable species.

Water Availability: Projected climate patterns indicate that stream temperature will increase and water supply in general will be much lower. Less available water impacts riparian areas, spring sources and wet meadows, which impact sage-grouse populations that depend on these systems for all life stages.

To protect and enhance mesic areas (riparian and wet meadows) the Initiative will focus on maintenance of intact systems and repair of degraded mesic areas. We will encourage maintenance of these systems by ensuring proper grazing management landscape wide, protecting sensitive areas (e.g., springs and riparian areas), and providing off site water. Repair of degraded systems will include control of invasive species, protection of sensitive areas, planting of appropriate vegetation, and strategies to restore floodplain function.

Given that change is expected to increase pressure from many of the existing ecological threats, the Partnership will employ treatments across the focal area to counter climatic processes that are anticipated to threaten sage-grouse habitat integrity. We will monitor ecological response to completed treatments to adapt our treatment methods in an evolving environment. We will share project successes and deficiencies to improve broader community understanding of sage-steppe restoration practice. The partnership is committed to the restoration of resilient ecosystems and will work to consider climate change in all planning and implementation.

Drought: While vegetation in sage-steppe ecosystems is adapted to arid conditions, drought as a result of climate change has pronounced impacts on shrubs, grasses, and forbs. For instance, during drought, sagebrush and other vegetation produces fewer stems, leaves, and flowering shoots, and has smaller canopy coverage (Miller et al. 1991). Drought also impacts insect populations. For sage-grouse, these plant and insect sources are vital to their existence as they provide dietary sustenance for sage-grouse during brood rearing (Drut et al. 1994). During dry years, sage-grouse switch to a sagebrush diet earlier in the year. Reduced forbs and insects and higher amounts of sagebrush in chick diets have been linked to lower chick survival (Drut et al. 1994).

Sage-grouse habitat across Oregon is threatened by historic and ongoing fragmentation by human development, changes to native plant communities and impacts of catastrophic wildfires. In some areas native shrubs and grasses have largely been replaced by invasive annual grasses and historic fire suppression has encouraged the expansion of juniper. The invasive grasses provide inadequate cover for sage-grouse nesting and are highly flammable, promoting more frequent and more severe wildfires. Juniper encroachment, invasive grasses and the increased incidence and severity of wildfires prevent the persistence and/or re-establishment of native plant species.

8. Theory of Change

The results chain (Figure 7) articulates the OACSC's theory of change by displaying the relationships between strategies, implementation outputs and the intermediate ecological results partners predict will occur in response to strategy implementation. These links in the chain will ultimately lead to accomplishing the FIP's ecological priorities. The theory of change also provides a framework for the partnership to measure progress in both the near and long term, and to identify where uncertainties might exist with regards to confidence of predicted outcomes between results.

The OACSC's theory of change describes the strategies and actions outlined in this SAP which will reduce or eliminate factors limiting sage-grouse and their habitats primarily on privately owned land, but also adjacent state and BLM-managed acres in Crook, Deschutes, Harney, Lake, and Malheur counties. This work represents important contributions to the larger regional scale efforts to recover and conserve sage-grouse. The strategies focus primarily on reducing the spatial extent of undesirable plant communities dominated by juniper and invasive annual grasses. It is predicted that a reduction in the number of undesirable plant species will promote an increase in the extent and connectivity of the desired plant communities necessary to support all life stages of sage-grouse. It is also predicted that the strategies will

reduce the frequency and severity of wildfires and allow the establishment and long-term stability of desired plant communities.

Strategy 1: This strategy ensures the administrative framework and capacity to enroll private lands in the Greater Sage-grouse Programmatic CCAAs and execute site specific plans. Aspects of this strategy include ensuring adequate staffing within each county, providing All County CCAA Coordination, maintaining the CCAA database, and communication/coordination with state-wide external partners to relay CCAA progress and accomplishments to remain engaged with state-level partners and funders.

The Theory of Change associated with Strategy 1 identifies that successful implementation of the 30-year CCAA program is contingent upon: 1) staff capacity to accomplish enrollment and conservation goals; 2) consistent implementation and coordination of each Programmatic CCAA; 3) facilitated communication among all CCAA permit holders; 4) the functionality of the CCAA database; and 5) outreach and coordination with statewide partners and funders. Strategy 1 addresses limiting factors associated with capacity needs, specifically that without sustained personnel and administrative support, progress towards our overarching ecological outcome will stall. Strategy 1 promotes our efficacy to carry out our operational and conservation strategies designed to reduce threats to sage-grouse within our planning area and halt the local sage-grouse population declines.

Near and long-term ecological outcomes will result because staffing capacity will be sufficient for enrolling private lands in programmatic CCAAs, for implementing activities associated with administration of the program (e.g. outreach, conservation implementation, baseline and repeat monitoring, database management, development of site specific plans, and annual reporting).

Strategy 2: This strategy focuses on communication to landowners and local partners. The goal of local outreach is to communicate enrollment opportunities and benefits to private landowners and local agencies with the purpose to enroll eligible lands according to the prioritization guidance in the programmatic CCAAs.

Strategy 2 is based on the theory that by providing the knowledge, tools, and financial assistance to implement vegetation and grazing management activities, we expect an increase in engagement in voluntary conservation programs like the CCAA and others (NRCS, SGI, etc.). By maintaining and or recruiting additional personnel, we anticipate the expansion of the CCAA program and implementation of vegetation enhancement activities in each county. Specifically, by increasing staff capacity the critical limiting factors, related to degraded sage-grouse habitat, will be addressed in a coordinated and expedited manner.

Ecological outcomes: Increased staff capacity will result in the ability to communicate with stakeholders and address immediate threats to sage-grouse habitat through conservation actions outlined in SSPs on enrolled private lands. Because of these actions we anticipate an expansion of contiguous habitat, improved resiliency of sagebrush communities, and increased sage-grouse population trends.

Strategy 3: This strategy focuses on management actions to reduce threats to sage-grouse on privately owned rangelands with the goal of maintaining or achieving high quality habitat conditions necessary to

promote sage-grouse populations. This may include assisting landowners in applying for funding to implement conservation activities. A comprehensive set of conservation measures was designed and is listed within the CCAAs. These measures are meant to enhance and/or protect sage-grouse populations and their habitat. The most commonly applied include: 1) wildfire prevention; 2) invasive annual grass treatments; 3) juniper removal; 5) development of grazing management plans. Some of these activities reduce direct mortality factors for sage-grouse, such as installing reflectors to prevent fence collisions and wildlife escape ramps to prevent drowning. Juniper removal results in desired vegetation outcomes, while also reducing predation of sage-grouse nests.

By removing or reducing threats (limiting factors) to sage-grouse habitat posed by invasive vegetation, wildfire, and improper grazing management, the extent and quality of sage-grouse habitat will improve in the OACSC planning area, thereby positively impacting the sage-grouse population. The theories of change associated with conservation measures to resolve limiting factors are listed below:

3.1) **Technical Assistance:** Providing technical assistance results in an increased capacity of landowners to implement management and restoration actions on the landscape in two ways. First, assistance can be provided in applying and receiving financial and technical assistance from supporting partners to implement conservation actions within the timeframes specified in a SSP. Second, technical assistance can be used to prioritize and coordinate implementation to increase the pace and scale of restoration. Technical assistance promotes near, intermediate and long term ecological outcomes.

3.2) **Wildfire**: Conservation measures to reduce wildfire risk operate with the theory that a reduction in the frequency and severity of wildfires will reduce the area of habitat lost and fragmented due to fire and reduce the risk for invasive annual grass establishment. This will promote the intermediate ecological outcomes of a) maintaining connected plant communities composed of desired species and b) ecosystem structure and function across sufficient spatial extent. Both outcomes will provide sage-grouse habitat that supports all life stages of sage-grouse at a population scale and ultimately stabilize or increase sage-grouse populations (overarching ecological outcome).

3.3) **Invasive Annual Grasses:** The theory of change associated with actions to treat exotic annual grasses is that these efforts will: a) reduce and/or remove exotic species from sage-grouse habitat; b) protect intact habitat from annual grass invasion; c) strategically manage grazing; and d) support conservation measures addressing severe wildfire threats. Restoring areas impacted by invasive vegetation will have the intermediate ecological outcome of supporting all sage-grouse life stages by maintaining or improving the quantity, quality, and connectivity of habitat through reduced wildfire risk and established desirable plant communities. Habitat connectivity and integrity will ultimately support stable or increasing sage-grouse population trends (overarching ecological outcome).

3.4) **Grazing Systems**: The theory of change invoked through the implementation of managed grazing systems leads to a reduction in the dominance of exotic annual grasses and promotion of

the vigor of deep-rooted perennial bunchgrasses and forbs. This will result in an increase in the extent of desired plant cover on grazed lands and diminish the frequency and severity of wildfire. *Intermediate ecological outcomes* are realized through the expansion of connected plant communities containing desired species that provide habitat structure (deep-rooted perennial vegetation) and forage (sage-grouse preferred forbs). These conditions are linked to our overarching ecological outcome of increasing the quantity and quality of sage-grouse habitat to promote sage-grouse populations statewide.

Conservation measures to address grazing infrastructure operate with the theory that the installation of wildlife escape ramps in livestock water troughs and marking fences in high-risk collision areas will reduce direct mortality of sage-grouse using these areas (*intermediate ecological outcome*). Reduced sage-grouse mortality confers the *long-term ecological outcomes* of stable to increasing sage-grouse populations.

Long-term ecological outcomes are realized through the increase in the size and spatial extent of sage-grouse populations. The reduced frequency and severity of wildfires and the recovery of desired plant communities leads to habitat connectivity and greater sage-grouse survival. 3.4)

3.5) **Juniper Removal**: Removal of juniper on CCAA enrolled properties will reduce the extent and density of juniper across CCAA enrolled properties. According to the theory of change associated with juniper removal, a reduction in woodland type plant communities will promote desired plant species, thereby improving the connectivity of sage-grouse habitat. In addition, a reduction in conifers will reduce avian predator perches and reduce predation of sage-grouse nests. Intermediate ecological outcomes are realized through a) reduced juniper extent and density; b) reduced avian predator perches; and c) an increase in desired plant cover. Long-term ecological outcomes include a) improved extent and connectivity of desired plant communities; b) reduced avian predation on sage-grouse nests; and ultimately c) stable to increasing trends in sage-grouse populations and ecological conditions (overarching ecological outcome).

3.6) **Growing and Defending the Core**: Stewardship following implementation ensures ecological outcomes are achieved. Proper management and maintenance of implemented practices coupled with opportunistic expansion of effected area to protect investments result in the improvement of ecological trends (near-term ecological outcome) and transition in ecological state to provide better sage-grouse habitat supporting long-term and our overarching ecological outcomes.

Strategy 4: This strategy focuses on the work that is required for ongoing monitoring of enrolled properties, not only a requirement per the terms of the Programmatic CCAAs, but also to document progress towards the goals stated above and to guide adaptive management of conservation measures.

Strategy 4 is based on the theory that by monitoring enrolled properties according to the intervals specified in site-specific plans, we will be able to determine if conservation measures are successful, and if not, adjust management as necessary to achieve desired outcomes. Annual meetings with landowners are useful for identifying any changed circumstances or new resource concerns. By thoroughly reviewing

available data and consulting key stakeholders, we will have the opportunity to expeditiously resolve emerging threats or challenges and select feasible solutions with the highest likelihood of producing desired results. Strategy 4 relates to Strategy 3 because monitoring may result in the adjustment of ongoing or previously implemented conservation measures and/or the development and implementation of new conservation measures to continue progress towards maintaining or promoting sage-grouse habitat (intermediate ecological outcome). In this way, our efforts will continue to increase the quantity and quality of sage-grouse habitat on private lands and ultimately benefit sage-grouse populations (overarching ecological outcome).

Conservation Actions

Our overarching targeted ecological outcome is an increase in the quantity and quality of sage-grouse habitat and ultimately an increase in sage-grouse populations. Each of the outcomes, goals, objectives, and conservation actions in this Strategic Action Plan and Work Plan have been carefully considered as incremental steps toward achieving this ecological outcome. The conservation actions we propose were specifically developed to address the major ecological problems and limiting factors identified in this SAP, specifically juniper removal, exotic annual grasses, grazing management, grazing infrastructure retrofits, and wildfire. This also includes administrative, outreach, communication and monitoring goals that support conservation actions and outcomes. Our proposed work is aligned with the key conservation issues and limiting factors for sagebrush habitats and sage-grouse populations identified in several conservation plans (detailed in Section 9).

Our conservation actions include:

1. Juniper Removal

Ecological Problems: As noted in Section 9, increases in juniper cover is a major ecological threat because juniper encroachment: 1) depletes the understory species essential for sage-grouse; 2) increases fuel loads, intensifying wildfires; 3) demands water resources, reducing the quality of mesic habitat; and 4) facilitates depredation of sage-grouse nests by avian predators; and 5) increases vertical structure, which causes sage-grouse to avoid otherwise viable habitat.

Conservation Actions: *Juniper removal practices will be tailored for each property with priority given to early phases of encroachment (Phase I and II) and may include techniques such as:*

- Removal of juniper through hand felling, mechanical removal or prescribed fire;
- Removal of juniper from riparian zones;
- Limbing felled branches to less than 4 ft. to reduce predator perching (lop and scatter);
- Piling or jackpot burning of slash.

Outputs Supporting Long-Term Ecological Outcomes: Conservation actions to remove juniper have the immediate effect of reducing fuel loads, thereby minimizing the threat of wildfire, and ultimately maintaining the quantity and quality of existing habitat. Sage-grouse readily resume use of conifer treatment areas and when predator perches are eliminated, sage-grouse nest success is promoted, and

localized sage-grouse populations rebound (Severson et al. 2016, Olsen et al. 2021a, Olsen et al. 2021b). Restoring hydrological resources and soil nutrients through conifer removal halts further degradation and promotes mesic and upland plant communities essential to support healthy sage-grouse populations.

2. Exotic Annual Grass Treatments

Ecological Problem: This limiting factor is described in Section 9. Preventing further spread and restoring areas already impacted by invasive vegetation is directly related to increasing the quantity and quality of sage-grouse habitat. Monocultures of invasive annual grasses have no ecological value to sage-grouse and fuel wildfires that can further reduce the extent and connectivity of habitat.

Conservation Actions: *Invasive annual grass strategies include both prevention and treatment and depend on site-specific ecological conditions. Activities may include, but are not limited to:*

- Early Detection and Rapid Response (EDRR) activities, which may include roadside spraying, weed surveys, and spot treatments;
- Herbicide application, mechanical treatment, prescribed fire, biological treatment;
- Targeted grazing on invasive vegetation or other grazing management (e.g. rest to promote desirable vegetation);
- Fencing to exclude grazing from treated areas.

Output Supporting Long Term Ecological Outcomes: Our approach is to: 1) contain infestations to protect existing valuable habitat and 2) restore lightly to moderately impacted sites to promote desirable vegetation at a landscape scale. This approach will maintain or increase contiguous areas with the vegetation components needed by sage-grouse to thrive year-round (adequate cover of sagebrush, deep-rooted perennial bunchgrasses, and forbs).

3. Grazing Management

Ecological Problem: Grazing management is critically related to maintaining desirable vegetation on the landscape. Improper grazing management can have a negative impact on native plant communities and promote undesirable shifts in plant community composition. Additionally, poorly placed and/or improperly installed infrastructure can result in sage-grouse mortality.

Conservation Actions: In order to implement grazing management plans, a variety of practices may be considered, including but not limited to:

Development of grazing management plans that incorporate as necessary:

- Rest/deferment schedules, changes to the season of use, timing, and intensity of grazing, targeted grazing to eradicate weeds, or rotational grazing techniques;
- Fencing to improve rotational capacity and protect riparian areas;
- Water/spring developments to provide livestock water when natural sources are excluded;

- Drought contingency planning.

Practices to mitigate risks from grazing infrastructure:

· Install wildlife escape ramps in all livestock water troughs;
· Mark high risk fences with anti-strike reflectors to make fences more visible to sage-grouse;
· Removal of unneeded fences.

Outputs Supporting Long Term Ecological Outcomes: *A*ppropriate grazing systems can reduce the threat of invasive vegetation and promote the vigor of deep-rooted bunchgrasses and forbs, essential for sage-grouse cover and nutrition. This, in turn, enhances the resiliency of grazed lands in the face of disturbances like wildfire or drought, ultimately maintaining the overall extent and condition of sage-grouse habitat. Grazing management will be reviewed on all CCAA enrolled acres, and all FIP funded project sites to ensure grazing is compatible with promoting sage-grouse habitat. Grazing management plans are developed for each enrolled property. Additionally, by improving, removing, or re-locating grazing infrastructure documented sage-grouse mortality can be prevented.

4. Wildfire Risk Reduction:

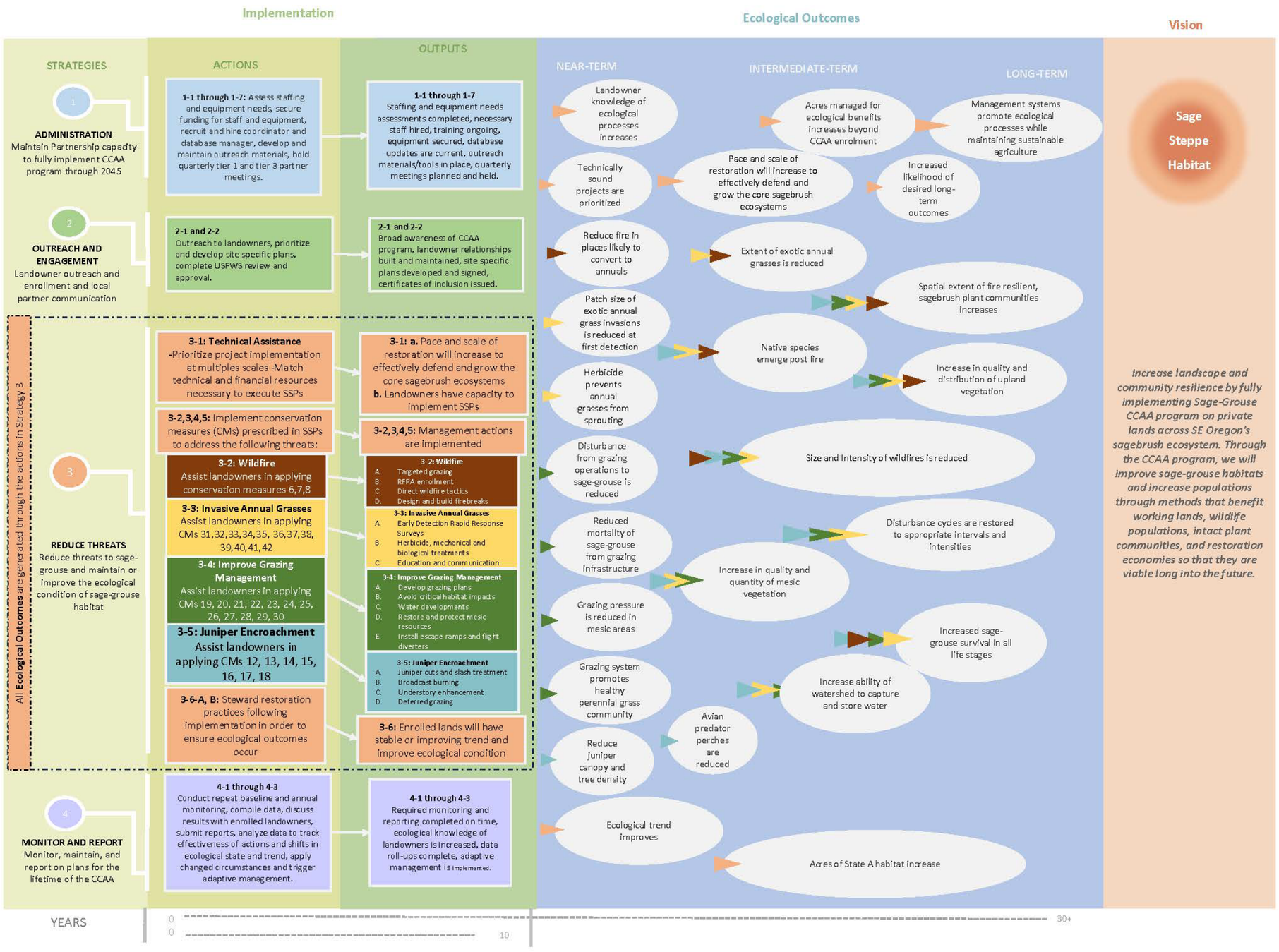
Ecological Problem: Fire (both lightning-caused and human-caused) is one of the primary risks to sagebrush ecosystems, particularly considering the direct correlation between exotic annual grasses and fire frequency (USFWS 2013).

Conservation Actions: Many of the aforementioned practices for juniper, invasive vegetation, and grazing management will reduce wildfire risk. Additional practices that may be considered include:

- Design and maintain fire breaks or green stripping to provide a fire fighting advantage or halt fire spread;
- Restore wildfire impacted areas with herbicide treatments and/or seedings;
- Encourage rest from grazing activities until burned sites have recovered.

Outputs Supporting Long-Term Ecological Outcomes: Actions to reduce the risk of wildfire and to restore burned areas prevent further habitat fragmentation, enhance ecological resilience, and ultimately promote the persistence of sage-grouse populations.

Figure 7. Results chain representing the OACSC's Theory of Change.



9. Progress Monitoring Framework

Monitoring Framework

The Partnership has a robust monitoring program to assess the effectiveness of CCAAs towards meeting ecological outcomes. (See Work Plan for detailed SMART objectives, metrics, and outputs for the 2024-2030 timeframe.) **Implementation monitoring** will collect quantitative and qualitative data, which will be used to assess progress towards our implementation goals. Numerical and spatial records are maintained in a custom database in order to document CCAA enrolment and land condition over time across all properties in the 5 permit geographies. Additionally, data is collected for all restoration treatments and other conservation measures such as improvement to grazing management systems or reducing land fragmentation. Landowner participation rates and the effectiveness of outreach tactics will be recorded. **Progress toward ecological outcomes** will be measured using Threat-based Ecological Models (TBEMs), and an associated monitoring protocol. These protocols were created by a diverse group of rangeland and wildlife scientists, landowners, and other stakeholders specifically for use with Oregon's Programmatic CCAAs and have been in use since 2015 with a subsequent peer review (Johnson et al. 2019, Renner et. al 2023). Additionally, TBEMs have biological significance for wildlife. Specifically, Doherty et al. 2021 demonstrated that habitat categorized according to threat-based ecostates is effective in predicting sage-grouse lek persistence on the landscape. TBEM aligns with the habitat characterization approach used by many partners charged with managing large landscapes in the Northern Great Basin. For example, the SageCon partnership relies on TBEM to describe the overall quality of sage-grouse habitat in Eastern Oregon and threat-based ecostates inform ODFW's sage-grouse mitigation program. Threat-based ecostate habitat classification is integral to Nevada Department of Wildlife's Sagebrush Habitat Plan. The CCAA program updated the riparian protocol in 2021 in response to a desire for more robust methods.

Baseline Data Collection and Repeat Monitoring Every 5-10 Years. Baseline data and repeat monitoring are assessed using the Threat-based Ecological Model monitoring protocols for uplands and riparian areas (Johnson et.al 2019, Renner et al. 2023) and photo points (NRCS protocol). Ecological data collection includes plant community composition and estimated cover, documentation of invasive annual grasses and/or other noxious weeds, documentation of ecosystem and/or sage-grouse specific threats, ecological state (ranging from A-E, representing various degrees of desired to undesirable conditions) and apparent trend.

Baseline conditions and permanent monitoring locations are established prior to initiating any treatments or practices. The first step in baseline data collection begins prior to site visits when the SWCD Rangeland Specialist reviews relevant geospatial and/or remotely-sensed data to expedite and inform field data collection. Examples of information that may be pertinent to review include: ecological site descriptions for the property, soil maps, aerial imagery, past treatments, fire history, etc. A landowner interview is also conducted to assemble information about current and historic land management practices, future goals, and known resource concerns. The second step of baseline data collection consists of upland and riparian ecological data, which are collected during private land site visits for each enrolled CCAA property owner. Photo points are established for every ecostate in every pasture as well as additional photo points that represent pre and post treatment conditions. Data are entered using tablets and are uploaded to a database created specifically for housing CCAA information. Repeat monitoring occurs on a 5-10 year interval during which the CCAA permit holder completes baseline monitoring protocol (described above). The 5-10-year interval is designed to match restoration timelines given that change in ecological condition may take several years to be realized. Repeat monitoring is also stored in the CCAA database.

The CCAA TBEM monitoring protocol is useful for assessing change in ecological conditions over time and across large landscapes. As described further below, data is tracked to assess our effectiveness in accomplishing our ecological goal of habitat maintenance and improvement ranging from the pasture scale, up to landownerships and across the entire CCAA program. This method uses the baseline ecological state, apparent trend, and photo points to determine the quantity of habitat sustained and uplifted as a result of conservation measures that are implemented. All CCAA permit holders follow the same monitoring protocols to ensure data quality, completeness, and compatibility across all counties; these data can also be "rolled up" to quantify the effectiveness of conservation efforts inclusive of all participating counties and across all CCAA-enrolled lands.

Annual Monitoring. Every year, CCAA permit holders meet with each enrolled landowner to discuss resource concerns, grazing, changed circumstances (like wildfire or drought), and CMs implemented in the prior year. This information is entered into the custom CCAA database and is used to adaptively manage the SSPs as needed. Annual reports are submitted to USFWS to document landowner compliance.

Statewide Metrics: Some metrics related to our ecological outcomes will be measured and analyzed by other agencies. Although specific geospatial data and PII for enrollees are protected, the OACSC participated with USFWS, ODFW, and the SageCon collaborative to develop a mechanism for reporting conservation efforts that have occurred on CCAA-enrolled properties. The approach balances the requirement to protect enrollees' private information with the statewide need to collate conservation implementation activities and ultimately relate restoration work to sage-grouse population dynamics. CCAA data are reported to the statewide Conservation Efforts Database at the scale of Sagebrush Reporting Units. SRUs are biologically meaningful geographies in that they are informed by geography/topography and sage-grouse movement data (where available). Using the best available data, SRUs were developed to represent likely sub-populations of sage-grouse within Oregon. And, SRUs are large enough to prevent the identification of individual landowners, even if efforts are described in terms of the type of habitat in which they occurred (e.g. priority, general). Analyzing lek trends within SRUs alongside conservation measures implemented by all stakeholders, including CCAA enrollees, and with disturbance (e.g. development or wildfire), is one way to estimate the effectiveness of Oregon's sagebrush restoration efforts. SRUs provide a data reporting framework for future analyses of this nature to be conducted by ODFW's Sage-grouse Conservation Coordinator and SageCon/Institute for Natural Resources.

The Institute for Natural Resources is leading SageCon efforts to track the ecological state of sage-grouse habitat range-wide in Oregon, using plot and remotely-sensed data. The SageCon Annual Rangeland Conditions Report provides an annual assessment of the ecological state of rangelands across Eastern Oregon. On BLM-managed lands, Assessment Inventory and Monitoring protocols yield data that will be analyzed by the BLM to present an understanding of habitat conditions on BLM-managed lands. ODFW leads statewide sage-grouse lek monitoring efforts and publishes annual sage-grouse population reports that will serve to inform the overall effectiveness of our FIP work plans.

Oregon's sage-steppe ecosystem is both dynamic and diverse and there are many factors that can influence the quality and quantity of habitat available to sage-grouse and other sage-steppe obligates. While some factors are induced by humans, other factors such as drought or fire can be tied to climatic conditions or natural events. Ongoing monitoring will provide SWCDs the ability to adapt conservation measures to account for any unforeseen or changed circumstances that occur within the CCAA geography.

Implementation and Ecological Outcome Progress Outputs, Outcomes, and Indicators that will be Tracked over Time

A comprehensive set of monitoring metrics for each strategy and related actions is detailed in the OACSC Work Plan. These are summarized below:

Strategy 1 ensures an adequate administrative framework and capacity exists for coordinated implementation of the Programmatic CCAAs throughout the life of the CCAA. This strategy is foundational to our ability to make a measurable difference in our long-term goals. Near-term SMART objectives, actions, and responsible parties to fulfill Strategy 1 are detailed in our Work Plan. Our Work Plan also details how we will measure our implementation progress and effectiveness in accomplishing Strategy 1. Near-term **implementation outputs and indicators for Strategy 1** are summarized Table 3. In brief, we will report staffing needs annually and document funding secured and hiring tasks to ensure adequate capacity for CCAA implementation, including an All County CCAA Coordinator and Database Manager. Other records will include meeting schedules and minutes, user guides for the CCAA database, documentation of ongoing database maintenance/troubleshooting, and the number and reach of outreach resources implemented. It is implied that fulfilling the administrative objectives associated with Strategy 1 will facilitate progress towards near-, intermediate-, and long-term ecological outcomes, and ultimately our overarching ecological goal (the outcomes and indicators for ecological progress are included with Strategy 3, see Table 6 below).

Table 3. Near-term outputs and indicators to measure implementation progress for Strategy 1: Administrative Framework and Statewide Partnership Communication

Objective	Implementation Outputs	Indicators
Objective 1-1: Increase and/or maintain technical staff capacity (8 FTE minimum) throughout 3 biennia of the FIP.	• Completion of a biennial staffing needs assessment • Amount of funding secured to hire/maintain staffing needs	• Completed staffing needs assessment • Adequate funding to support 8 FTE
Objective 1-2: Ensure CCAA partners have adequate equipment necessary to implement the CCAA program.	Completion of a biennial equipment needs assessment Amount of funding secured to address equipment needs	• Completed equipment needs assessment • Adequate funding to support identified equipment needs • Documentation of equipment secured
Objective 1-3: Contract an All County CCAA Coordinator to facilitate OACSC work and manage FIP grant.	• Employment of an All County CCAA Coordinator (0.25 FTE)	• Documented CCAA coordination capacity as demonstrated through employment of All County CCAA Coordinator for the life of the FIP
Objective 1-4: Annually, hold quarterly All County Coordination business meetings.	• 3-4 All County CCAA Coordination meetings, annually • Adaptive management of the CCAA implementation process • Continuity in the implementation of programmatic agreements	• Number of meetings and participants • Action items in meeting minutes • Ongoing continuity in CCAA implementation
Objective 1-5: Maintain capacity to manage and update CCAA databases to store data, track program effectiveness, and allow for adaptive management of the program data.	• Central repository for statewide CCAA data • Adaptive data management • Training needs of CCAA staff are met • Database guide developed/updated	• Records documenting maintenance and updates made to database • Records documenting database trainings provided • Database guide is updated to reflect upgrades or maintenance actions
Objective 1-6: Develop and maintain shared outreach resources.	• Monthly communications and outreach committee meeting to develop and acquire outreach tools • Shared outreach tools and materials developed, as identified	• Development of a statewide outreach plan identifying goals and appropriate outreach tools. • Development of identified outreach tools; implementation of the statewide outreach plan • Monitoring of outreach tools developed specific to the outreach method (e.g. website visits; social media shares; email recipients, etc.)
Objective 1-7: Annually, hold a partners meetings in conjunction with quarterly CCAA business meetings.	• 3-4 All County CCAA partner meetings, annually	• Number of meetings and participants

Strategy 2 is focused on outreach with landowners and local partner agencies to maximize enrollment in the CCAA Program, and thus actual on-the-ground work to increase sage-grouse habitat and, ultimately, populations. Monitoring will include maintenance of outreach and participation records to document progress towards our enrollment goals. As with Strategy 1, fulfilling this strategy is essential to achieve our long-term ecological goals (the outcomes and indicators for ecological progress are included with Strategy 3, see Table 6 below). Near-term SMART objectives, actions, and responsible parties to fulfill Strategy 2 are detailed in our Work Plan. Our Work Plan also details how we will measure our implementation progress and effectiveness in accomplishing Strategy 2. Near-term **implementation outputs and indicators for Strategy 2** are summarized Table 4.

Table 4. Near-term outputs and indicators to measure implementation progress for Strategy 2: Landowner outreach and enrollment and local partner communication.

Objective	Implementation Outputs	Indicators
Objective 2-1: Annually, each CCAA permit holder will conduct outreach activities with community members, private landowners, organizations, and agency personnel.	• A minimum of 2 outreach activities completed by each CCAA permit holder annually	• Number of outreach activities implemented • Number of participants reached during outreach activities • Number of properties and acres enrolled
Objective 2-2: By June 30, 2029, enroll a minimum of 33 properties totaling 450,768 privately owned acres within sage-grouse habitat into CCAAs. For reference, there are currently 17 enrolled properties with a total of 163,549 acres.	• Minimum of 450,768 acres (33 properties) of privately owned sage-grouse habitat enrolled within the FIP Phase 2 Focal Area	

Strategy 3 includes implementation of on-the-ground conservation measures strategically designed to eliminate threats to sage-grouse and promote the quantity, quality, and connectivity of habitat. We will primarily measure progress towards these goals by maintaining comprehensive treatment records and by comparing baseline and repeat monitoring data (see above). We will track the enrolled acres that transition from degraded to more desirable ecological states (and conversely, acres in desirable ecological states that may become degraded due to wildfire, treatment failure, etc.). We will also track apparent ecological trend in treatment areas and enrolled acres, because a shift from a downward to a stable or upward ecological trend represents incremental progress towards our short and long-term goals. Apparent ecological trend is important to document because improving ecological condition (i.e., improved ecostate) in sagebrush ecosystems can require several years to decades. Maintaining a stable or upward ecological trend within already good condition rangelands is also an important outcome of the CCAA effort. We are also tracking species composition, cover of desirable species, presence of noxious weeds, juniper encroachment, and other metrics that inform progress towards ecological outcomes, but are not necessarily reported individually. Data can be analyzed at various spatial scales ranging from the individual pasture, to entire properties, to all CCAA enrolled lands. Also, in partnering with statewide stakeholders, we will work to integrate our data into statewide assessments that span private and public lands. Near-term SMART objectives, actions, and responsible parties to fulfill Strategy 3 are detailed in our Work Plan. Our Work Plan also details how we will measure our implementation and ecological progress in accomplishing Strategy 3. Near-term **implementation outputs and indicators for Strategy 3** are summarized in Table 5 and near-term **ecological outcomes and indicators for Strategy 3** are summarized in Table 6.

Table 5. Near-term outputs and indicators to measure implementation progress for Strategy 3: Reduce threats to sage-grouse and maintain or improve the ecological condition of sage-grouse habitat.

Objective	Implementation Outputs	Implementation Indicator
Objective 3-1a: Assist landowners in applying for and receiving technical and financial assistance by working with technical partners to implement CMs according to the timeframes specified in the site specific plans.	• Landowners have the capacity to implement CMs identified in their SSPs. • Utilize planning processes to select projects that will most effectively address threats at multiple scales and on multiple ownerships	• Number of landowners assisted within FIP Phase 2 Focal Area. • Amount of match funding received to implement CMs within FIP Phase 2 Focal Area. • Number of complementary acres treated in addition to CCAA lands • Number of projects that include multiple landowners
Objective 3-1b: prioritize and coordinate implementation to increase the pace and scale of restoration to effectively defend and grow the core sagebrush ecosystems		
Objective 3-2: By June 30, 2029, 450,768 acres (33 enrolled properties) within the FIP Phase 2 Focal Area have conservation measures applied to address the threat of wildfire, where wildfire is identified as a threat.	• As applicable, enrolled landowners have applied CMs 6, 7, and/or 8 from Programmatic CCAA designed to reduce wildfire risk and/or the extent of wildfire impacts.	• Number of enrolled acres within FIP Phase 2 Focal Area with CMs to address wildfire threat.
Objective 3-3: By June 30, 2029, within the FIP phase 2 Focal Area, conservation measures will be implemented to treat exotic annual grasses on 25,807 acres of enrolled sage-grouse habitat.	• As applicable, enrolled landowners have applied 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, and/or 42 from Programmatic CCAA designed to detect new infestations or treat existing exotic annual grasses.	• Number of enrolled acres within FIP Phase 2 Focal Area with CMs to address exotic annual grasses threat. • Number of acres within FIP Phase 2 Focal Area with invasive vegetation treatment.

Objective 3-4: By June 30, 2029, within the FIP Phase 2 Focal Area, conservation measures will be implemented to address the threat of improper livestock grazing on 90% of management units where improper livestock grazing is identified as a threat.	• As applicable, enrolled landowners have applied CMs 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and/or 30 from Programmatic CCAA designed to improve grazing management.	• % of pastures with CMs to improve livestock grazing • Miles of fence construction to support better grazing management • Number of water developments to support better livestock distribution
Objective 3-5: By June 30, 2029, within the FIP Phase 2 Focal Area, conservation measures will be implemented to address the threat of conifer encroachment on 16,075 acres of enrolled sage-grouse habitat.	• As applicable, enrolled landowners have applied CMs 12, 13, 14, 15, 16, 17, and/or 18 from Programmatic CCAA designed to reduce the threat of conifer encroachment and improve understory conditions.	• Number of acres within FIP Phase 2 Focal Area with CMs to address conifer encroachment
Objective 3-6-A: By June 2029, 60% of enrolled private lands in FIP focus area will exhibit a stable to improving trend in ecological condition **Objective 3-6-B:** By June 2029, 6,000 acres of potential habitat identified as being in ecological states that do not currently provide seasonal or year-round habitat during baseline inventory will transition to stable or improving trend and/or ecological states capable of providing seasonal habitat.	• All enrolled properties have CMs implemented designed to maintain or improve ecological trend and ecostate • All enrolled properties are monitored according to schedule outlined in Programmatic CCAA	• Number of enrolled properties with CMs implemented • Number of enrolled properties with completed monitoring • % of enrolled acres with stable to improving ecological trend • Number of enrolled acres transitioned to provide seasonal or year-round habitat

Table 6. Near-term outcomes and indicators to measure ecological progress for Strategy 3: Reduce threats to sage-grouse and maintain or improve the ecological condition of sage-grouse habitat.

Objective	Ecological Outcomes	Ecological Indicator
Objective 3-2: By June 30, 2029, 450,768 acres (33 enrolled properties) within the FIP Phase 2 Focal Area have conservation measures applied to address the threat of wildfire, where wildfire is identified as a threat.	• Wildfire risk is reduced • Size, frequency, and intensity of wildfires is reduced on enrolled properties	Enrolled acres impacted by wildfire
Objective 3-3: By June 30, 2029, within the FIP phase 2 Focal Area, conservation measures will be implemented to treat exotic annual grasses on 25,807 acres of enrolled sage-grouse habitat	• Extent of exotic annual grasses on enrolled properties is reduced • Diversity and extent of desired vegetation (e.g., perennial bunchgrasses and forbs) on enrolled acres is increased • Patch size of exotic annual grass invasions is reduced at first detection • Wildfire risk is reduced on enrolled properties	• % cover of exotic annual grass within treatment areas • Enrolled acres in ecological states associated with exotic annual grass (States C, D) • % cover of desired vegetation within treatment areas • Enrolled acres in ecological condition associated with desired vegetation (States A, B) • Apparent ecological trend • Enrolled acres impacted by wildfire
Objective 3-4: By June 30, 2029, within the FIP Phase 2 Focal Area, conservation measures will be implemented to address the threat of improper livestock grazing on 90% of management units where improper livestock grazing is identified as a threat.	• Ecological condition of grazed rangelands is maintained or improved • Disturbance from grazing operations to sage-grouse is reduced	• Enrolled acres in ecological condition associated with desired vegetation (States A, B) • Apparent ecological trend • Grazing management plans that reflect compatibility with sage-grouse seasonal habitat needs
Objective 3-5: By June, 2029, within the FIP Phase 2 Focal Area, conservation measures will be implemented to address the threat of conifer encroachment on 16,075 acres of enrolled sage-grouse habitat.	• Extent of conifer cover on enrolled properties is reduced • Extent of desired vegetation on enrolled acres is increased • Wildfire risk is reduced on enrolled properties • Avian predator perches are reduced	• % cover of conifers within treatment areas • Enrolled acres in ecological states associated with conifer (States C, D, E) • % cover of desired vegetation within treatment areas • Enrolled acres in ecological condition associated with desired vegetation (States A, B) • Apparent ecological trend • Enrolled acres impacted by wildfire
Objective 3-6-A: By June 2029, 60% of enrolled private lands in FIP	• Sage-grouse habitat quality and quantity shows improvement	• Apparent ecological trend

focus area will exhibit a stable to improving trend in ecological condition		
Objective 3-6-B: By June 2029, 6,000 acres of potential habitat identified as being in ecological states that do not currently provide season or year- round habitat during baseline inventory will transition to stable or improving trend and/or ecological states capable of providing seasonal habitat.	• Sage-grouse habitat quality and quantity increases	• Enrolled acres in ecological condition associated with desired vegetation (States A, B)

Strategy 4 reflects our commitment to monitoring enrolled properties for the life of the CCAA and to complete required reporting to ensure program compliance. This strategy also relates to using monitoring data to adaptively manage our conservation efforts over time to ensure we continue to make progress towards our long-term goal of maintaining or improving sage-grouse habitat. Our implementation metrics for Strategy 4 include documentation of completed monitoring and reporting activities and adaptations to SSPs to address emerging resource concerns, Near-term SMART objectives, actions, and responsible parties to fulfill Strategy 4 are detailed in our Work Plan. Our Work Plan also details how we will measure our implementation progress and effectiveness in accomplishing Strategy 4. Near-term **implementation outputs and indicators for Strategy 4** are summarized in Table 7. Adaptive management may prompt the need to repeat or implement new conservation measures, as detailed in Strategy 3. Thus, Strategy 4 is linked to the ecological outcomes and indicators described for Strategy 3 in Table 6 above.

Table 7. Near-term outputs and indicators to measure implementation progress for Strategy 4: Monitor, maintain, report, and adaptively manage site-specific plans.

Objective	Implementation Outputs	Indicators
Objective 4-1: For the life of the CCAA, 100% of enrolled properties (goal of 33 properties) will be monitored according to intervals specified in their SSPs.	• Completed monitoring of 33 enrolled properties.	• Number of enrolled properties with repeat monitoring completed.
Objective 4-2: For the life of the CCAA, 100% of enrolled properties (goal of 33 properties) will have completed reports completed annually detailing conservation measure accomplishments, changed circumstances, and grazing use.	• Annual reports completed for 33 enrolled properties.	• Number of enrolled properties with annual reporting completed.
Objective 4-3: For the life of the CCAA, monitoring information will be used to inform adaptive management decisions including identifying new threats and applying additional conservation measures.	• As applicable, adaptive management is implemented using Changed Circumstances Conservation Measures (CCCMs).	• Number of CCCMs implemented • Acres where CCCMs are applied • Number of SSPs with applied CCCMs

Data Management

Data is housed in a newly developed CCAA database that utilizes Fulcrum (an online and table-based platform) and ArcGIS for geospatial data. This system streamlined data collection by incorporating the use of tablets in the field and allowing for data to be uploaded to a cloud-based database once connected to a network. Tablet-based forms have measures to ensure consistency across all counties implementing the CCAA and assure data quality and completeness. This uniform approach across all counties facilitates “roll-up” reporting to assess the overall effectiveness of the CCAA program in Oregon. The new database integrates all ecological and spatial data for each pasture and riparian area along with photo points, allowing for a complete and easily retrievable record for each property.

Cloud-based data are password protected and any hard copies of data are housed within the corresponding CCAA permit holder’s office. All records are confidential and are protected by HB 4093 & ORS 192.501(33).

Data Analysis and Interpretation

Once data is entered into the CCAA database, customized reports such as SSPs and annual monitoring reports can be generated. SSPs identify threats to sage-grouse and their habitat, as well as conservation measures that landowners voluntarily commit to implement to ameliorate threats. Thus, SSPs are land management plans that directly inform future voluntary restoration activities on private lands.

As described above, annual monitoring reports detail emerging resource concerns or changed circumstances. Thus, annual monitoring data and reports can guide any restoration activities necessary to maintain progress towards desired ecological outcomes on a yearly basis.

Every 5-10 years, the ecological condition of enrolled properties is completely re-inventoried using the same threat-based monitoring protocol used during baseline data collection at the time of enrollment. While annual reporting is in place to capture any rapidly emerging resource concerns, repeat ecological monitoring is only conducted every 5-10 years because positive shifts in sagebrush ecosystems are slow to manifest and inter-annual variability can mask longer-term ecological trends. Repeat ecological monitoring provides a new snapshot in time of a property’s conditions to guide future voluntary restoration work.

Tracking Progress toward Ecological Outcomes:

As described above, there are several ways in which our implementation and ecological data are used to track progress towards our short, intermediate, and long-term ecological outcomes. Comparison of baseline and repeat data collection will convey the effectiveness of conservation measures, and ultimately the ecological uplift achieved at various scales (e.g. within pastures, enrolled properties, FIP focus areas, and all CCAA-enrolled lands). Additionally, monitoring data will serve as a communication tool between SWCD planners and the enrolled landowners. Monitoring data supports management decisions through science-based solutions reducing the subjectivity of why currently identified treatments are being recommended or what conditions are creating the need for adaptive management.

Although measuring shifts in ecological condition and sage-grouse population trends across the entire range of the species in Oregon is beyond the scope of the Partnership, several statewide agencies are leading these analyses. We contribute implementation metrics at the scale of SRUs to aid SageCon, Institute for Natural Resources, and ODFW in drawing inferences from conservation efforts and local shifts in habitat or populations.

10. Adaptive Management

Through OACSC's collective experience in working on planning, restoration and monitoring in sage steppe-ecosystems, we have learned the value and have continuously implemented adaptive management in achieving our goals and objectives. Our individual CCAAs include language and guidelines for applying adaptive management in areas where monitoring indicates our restoration actions have fallen short of objectives. Each Core Partner champions adaptive management within their respective territory, partners with landowners and engages appropriate technical and funding resources to adjust management where appropriate. OACSC meets regularly to discuss adaptive management and how it can be normalized to be as consistent as possible across the range of sage-grouse. However, environmental factors are often widely variable so adaptive management actions may vary widely across the landscape. While management actions can be variable, the planning, monitoring, and evaluation processes remain consistent across all CCAAs in order to ensure repeatable, defensible, and ecologically sound actions are applied where appropriate.

Planning

Our planning process involves an extensive remote and on the ground inventory and assessment of resources and habitat on enrolled properties. We engage with enrolled landowners in the process of developing SSPs to record relevant management strategies and plan actions to improve resources in sage-steppe ecosystems for sage-grouse and other resources of concern. Factors including grazing, hydrologic function, wildlife habitat, ecosystem resilience, climate change, wildfire, plant community health and recreation, among others, are considered during this planning process to determine the best course of action to achieve the desired results and ultimately, ecological uplift. During this process we also consider options for adaptive management in the event that our actions fall short of achieving our objectives. Once our objectives and actions have been determined we consider how best to monitor the effects of our actions. The framework for monitoring is defined within each individual CCAA but the appropriate interval is set out in the approved SSP for each enrolled property. Core partners meet throughout the year with landowners to get updates on progress and their assessments of conditions and results from conservation actions. These interactions are captured and recorded in annual reports on SSP implementation as well as periodic larger, more extensive monitoring events that include re-inventorying enrolled properties to assess changes in ecological state and trend.

Implementation

The CCAAs are specifically designed to address threats to sage-grouse associated with resource conditions and management. Conservation measures are designed to address specific threats identified in the plans and are applied prescriptively on enrolled properties. These conservation measures are actions defined in the CCAAs and are a mix of best management practices and principles intended to achieve the desired change on the landscape. Additionally planners may identify custom conservation measures to address more complex problems, issues that were not identified during the writing of the CCAAs, or to engage in adaptive management where previously applied conservation measures did not achieve the desired effect.

Evaluation

Evaluation of the effectiveness of our conservation actions is determined during field visits with landowners and during the repeat inventory process. Effectiveness is generally tied to showing a transition from habitat states which do not support the year round needs of sage-grouse to states which provide for all life stages of sage-grouse. Additionally, trend information is collected on each site which helps inform the effectiveness of management actions. The partnership employs an integrated database which allows us to compare observed conditions to previous data which can trigger adaptive management if objectives are not being met.

Adjustment

The results of the monitoring efforts outlined above will be considered from an adaptive management perspective. Many of the potential conservation measures have been successfully implemented as part of other conservation efforts. However, outcomes of a few conservation measures may vary based on local site conditions. Specifically, conservation measures with a vegetation rehabilitation component may have varying success based on local soil type and climatic conditions such as rainfall timing and amount. For these conservation measures, careful monitoring both before and after implementation, along with the flexibility provided through adaptive management, will maximize the likelihood of success through possible changes to seed mixtures, rescheduling of rehabilitation efforts, timing of treatments, and other adjustments.

An adaptive, outcome-based approach (Walters 1986) will be used to allow management flexibility, recognizing conservation measures may need to be updated based on changing conditions or new information. Such an adaptive approach explicitly recognizes multiple factors (environmental conditions, biological processes) that affect sage-grouse populations. Furthermore, the consequences of prescriptive conservation measures cannot be predicted with certainty. Therefore, the CCAA provides a framework for making objective decisions in the face of uncertainty. If the desired results of a conservation measure are not achieved, the member organization will work with the landowner to modify the conservation measure or enact another conservation measure in order to achieve the desired results. The OACSC also incorporated a "Changed Circumstances"

section into the CCAA framework that helps to address any unforeseen events that impact an enrolled property owner. These unforeseen events include, but are not limited to wildfire, drought, and insect outbreaks. Lastly, adaptive management relies on an iterative cycle of monitoring, assessment and adjustment to clarify the relationships among the conservation measures and the response of habitat and, ultimately, sage-grouse abundance.

The OACSC will meet annually to review the findings of monitoring efforts across all counties and discuss successes and challenges. These meetings will allow for ongoing coordination and communication, including identification of training, staff, and funding needs as well as discussion of new information and emerging issues related to sage-grouse conservation. The OACSC learned a great deal from the planning and implementation efforts completed in the last nine years to improve sage-steppe habitat and increase and/or sustain sage-grouse populations. Lessons learned through implementation of the actions described in this plan will be incorporated into future activities and since the Strategic Action Plan is a "living document", there is flexibility in adjusting the goals, objectives, and actions to better meet the intended outcomes.

Strategic planning is essential for landscape-scale conservation efforts to be effective across large landscapes, however, a good plan allows for flexibility as multiple moving parts are not always succinct. Our environment is constantly changing, and as managers, we have no control over weather conditions, fire behavior or drought. Outside of environmental fluctuations managers must adapt to project design alterations, new and developing research in the natural resource field, equipment breakdowns, the rising costs of materials and contracted labor, or landowners that change their minds about a particular project component. Large projects are constantly evolving and while timelines may be altered, it does not mean that objectives will not be met. Instead, project managers re-group, make adjustments, address concerns at hand, and extend timelines as needed. Landscape conservation efforts are typically led by a highly functioning group of partners. They have the experience and knowledge to meet action items. To function at this high level, understanding and adaptability from project partners and granting organizations is necessary so that projects are effectively designed and implemented to meet overall goals. This kind of trust in leadership abilities will result in a smooth process that ends with ecological success, even if timelines are altered or objectives are revisited.

Table 8. Example of adaptive management used within the FIP process as illustrated in the initial FIP.

Adaptive Management

	CHALLENGES / OPPORTUNITIES	LESSONS LEARNED	ADAPTATIONS
Restoration	Project implementation was sometimes delayed by unforeseen issues including weather, lack of access to project sites, remote site locations, lack of pre-qualified contractors, or other challenges	The partnership was able to achieve many of the initiative goals due to the flexibility of the FIP budget and the understanding of OWEB staff	Establish flexibility within the FIP budget and maintain robust communication with OWEB staff
	Extended drought and large, intense wildland fires adjacent to project areas delayed some actions	Conservation actions that lead to a reduction in fuel loads and improved rangeland conditions contributes to reduced risk of catastrophic fire within the FIP geography	Conservation measures have been developed to guide treatment of vectors, and large-scale fuels management strategies
	Short timeframes for planning, design, grant development and contracting increased pressure to work efficiently and effectively and created difficulties coordinating contractors, conducting bid tours, awarding contracts, and fully meeting requirements for continued landowner enrollment into the CCAA program	Having shovel-ready projects with CCAA Site Specific Plans (SSPs) in place helped expedite the process of planning, design, and implementation Proactive relationship building led to increased landowner desire to improve sage-grouse habitat via CCAA SSPs	Strong emphasis on proactive project and relationship development well before funding was made available has allowed the partnership to carry out and complete quality projects
	Lack of adequate guidance for fuel break construction and fire mitigation strategies	The structure of the results chain/theory of change aided in the development of new conservation measures	New conservation measures related to fire mitigation, weed treatments, and additional mesic habitat data were developed
	CHALLENGES / OPPORTUNITIES	LESSONS LEARNED	ADAPTATIONS
Planning	Utility or value of the Progress Monitoring Framework	The PMF required the group to collaborate and develop a uniform methodology for prioritizing restoration projects Having clearly identified goals and objectives enabled the initiative to track progress toward reaching desired goals Methodology for annual reports required by USFWS as part of the CCAA agreements was easily incorporated into progress tracking The implementation objectives, timelines, and metrics, set clearly defined guidelines for the initiative and long-term FIP funding allowed consistent baseline and effectiveness monitoring to be initiated	The partnership developed prioritization protocols with internal knowledge and input from outside experts. Prioritization was based on potential sage grouse habitat quality and quantity with focus initially in the most critical areas for conservation Progress tracking methodologies were developed using the monitoring framework in conjunction with the CCAA protocols and reporting occurred quarterly and annually. Near-term, intermediate, and long-term ecological results will continue to be recorded and will identify ecological impacts. These metrics are broken down in the results chain and guide monitoring methodologies, in order to identify whether conservation actions are delivering the desired outcomes

Adaptive Management, continued

Partnership Capacity

CHALLENGES / OPPORTUNITIES	LESSONS LEARNED	ADAPTATIONS
The partnership experienced improved communication and unity amongst its members	Improved partner communication resulted in uniform monitoring and increased ability to problem solve across county jurisdictional boundaries with project implementation and design Stronger communication increased interest of outside FIP partners and greater willingness to combine funds and effort and work on larger, landscape scale projects, ultimately expanding the success of the FIP Stronger relationships promoted increased fluidity of funds across county lines and breaking down rigidity in fund division and allocation between counties.	Relationships and regular communication with partners facilitated the development of a database to improve efficiencies in data collection, plan development, implementation reporting, and monitoring progress toward FIP goals
Some members of the partnership experienced significant staff turnover throughout the FIP creating complications with project development and monitoring	Staff turnover emphasized the need to develop a database and clear protocol to input and manage project information	Database development which has detailed instructions for data collection and reporting requirements allows any new staff to readily enroll, monitor, report conservation measures, create annual reports, and report project acres/locations needed for FIP reporting

11. Sustainability

The Partnership is implementing 30-year conservation agreements (CCAAs), which directly commits us to sustain long-term ecological uplift within our geographic planning area, with the goal of increasing local sage-grouse population trends through habitat conservation practices implemented. The partnership intends to seek funding to continue to expand conservation actions and develop a Coordinator/Database Manager position to add to the stability of our partnership.

Security of Funding to Implement Conservation Actions

One of the strengths of our partnership is that it aligns well with objectives of our contributing partners who provide the majority of the funding for sage-grouse conservation across Eastern Oregon. NRCS, BLM, USFWS, and private landowners each invest large amounts of funding into on the ground restoration efforts that have and will continue to be guided, at least in part, by the planning efforts of the OACSC core partners. Site Specific Plans developed by the core partners include shovel ready projects intended to fit a variety of funding sources and solve a variety of landscape issues related to sage steppe habitat. These funding partners remain committed to sage-grouse habitat restoration for the foreseeable future. Additionally, the Partners have been successful in seeking grant funding through a variety of funding sources including OWEB, NFWF, and USFWS. Larger funding sources including OWEB's Focused Investment Partnership and NRCS's Regional Conservation Partnership Program are logical avenues to pursue for continued funding and are necessary to continue to drive an increase the pace and scale of restoration efforts. OACSC intends to continue to grow sage-grouse habitat restoration efforts using these and other programs moving forward.

The OACSC as a whole seeks funding through two avenues: 1) Strategically, as a landscape effort, and 2) Individually, for each county to implement Site Specific Plans for landowners within their respective areas, utilizing a variety of funding sources. Each member organization is responsible for determining their overall funding needs and leveraging dollars to both address immediate conservation actions and to match landscape-level grants. Annual evaluation of conservation treatments and assessment of monitoring results provides guidance for the OACSC to prioritize actions and determine funding needs.

While state and federal budgets are often uncertain, sage-grouse habitat conservation remains a priority among partner agencies. Consequently, each local, state and federal agency brings funding to support annual conservation goals and treatments.

Funding support also comes in the form of in-kind match from concurrent conservation projects that reach the same end result or landscape goal. This may be the BLM conducting conservation for sage-grouse on public land, or it could be County Weed Management Boards addressing invasive annual grasses on private land. In-kind contributions are also leveraged through private landowners who volunteer their time, equipment and/or materials for a conservation treatment. Despite funding uncertainty, agencies have maintained a high level of financial and in-kind contributions, as reflected in recent estimates for value-added funds for 2024-2030 (Table 9).

Table 9. Projected in-kind contribution from project partners (2024-2030).

Funding Source	Contribution Amount
Natural Resource Conservation Service NRCS has committed to in-kind match funding from EQIP & Sage Grouse Initiative and other Farm Bill programs on private land in each county.	$2, 600,000
Bureau of Land Management BLMs match funding is sourced from cross boundary treatments to address wildfire risk, juniper encroachment, exotic weed treatments, and monitoring.	$6,000,000
ODFW ODFW contributions include staff time for OACSC Partnership meetings and consultation for siting treatment acres to benefit sage-grouse.	$2000
USFWS USFWS provides match funds for on-the-ground conservation work via the Partners Program. Budgets average $25,000 per project with an estimated 1-2 projects implemented annually. USFWS matches funds through staff participating in the LIT and USFWS' work to implement the CCAA in each county. USFWS also assists with on-going field work associated with sage-grouse habitat	$135,000
Private Landowners We anticipate that landowners will provide over 2400 hours of in-kind by initiating and maintaining CCAA plans, (e.g. reporting, meetings, tracking grazing, maintenance and management of projects).	$60,000
Core Partners Core partners contribute in-kind time annually to outreach with private landowners and partnering organizations in each respective county.	$6,000
SWCDs Crook, Harney, Lake and Malheur counties annually contribute staff in-kind time to strategic planning, outreach, database management, and monitoring sage-grouse activities taking place in each county to address threats to sage-grouse and meet long-term ecological goals.	$60,000
ODF Pending match is anticipated through SB762 funding for wildfire risk reduction projects and forest health thinning practices, which will take place in Harney, Lake and Malheur counties.	$600,000

Sustainability of partnership function and tracking progress toward ecological goals

The CCAAs are designed to sustain long-term outcomes through 30-year voluntary commitments from enrollees. As part of the SSPs, landowners have committed to implementing and tracking conservation measures that address limiting factors to sage-grouse population increases and agree to maintain positive ecological outcomes through 2045, the lifespan of the CCAAs. Implementation of CCAAs over the course of a 30-year enrollment period along with associated monitoring facilitates the SWCDs ability to evaluate ecological outcomes on an annual or semi-annual basis. Additionally, SWCDs meet with producers annually (at a minimum) to discuss various facets of the enrolled property and evaluate the need for adaptive management.

OACSC core partners utilize limited stable funding sources to pay staff time to engage in partnership activities and apply for additional capacity and implementation funding. Additionally, partners including NRCS, USFWS, and SageCon have helped support our partnership by providing funding for a part time partnership coordinator for the last 8 years.

OACSC's plan to track progress has evolved more than any other portion of our partnership. Our previous plan to track progress proved to be unsustainable and difficult to communicate to funding and regulatory partners. To address this shortcoming OACSC utilized USFWS and OWEB funding to develop a database to comprehensively track restoration and management efforts on private lands enrolled in CCAAs. The database uses a Fulcrum and ArcGIS to track progress toward goals and objectives within the SAP and workplan as well as to report to partners to assist in track goals across a much broader landscape and suite of resource concerns. This database is updated annually to reflect changes associated with restoration activities, management changes, wildfire, drought, and other factors that impact the quantity and quality of sage-grouse habitat on enrolled properties. Future funding is necessary to continue to build appropriate functionality into the database and provide for its upkeep.

As the partnership grows we anticipate the need to transition our part time coordinator to a full time position to help maintain our critical function and structure in addition to maintaining our database to assist in tracking progress toward ecological goals. To this end, the partnership intends to hire a coordinator who will oversee the maintenance, improvement, and training needed by the partners in order to maximize the benefit of this valuable tool to sage-grouse conservation efforts.

12. Literature Citations

City of Bend. July 2016. Urban Growth Boundary Remand.

Connelly, J. W., Braun, C. E.. Long-term changes in sage-grouse Centrocercus urophasianus populations in Western North America. Wildlife Biology. 1997.

Creutzburg, Megan. June 2021. Rangeland Condition in Oregon SageCon Partnership Rangeland Condition Report. Institute for Natural Resources for the Oregon SageCon Partnership.

Crook Soil and Water Conservation District and United States Fish and Wildlife Service. 20 February 2015. Greater Sage-Grouse Programmatic Candidate Conservation Agreement with Assurances for Private Rangelands in Crook and Deschutes Counties, Oregon.

Department of the Interior, Washington, D.C. 2020. Oregon Action Plan for Implementation of Department of the Interior Secretarial Order 3362: "Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors".

Drut, M. S., Pyle, W. H., & Crawford, J. A. (1994). Technical note: Diets and food selection of sage-grouse chicks in Oregon. Journal of Range Management, 47(1), 90-93.Greater Sage-grouse ARMPA (Bureau of Land Management, 2015).

Endangered Species Coalition. 12 July 2013. Greater Sage-Grouse.

Hagen, Christian. 22 April 2011. Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat. Oregon Department of Fish and Wildlife, Bend, Oregon.

Hendrickson, Molly. 8 December 2022. Per Capita Personal Income in Oregon's Counties. Quality Info - State of Oregon Employment Department.

Institute for Natural Resources for the Oregon SageCon Partnership. 2021. The SageCon Invasives Initiative Geographic Strategy. Oregon Explorer.

Johnson, D., Cahill, M., et. al. September 2019. Threat-Based Land Management in the Northern Great Basin: A Manager's Guide. PNW 722.

Johnson, Douglas H., Holloran, Matthew J., Connelly, John W., Hanser, Steven E., Amundson, Courtney L. and Knick, Steven T.. "CHAPTER SEVENTEEN. Influences of Environmental and Anthropogenic Features on Greater Sage-Grouse Populations, 1997–2007". Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats, edited by Steve Knick and John W. Connelly, Berkeley: University of California Press, 2011, pp. 407-450.

Kerns, Becky K.; Tortorelli, Claire; Day, Michelle A.; Nietupski, Ty; Barros, Ana M.G.; Kim, John B.; Krawchuk, Meg A. 2020. Invasive grasses: A new perfect storm for forested ecosystems?. Forest Ecology and Management. 463: 117985-. https://doi.org/10.1016/j.foreco.2020.117985.

Miller, R.F. Miller, R.F., Bates, J.D., Svejcar, T.J., Pierson, F.B., and Eddleman, L.E., 2007, Western Juniper Field Guide: Asking the Right Questions to Select Appropriate Management Actions: U.S. Geological Survey Circular 1321, 61

Miller, R.F., Bates, J.D., Svejcar, T.J., Pierson, F.B., Eddleman, L.E., 2005. Biology, ecology, and management of western juniper. Oregon State University Agricultural Experiment Station Technical Bulletin 152. OSU, Corvallis, OR, USA

Miller, R. F. et al.. Management in the Sagebrush Steppe. Special Report 880. Oregon State University and ARS. Corvallis, OR. USA

Mote, P., E. Salathe, V. Duliere, E. Jump. Scenarios of future climate for the Pacific Northwest, climate Impacts Group, University of Washington 2008.

Natural Resources Conservation Service - United States Department of Agriculture. August 2015. sage-grouse Initiative 2.0 Investment Strategy, FY 2015-2018.

Olsen, Andrew C., Severson, John P., Allred, Brady W., Jones, Mathew O., Maestas, Jeremy D., Naugle, David E., Yates, Kate H., Hagen, Christian A. Reversing Tree Encroachment Increases Usable Space for Sage-Grouse during the Breeding Season. 29 September 2021. Wildlife Society Bulletin.

Olsen, Andrew C., Severson, John P., Maestas, Jeremy D., Naugle, David E., Smith, Joseph T., Tack, Jason D., Yates, Kate H., Hagen, Christian A. Reversing tree expansion in sagebrush steppe yields population-level benefit for imperiled grouse. 09 June 2021. Ecosphere.

Oregon All Counties Conservation Agreements with Assurances (CCAA) Steering Committee. 2016. The Oregon Model to Protect Sage-Grouse, All Counties.

Oregon Conservation Strategy. 2016. Oregon Department of Fish and Wildlife, Salem, Oregon.

Oregon Department of Fish and Wildlife. 2021. ODFW Sensitive Species List 2021.

Oregon Department of Fish and Wildlife. September 2022. Oregon Greater Sage-Grouse Population Monitoring: 2022 Annual Report.

Oregon State University. 23 February 2018. Passion for Sage-Grouse Conservation Lands OSU Student a Scholarship.

Renner, D., Cupples, J., et. al. August 2023. Threat Based Management for Creeks, Streams and Rivers: A Manager's Guide for Understanding and Managing Flowing Water in Sagebrush Ecosystems of the Pacific Northwest. PNW 773.

Rory C O'Connor5,1, Matthew J Germino5,6,1, David M Barnard1,2, Caitlin M Andrews3, John B Bradford3, David S Pilliod1, Robert S Arkle1 and Robert K Shriver4. 13 March 2020. Small-scale water deficits after wildfires create long-lasting ecological impacts.

Sage-Grouse Conservation Partnership. 2015. The Oregon Sage-Grouse Action Plan. Governor's Natural Resources Office. Salem, Oregon.

Severson, John P., Hagen, Christian A., Maestas, Jeremy D., Naugle, David E., Forbes, Todd., Reese, Kerry P. 26 October 2016. Effects of conifer expansion on greater sage-grouse nesting habitat selection. The Journal of Wildlife Management.

State University Libraries & Press and Institute for Natural Resources. 2023. Oregon Explorer: SageCon Landscape Planning Tool.

Think Wild – Wildlife Hospital and Conservation Center. N.D. Amphibians. Accessed October 10, 2023.

United States Fish and Wildlife Service. 23 March 2010. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered. Federal Register - National Archives.

United States Fish and Wildlife Service. 2023. Listed Animals. Environmental Conservation Online System.

U.S. Fish and Wildlife Service Mountain-Prairie Region. 13 March 2013. Strategic Communications Plan; Greater Sage-Grouse – Conservation Objectives Team Report.

Walters, C., Rasch, D. Adaptive management of renewable resources. 1989. MacMillan Publishing Company, New York 1986, 374 pp., 55 figs., 10 tab., DM 69, 90. Biometrical Journal.

Ziska and George, Rising Carbon Dioxide and Invasive Noxious Plants: Potential Threats and Consequences. World Resource Review Vol 16 No. 4 2004.