Washington Shrubsteppe Restoration and Resiliency Initiative

Long-Term Strategy 2024 – 2054

Fostering resilient wildlife and human communities in the face of wildfire in the shrubsteppe landscape.

Washington Department of FISH & WILDLIFE

WASHINGTON DEPARTMENT OF NATURAL RESOURCES

Washington State Conservation Commission

Above:
Shrubsteppe Habitat on Oak Creek Wildlife Area.   J. Haug

Cover photo:
*Sunset over shrubsteppe, with Chopaka Mountain in the distance,
on the Charles and Mary Eder Wildlife Area Unit   J. Haug*

Washington Shrubsteppe Restoration and Resiliency Initiative
Long-Term Strategy 2024-2054

Executive Summary

Washington Department of
FISH & WILDLIFE

Washington State
**Conservation Commission**

Introduction

Once covering more than 10 million acres in Eastern Washington, 60 to 80 percent of our state's shrubsteppe landscape has been lost or degraded. This is a diverse landscape, with large expanses of arid mixed shrub and grasslands, scattered permanent and seasonal wetlands, riparian areas, sand dunes, and basalt cliffs and talus. It provides habitat for a wide range of wildlife and plant species, some of which only occur here. Many of these dependent species are federally or state listed as endangered or threatened, and yet more are candidates for listing. This landscape is home to people who derive their livelihoods from these lands and provide essential stewardship and conservation of fish and wildlife habitats.

On September 7, 2020, a historic fire event driven by high winds resulted in 80 fires and nearly 300,000 acres burned in a single day; several of these fires were unprecedented in their scale and impact on wildlife. The Cold Springs Canyon/Pearl Hill fire, the largest wildfire in Washington State recorded history, burned over 410,000 acres of shrubsteppe habitats in Douglas and Okanogan Counties, and the Whitney fire impacted an additional 127,400 acres of shrubsteppe habitats in Lincoln County.

The extent of the areas impacted, the speed at which the fires moved, and the intensity at which they burned resulted in severe and immediate impacts to wildlife, habitat, and human communities, through loss of forage for wildlife and domestic livestock, loss of cover for wildlife coming into winter, and loss of structures and fencing used for management of wildlife and working lands. Long-term impacts include the conversion of shrub-dominated to grass-dominated habitats, and the expansion of invasive species. These fires burned in areas that were critical for endangered and threatened species, including greater sage-grouse, Columbian sharp-tailed grouse and Columbia Basin pygmy rabbit, likely setting back their recovery for many years to come.
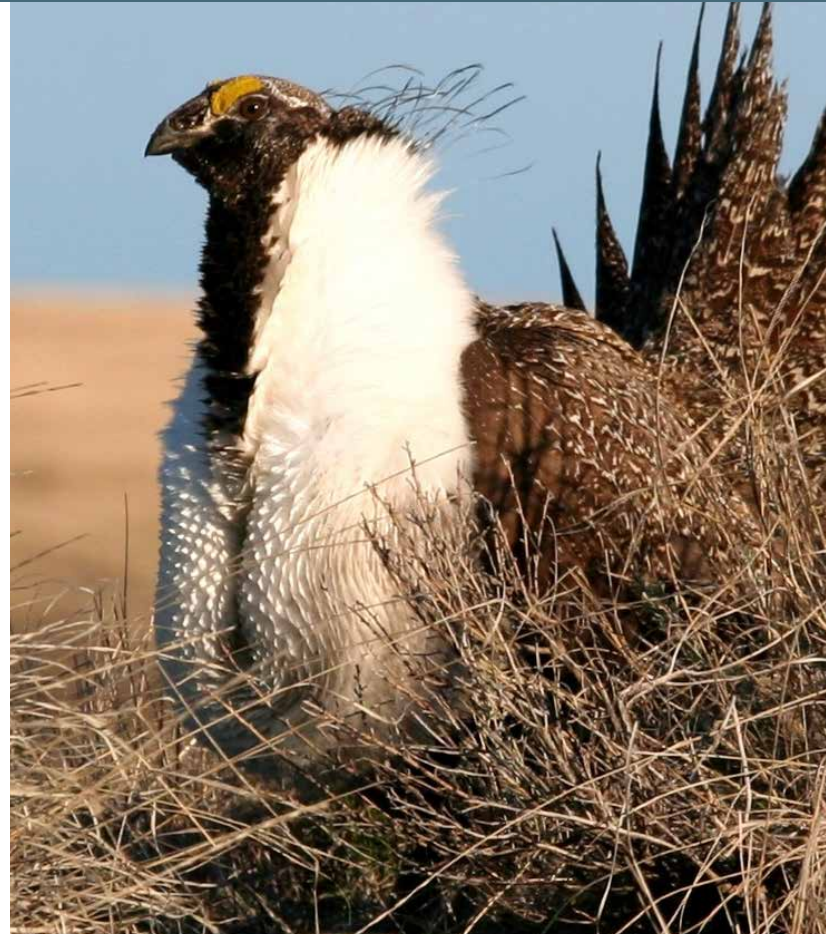
Greater sage-grouse. WDFW

"When we all woke up the morning after the September 2020 Pearl Hill, Cold Springs, and Whitney fires we all wondered how bad it would be. Thankfully our state legislature led by Senator Christine Rolfes jumped into action and initiated an ongoing funding source to help landowners, communities, and wildlife recover from those devastating fires."
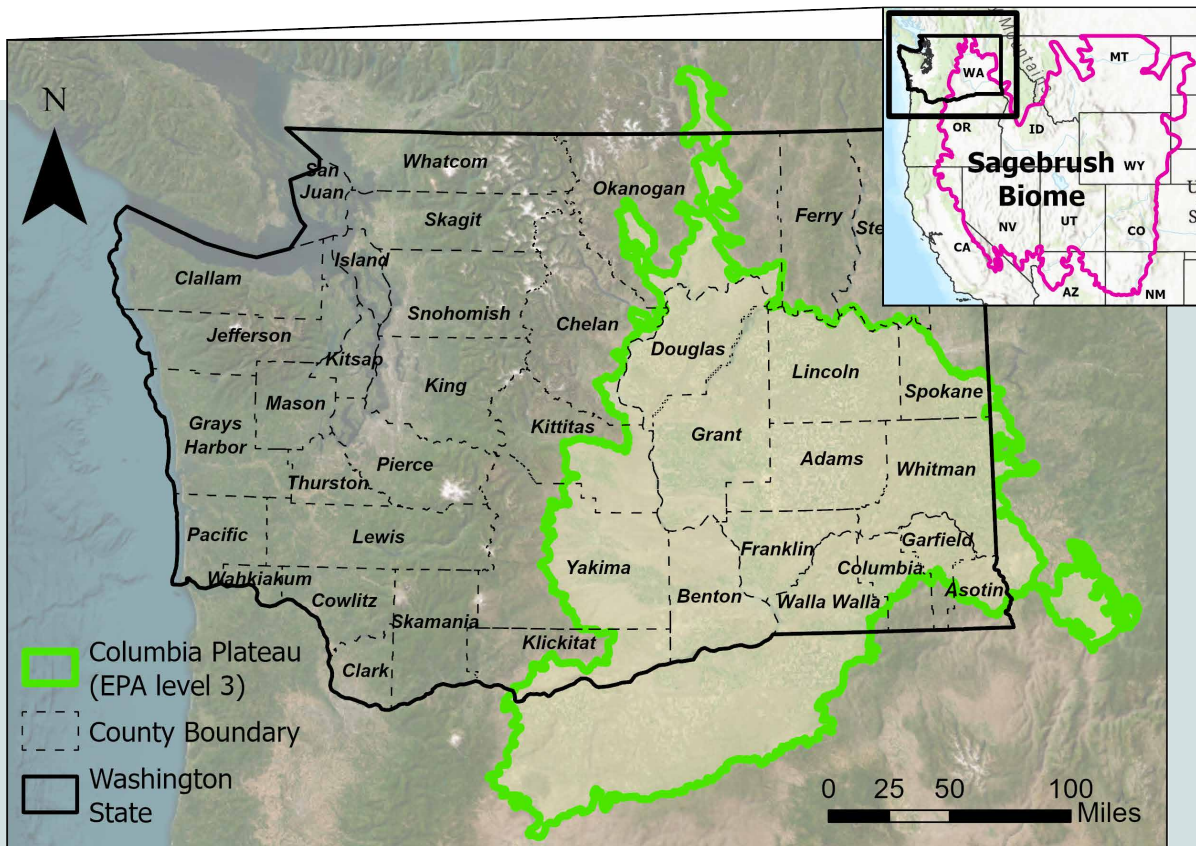
- Jay Kehne, Conservation Northwest

In response to the unprecedented damage from these fires, the Washington State Legislature, through a budget proviso, directed the Washington Department of Fish and Wildlife (WDFW) to collaborate with the Washington State Conservation Commission (SCC) and the Washington Department of Natural Resources (DNR) to restore shrubsteppe habitat and associated wildlife impacted by wildland fire.
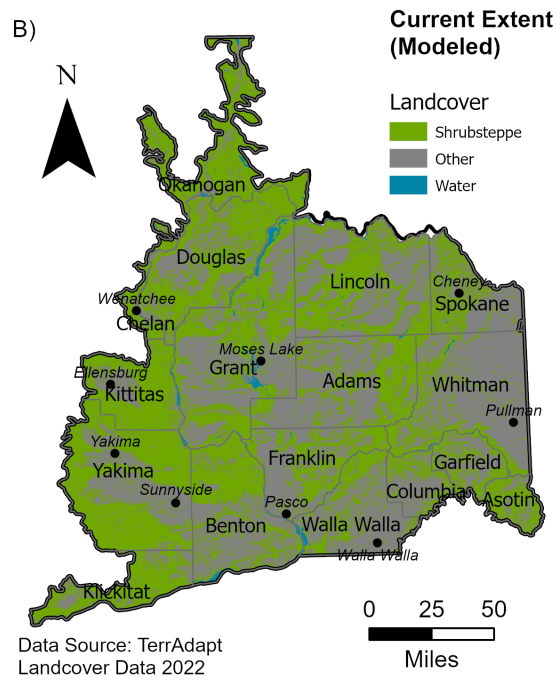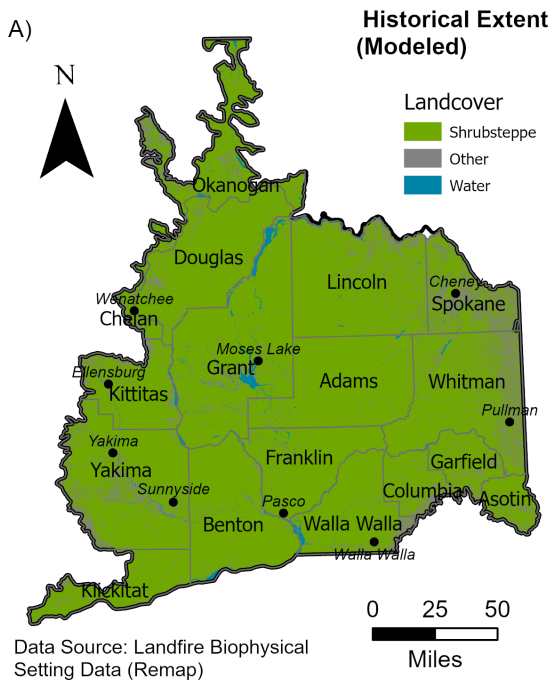
Together, these three agencies worked together to implement immediate actions that support wildlife habitat and rural landowners in response to these fires, and collaboratively develop a long-term strategy to conserve and restore wildlife habitats, enhance wildfire preparedness and response, and support working lands in Eastern Washington's shrubsteppe landscape. This collective effort is the Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI).

WSRRI's primary objective is to conserve and restore Washington's shrubsteppe wildlife and habitat with an emphasis on addressing the escalating extent, frequency, and severity of wildland fires. WSRRI also addresses the needs of people that live and work in Washington's shrubsteppe ecosystems and benefit from healthy and resilient landscapes, habitat, and wildlife populations. WSRRI is a collaborative effort, closely informed and guided by an advisory group comprised of tribal nations and diverse stakeholders with a vested interest in Washington's shrubsteppe landscape, including various public and private partners.
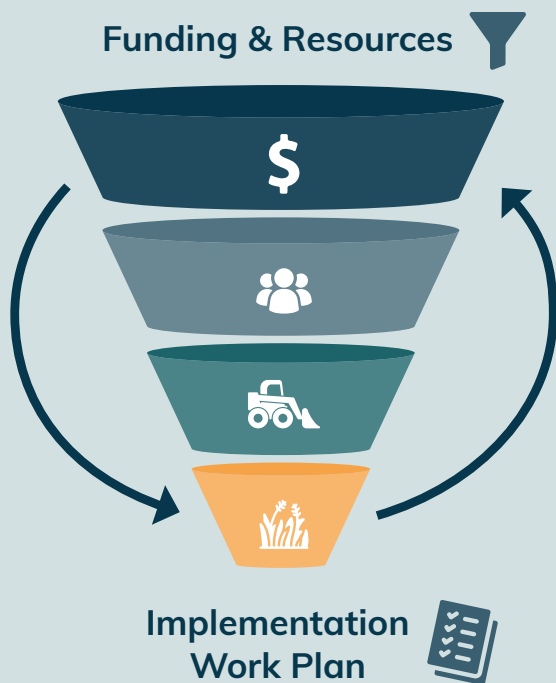
This strategy recognizes that cooperation with tribal nations is fundamental to the ongoing stewardship and management of Washington's shrubsteppe landscape.

The Columbia Plateau Ecoregion (EPA level 3) across the PNW and Eastern Washington with the inset map displaying the rangewide sagebrush biome data (Jeffries & Finn, 2019 (USGS)) used in WAFWA's Sagebrush Conservation Strategy publication.

A) **Historical Extent (Modeled)**

Landcover
- Shrubsteppe
- Other
- Water

Okanogan
Douglas
Lincoln
Cheney
Spokane
Wenatchee
Chelan
Moses Lake
Grant
Ellensburg
Kittitas
Adams
Whitman
Pullman
Yakima
Yakima
Franklin
Garfield
Sunnyside
Columbia
Asotin
Pasco
Benton
Walla Walla
Walla Walla
Klickitat

0 25 50
Miles

Data Source: Landfire Biophysical
Setting Data (Remap)

B) **Current Extent (Modeled)**

Landcover
- Shrubsteppe
- Other
- Water

Okanogan
Douglas
Lincoln
Cheney
Spokane
Wenatchee
Chelan
Moses Lake
Grant
Ellensburg
Kittitas
Adams
Whitman
Pullman
Yakima
Yakima
Franklin
Garfield
Sunnyside
Columbia
Asotin
Pasco
Benton
Walla Walla
Walla Walla
Klickitat

0 25 50
Miles

Data Source: TerrAdapt
Landcover Data 2022

The historical (A) and current (B) extent of shrubsteppe habitat in Washington. The data sources vary (Landfire Biophysical Setting (A) versus TerrAdapt.org(B)), but in both cases, the landcover types associated with natural shrublands or natural grasslands were combined to map shrubsteppe habitat. Landfire's Biophysical Setting data represents the vegetation system that may have been dominant on the landscape prior to Euro-American settlement and is based on the current biophysical environment and an approximation of the historical disturbance regime (https://www.landfire.gov/bps.php).

Funding & Resources

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Implementation Work Plan

The WSRRI 3-year implementation work plan will inform resource needs and help prioritize distribution.

"Preparedness for the unknown and being able to deploy resources faster needs to be functional, especially relative to grazing and fencing"

- Allen Miller, private landowner

Bunchgrasses. J.Haug

WSRRI Vision, Mission, and Guiding Principles

Developed with input from an Advisory Group representing broad stakeholders, the vision, mission, and guiding principles articulate the desired outcomes of the Long-Term Strategy (Strategy).

VISION

WSRRI's vision is a resilient shrubsteppe landscape, achieved through collaborative partnerships for the benefit of wildlife and human communities.

MISSION

WSRRI's mission, as inspired by the State Legislature, is to implement the collaboratively developed Long-Term Strategy for shrubsteppe conservation and wildland fire preparedness, response, and recovery, to meet the needs of the state's shrubsteppe wildlife and human communities.

GUIDING PRINCIPLES

Guiding Principles in developing the Strategy:

1. Focus on Shrubsteppe Wildlife and Habitat Conservation

2. Support Working Lands and Rural Communities

3. Strategically Target Investments

4. Accelerate the Pace and Scale of Conservation and Restoration

5. Support and Build Upon Existing Efforts and Capacity

6. Incorporate Diverse and Traditional Perspectives

7. Proactively Address Equity and Environmental Justice

8. Monitor Results and Adapt Strategies

Mule deer doe.   J. Haug

WSRRI is grounded in the principles of collaboration, synergy, and efficiency. The Strategy seeks to identify existing efforts and capacity, build upon and support them, and fill gaps to achieve the goal of shrubsteppe landscape conservation and restoration.

Committing to Environmental Justice

Addressing environmental justice (EJ) and inequities through implementation of the Strategy requires meaningful involvement with underserved, highly impacted, overburdened, and vulnerable human populations across Washington's shrubsteppe landscape to identify their needs, how to meet them, and taking actions that address these needs. WSRRI is committed to these fundamental principles, and this strategy lays the groundwork for developing actions to further assess and integrate EJ and equity principles into shrubsteppe conservation and wildland fire preparedness, response, and recovery.

The Importance of Private Lands in Shrubsteppe Conservation

Private lands constitute approximately 75% of the Columbia Plateau in Washington, making private landowners and managers key partners in shrubsteppe habitat protection and restoration. Working lands provide a significant benefit by keeping the shrubsteppe landscape open in the face of development pressure, conserving shrubsteppe habitat for wildlife. Livestock grazing is a common practice on the working lands in the shrubsteppe ecosystem. When managed properly, grazing can benefit wildlife and shrubsteppe habitat. However, improper grazing can also be a threat and cause great damage. The Strategy provides recommendations to implement grazing management programs while striving to find a balance in supporting both human and wildlife communities. We recognize the essential role of working lands and rural communities to steward and conserve shrubsteppe habitats, and the Strategy identifies support and opportunities for their sustained well-being, while also protecting wildlife and habitat. The WSRRI organizational structure will provide opportunities for working lands communities to contribute their insights and knowledge, through participation in an Advisory Group, Regional Implementation Teams, and Local Grazing Networks, and participate in implementing wildlife conservation projects supported by funding provided by their local agency partners.

Cow fitted with virtual fence collar   J. Kehne, Conservation Northwest

"I grew up on what we called the scablands. Our farm ground on the other side of the gravel road and our pasture/scablands on the same side as our old farmhouse. Recently, some have named these sagebrush areas shrubsteppe.

No matter what you call them, they are precious to farmers/ranchers like we are and necessary for the livestock and the wildlife that call them home as well. Preventing their loss to wildfire is important and recovery from the nearly inevitable lightning strike or man-caused fire event is also crucial.
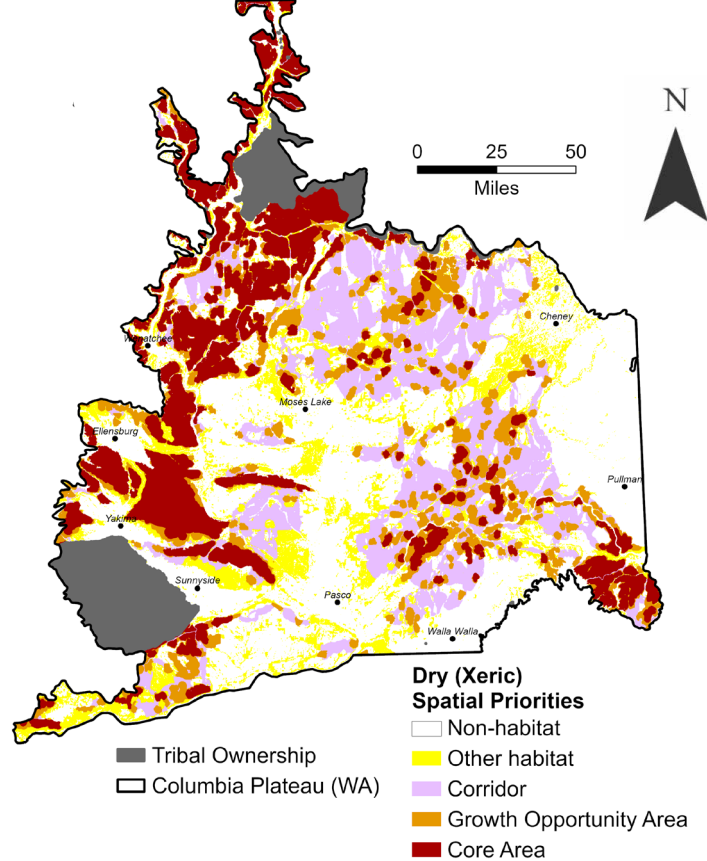
Hopefully this document, the result of many hours of work, thought, deliberation and collaboration, will help guide those of us called to steward these lands toward better prevention and restoration in the years to come."

- Danny Stone,
  Grant County Commissioner

Strategic Approach

Given the extent of habitat loss across the shrubsteppe landscape, all remaining habitat has conservation value, but it is necessary to collaboratively and strategically prioritize action to realize the best conservation outcomes. WSRRI's strategic approach to this prioritization in the Strategy is built upon the principles of the Western Association of Fish and Wildlife Agencies' Sagebrush Conservation Strategy (Remington et al. 2021) and Sagebrush Conservation Design (Doherty et al. 2022). At the root of these principles is a collaborative framework to "defend the core, grow the core, and mitigate impacts" where core habitat is the highest quality remaining on the landscape. Because of habitat fragmentation across Washington's shrubsteppe landscape, and the need to keep wildlife populations connected to each other for long-term viability, WSRRI's approach is not only to defend and grow the core, but also connect it.

To facilitate this approach, the Strategy development process included collaboratively identifying, geographically, core areas, growth opportunity areas, corridors, and other habitat, to guide where on the landscape WSRRI and its partners should invest proactively and implement specific actions. Maps of these spatial priorities were developed for both dry (xeric) and wet (mesic) habitats, as well as greater sage-grouse, a species of highest conservation concern.

▶ **DEFEND THE CORE**
Defending high-quality core habitat from encroachment of threats, like development, conversion, loss due to wildland fire, and invasive annual grasses, must be the highest priority for WSRRI.

▶ **GROW THE CORE**
While cores are being defended, action should also be taken in lesser quality habitat surrounding and adjacent to core areas, to expand the footprint of high-quality habitat.

▶ **CONNECT THE CORE**
Connecting the core, by maintaining open and viable linkages between core areas, will allow wildlife to move across the landscape and access high-quality habitat, allow for demographic and genetic exchange between populations, and increase habitat resilience and viability.

WSRRI Spatial priorities for Dry (Xeric) habitats, one of three conservation targets for which spatial priorities were mapped.

Core Areas have the highest quality habitat, and actions targeted here should include protection, threat prevention and abatement, and restoration where disturbances occur despite protection measures.

Growth Opportunity Areas are areas with significant amounts of habitat that is more degraded than habitat in core areas and should be targeted for strategic restoration where increases in habitat quality would result in more core area.

Corridors are relatively free of wildlife movement barriers and connect core areas and growth opportunity areas across the landscape. Further barrier development (e.g., road construction) should be avoided in corridors.

Other Habitat is more degraded than the other three categories but is still important to retain and, if resources allow, their condition should be improved over time.

While these maps will influence the geographic application of many specific WSRRI strategic actions and investments over its 30-year planning period, ongoing mitigation of threats to shrubsteppe habitats, wildlife, and human communities (e.g., invasive annual grasses, wildland fire) across the shrubsteppe landscape will continue to be necessary.

> "The devastating fires of 2020 were a wake-up call for everyone who cares about the shrubsteppe landscape, and the birds, wildlife, and people that call it home. Audubon Washington couldn't be prouder to have participated in this all-hands-on-deck effort to save the shrubsteppe and is ready to get to work putting plans into action. "
>
> - Trina Bayard,
>   Interim Executive Director/Director of Bird Conservation, Audubon Washington

GOALS

▶ **GOAL #1**

Human communities in the shrubsteppe landscape are better protected, prepared, and resilient to wildland fire, engaged in shrubsteppe conservation, and economically viable.

▶ **GOAL #2**

The extent, frequency, and severity of wildland fire in the shrubsteppe landscape are similar to pre-1800s fire return intervals, while taking into consideration changes in land use, climate, and other modern factors.

▶ **GOAL #3**

Habitat quantity and quality is increased to support healthy wildlife populations and communities.

▶ **GOAL #4**

Populations of Species of Greatest Conservation Need (SGCN) are: representative, ensuring they can adapt to changing conditions; resilient so they are able to persist despite disturbance; and redundant, such that they can withstand catastrophic events.

Creation of beaver dam analog on Big Bend Wildlife Area.   J. Burnham

THREATS

WSRRI considered the following threats, the factors contributing to them, and their impacts to wildlife and human communities while developing our strategies and actions.

▶ Altered wildland fire regimes

▶ Altered hydrology

▶ Invasive plant species

▶ Climate change

▶ Wild and free roaming horses

▶ Incompatible grazing

▶ Mining and energy development

▶ Land use and development

▶ Small wildlife population size

▶ Human associated predators

▶ Direct human resource use and disturbance

ENABLING CONDITIONS

In developing the Strategy, subject matter experts were asked to consider specific mechanisms, structures, and processes necessary to facilitate action and affect change. These are referred to as the "enabling conditions," which are listed below.

Enabling conditions for the Strategy:

▶ Information and Planning

▶ Science and Monitoring

▶ Organization and Governance

▶ Policy and Permitting

▶ Resources and Equipment Capacity

▶ Outreach and Education

▶ Funding
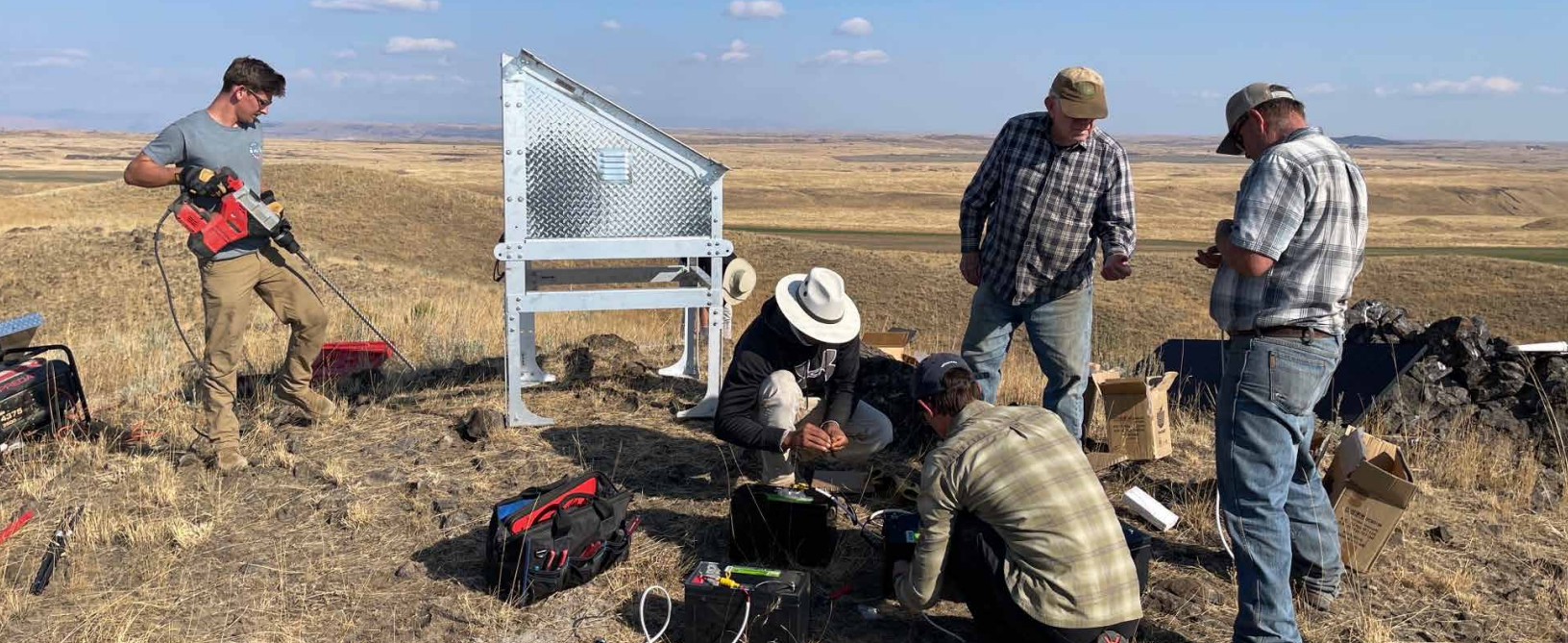
Foster Creek Conservation District virtual fence base station installation

WSRRI Key Strategies and Corresponding Actions

Recommended actions to achieve WSRRI's Goals and Objectives, and address Threats, are organized into five Key Strategies: Community Engagement, Habitat Protection, Habitat Restoration, Species Management, and Wildland Fire Management. WSRRI's spatial prioritization, organization and governance, and monitoring and adaptive management apply comprehensively across all Key Strategies, to guide implementation and realize the best outcomes over time for both wildlife and human communities.

WSRRI ENABLING CONDITIONS

Information and Planning

Science and Monitoring

Organization and Governance

Policy and Permitting

Resources and Equipment

Capacity and Training

Outreach and Education

Funding

COMMUNITY ENGAGEMENT

HABITAT RESTORATION

WSRRI KEY STRATEGIES

HABITAT PROTECTION

SPECIES MANAGEMENT

WILDLAND FIRE MANAGEMENT

SPATIAL PRIORITIZATION

ORGANIZATION AND GOVERNANCE

MONITORING AND ADAPTIVE MANAGEMENT

WSRRI Enabling Conditions and Key Strategies encompassed and guided by
Spatial Prioritization, Organization and Governance, and Monitoring and Adaptive Management.

ACTIONS:
The Actions outlined for each key strategy represent the long-term efforts recommended, spanning a 30-year horizon, to achieve WSRRI's goals and objectives. Actions identified for the short term will be documented in 3-year Implementation Work Plans. Because this Strategy is a living document, the Actions represent the current understanding for how to best achieve the Goals and Objectives.

COMMUNITY ENGAGEMENT

Community engagement is vital to the success of shrubsteppe protection and conservation to benefit wildlife and human communities in the face of wildland fire. Human behavior and values can have significant positive or negative impacts on the quantity and quality of wildlife habitat for numerous sensitive species in this landscape. It is essential to the success of the Strategy that meaningful community engagement is the bookend to all other actions taken. Without local community commitment, the goals and objectives to protect and conserve Washington's shrubsteppe landscape cannot be achieved.

Community Engagement Strategy Action categories include:

► Understanding human values, perceptions, and needs

► Ensuring communication

► Conducting sustained and amplified engagement

► Building and supporting capacity

► Providing grazing and working lands outreach & education

COMMUNITY ENGAGEMENT

HABITAT PROTECTION

HABITAT PROTECTION

Private lands constitute approximately 75% of the Columbia Plateau in Washington, making private landowners key partners in shrubsteppe habitat protection and restoration. WSRRI's interest is to inform, enhance, and accelerate coordinated action on the ground, whether that action is driven by voluntary programs or regulation. Our success will require the full strength of our diverse partnerships to effectively work with landowners and producers to bring those benefits to bear. The Strategy is intended to provide a pathway to improve habitat protection programs and increase opportunities, while strengthening partnerships by increasing capacity and coordination to better work with landowners, support their interests and capitalize on habitat protection opportunities.

Habitat Protection Strategy Action categories include:

► Improving data, tools, and recommendations to inform land protection

► Supporting local jurisdictions in Growth Management Act implementation

► Increasing participation in voluntary incentive programs

► Increasing innovative approaches and funding support

► Improving application of conservation easements

► Empowering partners to deliver incentives

► Developing local grazing networks

► Enhancing grazing management programs

A. Wold, Okanogan Conservation District

"The Habitat Protection goals and strategies recognize the existence of these challenges for land trusts, and point a clear direction towards addressing them, thereby increasing the scope and scale of our efforts.

From landowner outreach to a specified funding source for shrubsteppe protection, to funding and collaboration in establishing and monitoring grazing management, they are thorough and well done. We feel heard and look forward to continuing this work."

- Mickey Fleming, Chelan Douglas Land Trust

HABITAT RESTORATION

The shrubsteppe Habitat Restoration Key Strategy is action-oriented, focusing on collaborative efforts and best practice sharing among WSRRI partners to restore vitality to these landscapes. Key actions include restoring degraded habitats with native vegetation to enhance pre- and post-wildfire resistance and resilience, strategically controlling invasive species like cheatgrass, and significantly scaling up planning and implementation capacity for widespread restoration. The strategy is also focused on protecting cultural resources through well-supported review processes, sourcing locally adapted native plant materials for restoration and employing adaptive management to continuously refine these actions based on evolving knowledge. Through these actions, we aim to provide habitat to ensure the long-term health and sustainability of wildlife and people that inhabit the shrubsteppe landscape.

The WSRRI approach for restoration implementation is aimed at building capacity and resources across the landscape and focusing the shared use of that capacity toward priority areas, irrespective of land ownership. By sharing expanded resources and services, WSRRI can be responsive to restoring habitats impacted by wildfires while also creating more resilient conditions in non-fire years.

Habitat Restoration Strategy Action categories include:

▶ Collaborating and sharing information

▶ Restoring degraded habitat

▶ Increasing restoration implementation capacity

▶ Conducting cultural resources review

▶ Controlling invasive plants

▶ Improving availability of native plant materials

▶ Evaluating habitat conditions

▶ Expanding the knowledge base

Planted sagebrush plug with Washington Conservation Corps crew member in background.   K. Merg

Pygmy rabbit at Sagebrush Flat Wildlife Area.   B. DeMay

SPECIES MANAGEMENT

The Species Management Key Strategy actions are meant to complement the Habitat Protection, Community Engagement, Fire Management, and Habitat Restoration actions that we expect to broadly benefit all wildlife species, including both game and non-game, both common and rare. Here, we aim to amplify programmatic actions that support shrubsteppe wildlife and identify those things that are needed to bolster populations in addition to actions necessary in the other strategies. WSRRI's species management strategy focuses primarily on wildlife that occur in terrestrial environments, inclusive of birds and amphibians using wet (mesic) habitats within the shrubsteppe landscape. Salmonids and other fish are not a primary focus.

Species Management Strategy Action categories include:

▶ Surveying and monitoring SGCN

▶ Developing a comprehensive approach to disease management

▶ Conducting conservation translocations as needed

▶ Minimizing SGCN impact from non-native and human-associated predators

▶ Minimizing impacts to SGCN individuals from built infrastructure

▶ Minimizing impact from human actions and disturbance

▶ Explicitly linking species-specific considerations in habitat protection and restoration efforts

▶ Conducting strategic research for SGCN conservation
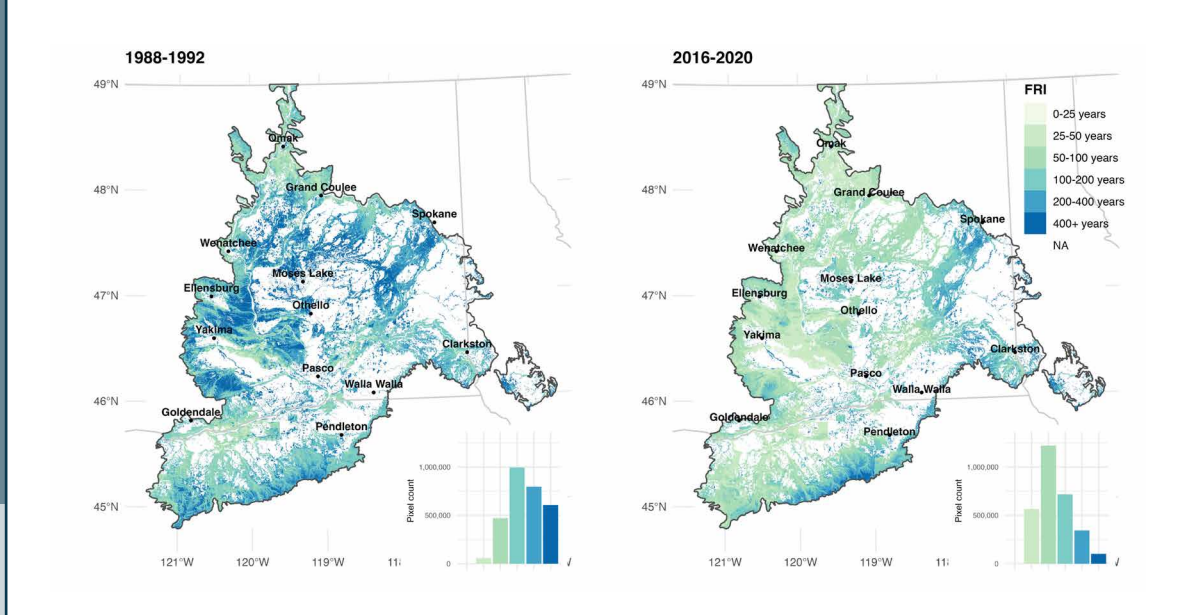
1988-1992   2016-2020

Estimated Fire Return Intervals (FRI) Calculated from Burn Probabilities Averaged over the 1988-1992 Fire Seasons (left) and the 2016-2020 Fire Seasons (right). Note that these estimates of the FRI are considered slightly overestimated (Smith 2023).

WILDLAND FIRE MANAGEMENT

WILDLAND FIRE MANAGEMENT AND SHRUBSTEPPE CONSERVATION

Implementing successful wildland fire management is critical for shrubsteppe conservation. Achieving success with wildland fire management requires a series of integrated and dependent actions such as effective pre-fire response planning and preparation, fire response, mitigating risk and improving community protection, strategic fuel reduction, and reestablishing more natural fire regimes. Importantly, these actions must be implemented in a way that recognizes and supports the overarching goal of restoring ecological functions and processes that result in a healthy shrubsteppe ecosystem.

Invasion by non-native annual grasses and forbs is understood to be one of the primary factors increasing wildland fire risk in Washington's shrubsteppe. This is because invasive annual grasses create continuous and highly flammable fuel conditions, where native shrubsteppe grasses and other fuels are discontinuous, creating a fire-resistant landscape. While native shrubs like sagebrush and bitterbrush burn intensely, they are not the key source of wildland

fire risk in this landscape. It is colonization by non-native annual grasses that increases wildland fire frequency, extent, and severity. Consequently, the strategy prioritizes fuel reduction efforts focused on decreasing non-native annual grasses while encouraging native perennials. It is also explicitly recognized that current land uses, the condition of the landscape, wildlife populations, climate, and other factors must be first taken into account when implementing actions to reduce fuels and reestablish more natural fire regimes.

Wildland Fire Management Strategy
Action categories include:

▶ Improving fire response and mitigation

▶ Conducting pre-fire fuels reduction

▶ Improving community fire protection

▶ Delivering emergency and post-disaster recovery response resources for working lands
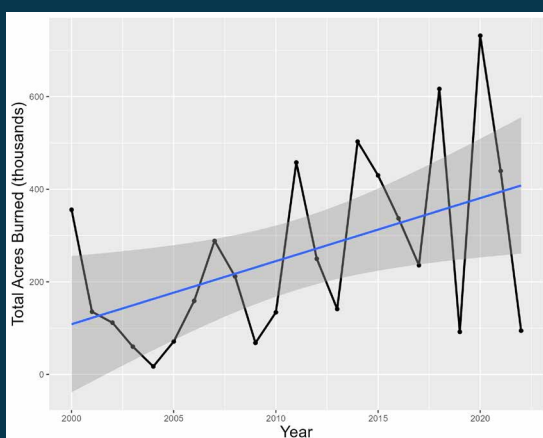
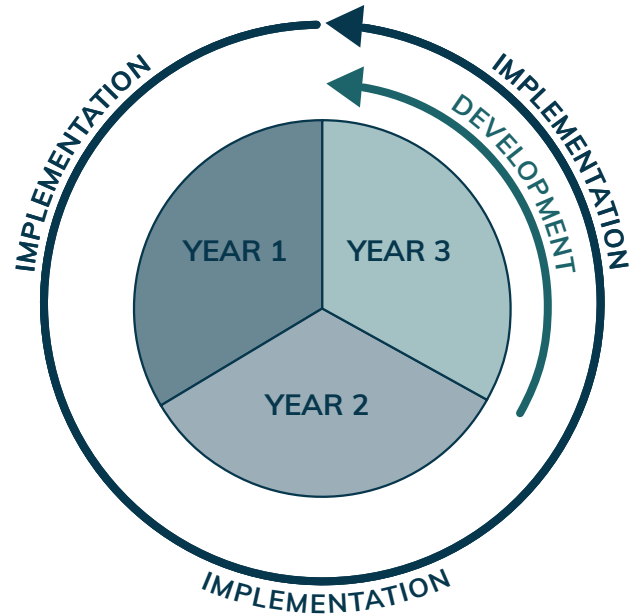*Total acres burned across the Columbia Plateau from 2000-2022*

Burned fence. J. Juelson
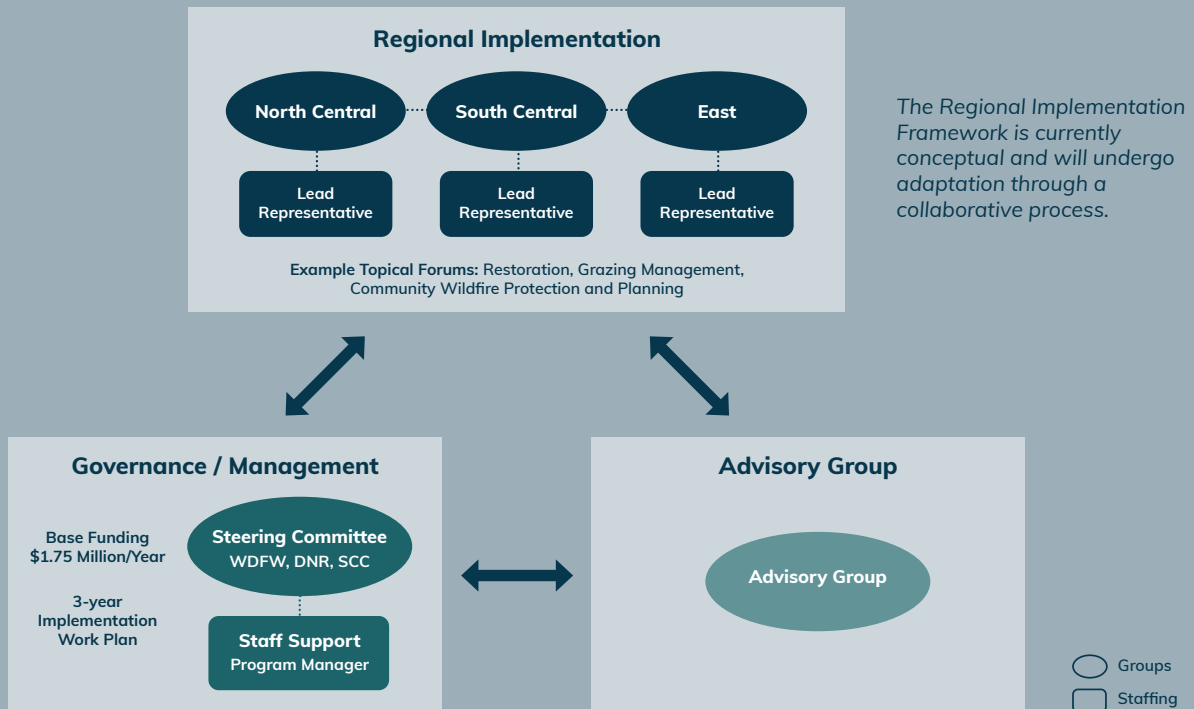
The 3-year Implementation Work Plan

To complement and facilitate the implementation of WSRRI's overarching 30-year vision, iterative and regularly updated implementation work plans will be developed. These work plans will outline specific actions and short-term steps to be taken, and document responsible implementors. They will encompass federal, state, and partner actions, clearly identifying roles and responsibilities.

We anticipate that WSRRI's conceptual management structure and governance will mature through time, adjusting and changing to meet the needs of the partners and communities it aims to support. As we near year one of Strategy implementation, we expect the management structure to include the Steering Committee, a Program Manager, an Advisory Group, and Regional Implementation Teams. Together, these groups and individuals, bolstered by WSRRI's technical, resource, and financial support, will form the backbone of the shared efforts to conserve habitats, provide fire protection, and restore shrubsteppe to meet the needs of the state's shrubsteppe wildlife and human communities across all land ownerships.

WSRRI 3-year work plan cycle

Strategy Implementation Framework

The Regional Implementation Framework is currently conceptual and will undergo adaptation through a collaborative process.

Conceptual WSRRI implementation framework

▶ **WSRRI STEERING COMMITTEE (WDFW, DNR, SCC)**

The WSRRI Steering Committee has and will continue to play a pivotal role in providing strategic direction and decision-making, ensuring that WSRRI's work remains collaborative and honors the investment of the Washington State Legislature. The Steering Committee will align WSRRI priorities with state agencies, Tribes, and other partners, and integrate these priorities into agency Legislative requests.

▶ **WSRRI PROGRAM MANAGER**

The WSRRI Program Manager will focus on implementation coordination by facilitating collaboration between the Steering Committee, the Advisory Group, and Regional Implementation Teams; monitoring and reporting on WSRRI progress; and managing overall communications. Additionally, the Program Manager will facilitate and support the development of implementation work plans, engage in grant development and management to support strategic action implementation, and refine monitoring and adaptive management plans.

▶ **ADVISORY GROUP**

The Advisory Group, a diverse body comprising representatives from state and federal agencies, Tribes, community members, farmers and ranchers, funding organizations, subject matter experts, and other stakeholders, will provide valuable input, expertise, and feedback, ensuring a comprehensive and inclusive perspective in advancing WSRRI's objectives. This group will advise the WSRRI Program Manager and Steering Committee on work plans, assist with securing funding, and recommend priorities and criteria for allocating resources.

In its initial phases, WSRRI has had limited designated funding available for programs such as habitat restoration, deferred wildland grazing after fire, and wildlife-friendly fencing. Significant additional funding will be needed to fully implement the Strategy, meet the goals and objectives, and realize the complete WSRRI vision.

▶ **REGIONAL IMPLEMENTATION TEAMS**

While still conceptual at the time of the Strategy finalization, Regional Implementation Teams, built from already existing partner capacity but integrated into and supported by the WSRRI organizational structure, will create regional implementation work plans, pursue funding for region-specific needs, and implement restoration and wildland fire resiliency projects. These teams, in close collaboration with local stakeholders, Tribes, landowners, and communities, will be vital in driving effective on-the-ground conservation and restoration, ensuring the success of WSRRI. Within the Regional Implementation Teams, Lead Representatives will foster collaboration, coordination, innovation, and inclusive engagement, support Regional Implementation Teams in their work, and ensure that regional needs and priorities are integrated into program-level priorities.

▶ **TOPICAL FORUMS**

Topical Forums, convened as needed, will bring together subject matter experts from across Regional Implementation Teams to address specific management issues or opportunities critical for effectively implementing the WSRRI strategy. Topical Forums will cover topics such as (but not limited to) habitat restoration, grazing management, and community wildfire protection and planning. This will provide coordination and idea-sharing across the regional implementation teams to enhance planning and implementation.

## Proactive Approach to Habitat Restoration and Project Implementation

In addition to general solicitations for project proposals, WSRRI will take an active approach to identify habitat restoration projects in strategic areas of the shrubsteppe landscape. We will engage with Regional Implementation Teams, landowners, and other stakeholders and Tribes for effective project planning and implementation. This approach includes establishing clear project selection criteria aligned with WSRRI's conservation goals, leveraging existing capacities and diverse expertise for project execution, fostering collaboration to maximize funding and resources, and instituting a transparent review process. Additionally, WSRRI commits to regularly evaluating and refining its project generation process to adapt to changing conservation needs and ecosystem conditions.

Pond at Big Bend Wildlife Area.   WDFW

Monitoring and Adaptive Management

Given the duration of the Strategy and anticipated uncertainty (e.g., climate change), monitoring the implementation and effectiveness of WSRRI actions is essential to ensure that we meet our management objectives. Further, adaptive management will allow us to make informed decisions despite uncertainty and incorporate new information over time.
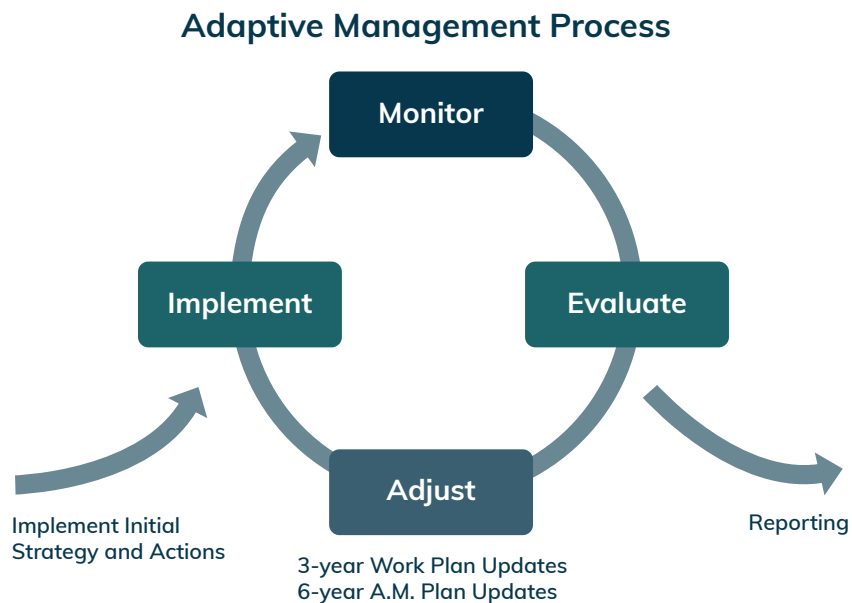
Adaptive Management Process

Implement Initial
Strategy and Actions

3-year Work Plan Updates
6-year A.M. Plan Updates

Reporting

Adaptive Management Process. Work plan and adaptive management plan updates represent opportunities to adjust during implementation.

Metrics to track progress towards achieving WSRRI's goals have been identified for each objective. Metric selection will be refined in the first work plan, and then evaluated and adjusted at regular intervals, to incorporate scientific advancements and lessons learned through implementation.

Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI), fueled by legislative support and guided by a three-agency Steering Committee, is committed to preserving and revitalizing the shrubsteppe landscape of Washington State for the wildlife and human communities that call this place home. Success will only occur if the people that steward and live on these lands see their priorities and responsibilities reflected in the Strategy, feel ownership of it, and see value in implementing it. The team developing the Strategy has worked diligently to reflect these priorities and responsibilities in the mission, vision, goals, and actions. We remain committed to understanding how to continuously improve the Strategy to ensure it reflects shared priorities. By balancing strategic wildlife habitat protection and restoration with sustainable working lands management, and engaging a broad range of shrubsteppe communities, stakeholders, and Tribes, the initiative seeks to foster a wildfire resilient and thriving landscape.

Acknowledgments

WSRRI Steering Committee members Allen Lebovitz (DNR), Hannah Anderson (WDFW), and Shana Joy (SCC).   Photo: J. Juelson

Background photo: Shrubsteppe habitat in hills above Wenatchee.   S DeMay

Table of Contents

Notes to reader:

Please see the document glossary on page 98 through 102 for commonly used or technical terms throughout the document.

Acronyms are spelled out on their first occurrence throughout the document. A list of all acronyms is located on page 103.

Tables

Figures

1. WSRRI Coordination with Sovereign Tribal Nations in the Shrubsteppe Landscape

Indigenous Peoples have been stewards of the shrubsteppe landscape since time immemorial. There are five federally recognized Tribes with usual and accustomed territory in the Columbia Plateau. This strategy recognizes that cooperation with these tribal nations is fundamental to the ongoing stewardship and management of the shrubsteppe landscape. Each Tribe in the region maintains distinct lifeways and unique cultural practices rooted in relationship to the land, and all are vital to the effort to conserve and restore native ecosystems. The Washington Department of Fish and Wildlife, Washington Department of Natural Resources, and Washington State Conservation Commission, who together make up the Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI) Steering Committee, recognize the sovereignty of these tribal nations and respect their rights, titles, and treaties. The three agencies that lead the WSRRI are committed to partnering with these tribal nations to conserve, restore, and protect the health and integrity of Washington's shrubsteppe habitats and wildlife species.

Columbia Plateau tribal representatives have helped craft the development of this strategy. The WSRRI Steering Committee recognizes that this strategy represents the beginning of the restoration and protection work. Involving tribal nations to help implement a long-term strategy for the conservation and restoration of the shrubsteppe landscape will be essential to its success.

2. Introduction

Washington's shrubsteppe landscape sits at the northwestern edge of the sagebrush biome, which extends across several Western states, within the Columbia Plateau ecoregion (Figure 1). The ecoregion was formed by basaltic lava floods followed by the great Missoula floods which scraped away loess soils and created the channeled scablands (Sleeter et al., 2012). Average annual precipitation ranges from 6 to 30 inches, half of which is stored as ice and snow and becomes accessible to the land as spring arrives (Washington Department of Ecology, n.d.), with the interior portion of the ecoregion getting the least precipitation. The climate is typically characterized by cold winters and hot, dry summers.

As a wildlife habitat, dry or arid shrubsteppe is characterized by a mix of shrubs, grasses, and forbs; various sagebrush species, hopsage, greasewood, and bitterbrush, are intermixed with perennial bunchgrasses and wildflowers (Condon et al., 1998). Cryptobiotic soil crusts not only protect against soil erosion but also play a vital role in preventing the establishment of invasive plant species (Belnap & Eldridge, 2003). The ecoregion's geological history coupled with its climate have resulted in a very diverse landscape, with large expanses of these arid mixed shrub and grasslands, surrounding scattered permanent and seasonal wetlands, riparian areas, sand dunes, and basalt cliffs and talus. These collectively support unique biological diversity, providing habitat for a wide range of wildlife species, including birds, mammals, reptiles, amphibians, and insects, as well as plants, some of which only occur here. Forty-three of these species are currently designated as Species of Greatest Conservation Need (SGCN) in the State Wildlife Action Plan (WDFW, 2015), and many of these are federally- or state-listed as endangered or threatened or are candidates for listing.
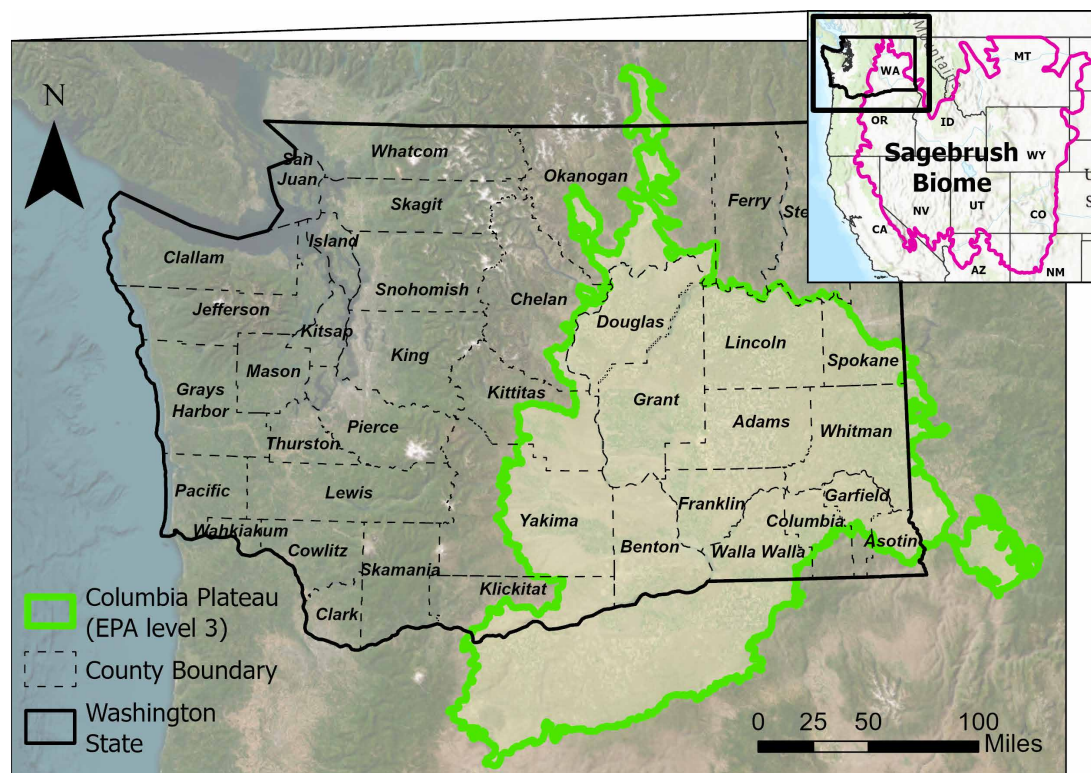
Figure 1. The Columbia Plateau Ecoregion (EPA level 3) across the PNW and Eastern Washington with the inset map displaying the rangewide sagebrush biome data (Jeffries & Finn, 2019 (USGS)) used in WAFWA's Sagebrush Conservation Strategy publication.

Once covering more than 10 million acres in Eastern Washington, a significant portion of the shrubsteppe landscape has been lost or degraded; Figure 2 compares historical (i.e. prior to Euro-American settlement) to current (2022) shrubsteppe land cover. Private land ownership by white settlers displaced Indigenous communities and significantly altered the landscape through introduction of horses and livestock, development of an engineered irrigation network and then hydro-electric power production, and conversion to agricultural uses (Sleeter et al., 2012). Quantifying estimates of shrubsteppe loss is difficult as assessments of historical presence are likely inaccurate and estimation methodologies vary (M. Schroeder, personal communication, December 17, 2023). However, even during the mid-1990s, WDFW estimated that nearly 60% of the original shrubsteppe habitat in Washington had been converted to other landcover (Dobler et al., 1996). More recently, Miller et al. (2011), estimated that 76.3% of historical sagebrush distribution in Washington had been lost.
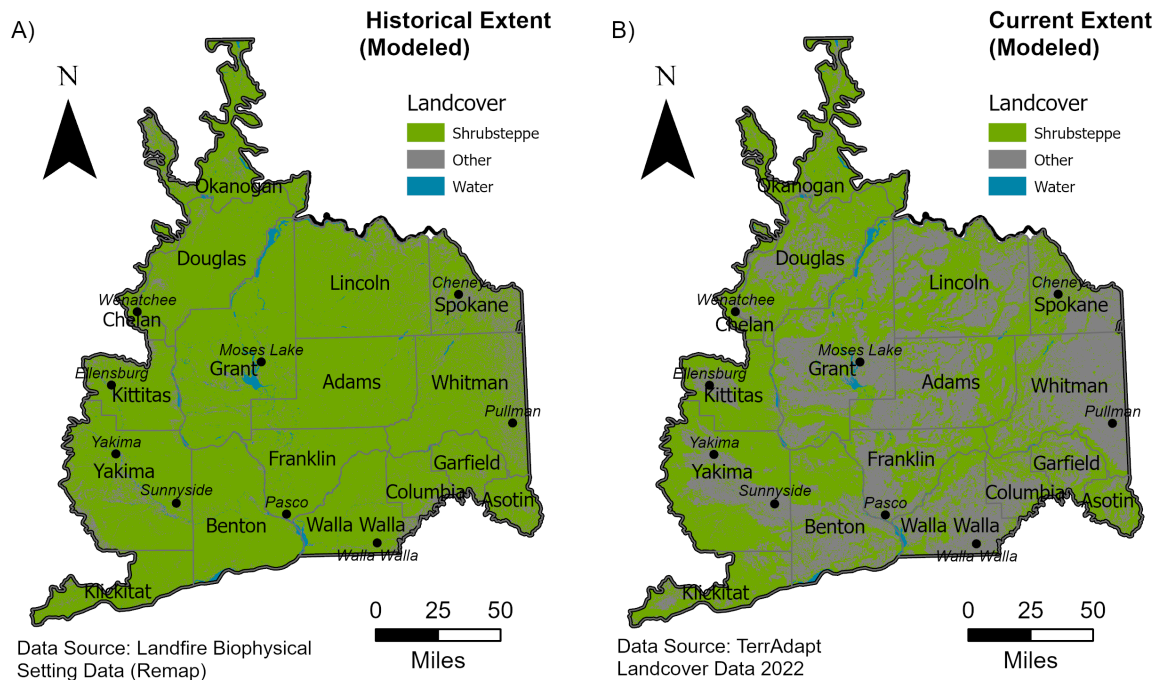
Figure 2. The historical (A) and current (B) extent of shrubsteppe habitat in Washington. The data sources vary (Landfire Biophysical Setting (A) versus TerrAdapt.org(B)), but in both cases, the landcover types associated with natural shrublands or natural grasslands were combined to map shrubsteppe habitat. Landfire's Biophysical Setting data represents the vegetation system that may have been dominant on the landscape prior to Euro-American settlement and is based on the current biophysical environment and an approximation of the historical disturbance regime (https://www.landfire.gov/bps.php).

What little remains of our state's native shrubsteppe habitat is under threat due to the unprecedented extent, frequency, and severity of wildland fire, invasion of non-native annual grasses, a rapidly changing climate, and increased human pressure. Conserving and restoring shrubsteppe habitats to increase resilience and resistance are essential for native wildlife as well as the human communities that live and work in the Columbia Plateau. In this document, "resilience" refers to the broad ability of systems (e.g., habitats, human communities, species, etc.,) to regain fundamental structures, processes, and functioning following stresses or disturbances, while "resistance" refers to the broad ability of systems to retain fundamental structures, processes, and functioning despite stresses or disturbances.

Fire severity, or burn severity, refers to the degree of consumption of combustible biomass and surface soil organic matter after a fire, reflecting the impact on ecosystems.

3. 2020 Wildfires Prompting the Legislative Proviso

Fire is a natural and important part of shrubsteppe ecosystems, historically playing a large role in creating a mosaic of stands of different sizes in various seral conditions (Remington et al., 2021, West 1999; Knick et al. 2005). In recent decades, the increasing extent, frequency, and severity of wildland fire, paired with the loss of wildlife habitat and increase in human uses, has resulted in catastrophic impacts to vegetation, wildlife, and people across the Columbia Plateau. No year illustrates this trend in Washington more so than 2020. The largest wildfire in Washington State recorded history, the Cold Springs Canyon/Pearl Hill fire, burned over 410,000 acres of our shrubsteppe landscape in early September 2020, moving with enough speed to jump a quarter-mile wide reach of the Columbia River from Okanogan County to Douglas County. Also in 2020, the Whitney fire impacted an additional 127,400 acres of shrubsteppe habitats in Lincoln County. The damage caused by these wildfires was particularly severe due to the extent of the areas impacted, the speed at which the fires moved, and the intensity at which the fires burned. The combination of these factors had not only immediate impacts to habitat and wildlife, but also severe long-term impacts resulting from the conversion of shrub-dominated habitats to grass-dominated ones, and the expansion of invasive species into these habitats. One particularly poignant example of the degree of the impact from the wildfires of 2020 is that they had a larger effect on greater sage-grouse habitat in Washington State than any other wildfires in recorded history. In addition, the 2020 wildfires eliminated one of three pygmy rabbit recovery areas, considerably setting back conservation progress.

> *Fire intensity* is the amount of energy or heat given off by a fire at a specific point in time, or the energy output from fire.

In response to the 2020 wildfires, the Washington State Legislature, through a budget proviso, directed the Washington Department of Fish and Wildlife (WDFW), Washington Department of Natural Resources (DNR), and Washington State Conservation Commission (SCC) to restore shrubsteppe habitats and associated wildlife impacted by wildland fire. Towards this specific purpose, the proviso allocated $2.35 million in ongoing funding in the 2021-23 biennium to WDFW from the State General Fund as part of the operating budget (Washington State Legislature, 2021; full proviso language in Appendix A). Accompanying the Operating Budget investment, $1.5 million of Capital funds were made available to replace burned livestock fences with wildlife-friendly versions across the shrubsteppe landscape. Subsequently, the Legislature has reinvested in wildlife-friendly fences, appropriating an additional $1.5 million to the SCC in the 2023-25 Capital budget.

The proviso includes two key elements -

1. Implementation of restoration actions on public and private lands, which may include species-specific recovery actions; increasing the availability of native plant materials; increasing the number of certified and trained personnel for implementation at scale; supporting the replacement of burned fences with wildlife-friendly fencing versions; and providing support for private landowners/ranchers to defer wildland grazing and allow natural habitat regeneration.
2. Formation of a collaborative group process including diverse stakeholders and facilitated by a neutral third-party to develop a long-term strategy for shrubsteppe conservation and fire preparedness, response, and restoration to meet the needs of the state's shrubsteppe wildlife and human communities. The long-term strategy should address the restoration actions described in element one, spatial priorities for shrubsteppe conservation, gaps in fire coverage, management tools to reduce fire-prone conditions, and identify and make recommendations on any other threats.

The Washinton Shrubsteppe Restoration and Resiliency Initiative (WSRRI) was built from the foundation of this Legislative proviso. WSRRI's primary objective is to enhance the well-being of Washington's shrubsteppe wildlife and habitat with an emphasis on addressing the escalating extent, frequency, and severity of wildland fires. WSRRI also addresses the needs of human communities that live and work in Washington's shrubsteppe landscape and that benefit from healthy and resilient landscapes, habitat, and wildlife populations. WSRRI is a collaborative effort, led by a Steering Committee comprised of three state agencies – WDFW, SCC, and DNR. WSRRI is closely informed and guided by an advisory group comprised of Tribes and diverse stakeholders with a vested interest in Washington's shrubsteppe landscape, including various public and private partners. More information on WSRRI's formation to date can be found in Appendix B, and proposed future Organization and Governance is described in Section 8.

3.1. Proviso Element One – Implementing Restoration Actions

Because planning takes time and the needs on the landscape were urgent, it was necessary to begin implementing restoration actions well before our long-term strategy process was completed. While the proviso established the foundational framework, numerous details still needed careful consideration to transform proviso element one into actionable and operational steps. The Steering Committee convened a Near-Term Action Advisory Group and six Technical Teams comprised of a diverse spectrum of interests, including local, state, federal, agricultural, and conservation organizations. Their diverse backgrounds and expertise ensured a well-rounded perspective. This group identified species-specific recovery actions that could be immediately implemented to bolster wildlife populations impacted by the fires, how to expand on-the-ground personnel and cultural resources capacity, selected which native plants to produce and an approach for their production, created a definition for wildlife-friendly fencing and an approach to deliver that program, and put together a process for offering assistance to ranchers to support deferring grazing to allow habitat time to recover after fire. Together, this work allowed WSRRI to move forward, putting the proviso dollars to work and laying the essential building blocks for components of our long-term strategy.

WSRRI's approach has been to build restoration capacity by delivering resources and services, rather than solely distributing the proviso funding as grants to implement projects. WSRRI aims to remove barriers and bottlenecks to implementing landscape-scale habitat restoration by increasing the availability of resources needed to implement restoration; to date, WSRRI has provided cultural resource reviews, technical personnel and labor needed to implement project work, native seeds and plants, fencing materials for wildlife-friendly versions, and funding to compensate livestock producers for deferring grazing after a wildfire to allow for habitat recovery.

Coordinating this effort at a landscape scale allows WSRRI to strategically focus investments on re-establishing native and perennial plant communities where they have been lost, expanding their presence in areas where they still exist, and providing the capacity needed to deliver resources to immediate needs when wildfires occur. There is often a relatively short ecological window of time immediately following a fire when specific restoration actions are needed and will be most effective, such as installing native plants or seeds and herbicide application to manage the spread of invasive vegetation. Having crews and native plants available to quickly focus attention to priority burned areas, irrespective of political boundary or land ownership, is extremely valuable and was a capacity gap clearly identified just after the 2020 wildfires. WSRRI aims to fill this capacity gap and remain flexible at the landscape scale by coordinating and sharing resources and services across ownerships.

Initial WSRRI efforts to expand resource and service capacity have included:

▶ **Personnel**

Hiring of a shrubsteppe landscape restoration coordinator; engaging crews, such as Washington Conservation Corps; contracting local restoration professionals; directing agency staff investments to WSRRI efforts (e.g., archeologist); and funding conservation districts to provide enhanced technical assistance to landowners.

▶ **Native Plant Materials**

Contracting with local professional growers to purchase native perennial grass seed and partnering with the Sustainability in Prisons Project (SPP) to grow locally sourced sagebrush plugs and seeds. SPP also benefits and supports participating incarcerated technicians by providing shrubsteppe landscape educational and training programs.

▶ **Supplies and Equipment**

Purchasing equipment to enable large-scale restoration, including specialized items (e.g., seed drill modified for native seeds); purchased supplies necessary to implement projects such as herbicide, fence markers, and tools for crews.

WSRRI leveraged our partnership network, worked directly with landowners and land managers, and issued broad public solicitations to collect project proposals to capitalize on these available resources. To date, WSRRI has allocated resources and services, as well as limited funding awards, toward the following actions:

▶ **Shrubsteppe Habitat Restoration**

The WSRRI restoration coordinator has worked with tribal, public, and private landowners, and conservation districts to implement restoration actions.

▶ **Riparian Restoration**

Partners developed a collaborative project to restore riparian function to East Foster Creek using beaver dam analogs and post-assisted log structures.

▶ **Wildlife Friendly Fence**

Conservation districts have facilitated the delivery of burned fence replacements and retrofits with wildlife-friendly versions, including the piloting of virtual fence in Washington. In addition, WSRRI crews have removed many miles of burned fence, reducing this hazard on the landscape.

▶ **Deferred Wildland Grazing**

WSRRI has delivered reimbursement through conservation districts to participating landowners opting to defer wildland grazing while habitat recovers from wildfire.

▶ **Bolstering Species Populations**

In the first year of implementation, WSRRI supported the Columbia Basin pygmy rabbit reintroduction project and a research project aimed at understanding wildlife use of various shrubsteppe habitat conditions. As other funding sources have become available to support species-specific work (e.g., 2023 legislative investment in biological diversity), WSRRI has refocused investments toward restoration and working lands components.

Expanding capacity and delivering resources and services on the ground in a coordinated and collaborative way to recover wildlife, restore habitat, and support working landowners has been WSRRI's primary effort to date. With the development of our long-term strategy, we're setting a vision and approach to expand on that effort and making recommendations to put in place the resources and infrastructure necessary to prepare, respond, and recover from wildland fire in the shrubsteppe.

3.2. Proviso Element Two: Long-Term Strategy for Shrubsteppe Conservation

WSRRI's Long-Term Strategy for Shrubsteppe Conservation (Strategy) is the product of the second proviso element. It arises from the urgent need to act in a comprehensive strategic, collaborative, and sustained effort to safeguard and restore this ecosystem. The Strategy builds on the work of proviso element one to take immediate actions to restore habitat, bolster species populations, and support working lands and significantly expands on this initial scope to include longer-term actions in the areas of habitat protection, wildland fire management, and community engagement.

The Strategy takes a holistic approach to achieving shrubsteppe conservation, while being cognizant to not duplicate efforts already underway. For example, the Strategy does not focus on actions aimed specifically at recovering salmon species, nor does it try to explicitly guide the siting of new solar energy projects. Both of those efforts are coordinated and carried out by partners in other forums. Instead, the Strategy emphasizes actions that need increased attention, coordination, and collaboration.

This document is intended to serve the following purposes:

▶ **Charting the Course**

Taking a holistic, long-sighted, landscape-scale view to delineate the path forward, outlining the actions required at present to achieve long-term goals in the coming decades.

▶ **Supporting Coordinated Efforts**

Supporting a wide spectrum of conservation, restoration, and infrastructure investments, ensuring that resources are allocated efficiently.

▶ **Ensuring Accountability**

Set forth a vision for what must be achieved, how these achievements can be realized, and how the lead agencies can uphold accountability to ensure that progress is continually made.

4. Strategy Design

4.1. Vision, Mission, and Guiding Principles:

Underpinned by the Guiding Principles, WSRRI's Vision and Mission provide a blueprint for realizing resilient and thriving wildlife and human communities across the shrubsteppe landscape in Washington State.

VISION

A resilient shrubsteppe landscape, achieved through collaborative partnerships for the benefit of wildlife and human communities.

MISSION

To implement the collaboratively developed long-term strategy for shrubsteppe conservation and wildland fire preparedness, response, and recovery to meet the needs of the state's shrubsteppe wildlife and human communities.

GUIDING PRINCIPLES

The Steering Committee and collaborators followed these Guiding Principles in developing the Strategy:

1. **Focus on Shrubsteppe Wildlife and Habitat Conservation**

    The central reason for the Strategy is the urgent need to address the catastrophic loss of shrubsteppe wildlife and their habitats in Washington State.

2. **Support Working Lands and Rural Communities**

    We recognize the essential role of working lands and rural communities to steward and conserve shrubsteppe habitats. The Strategy identifies support and opportunities for their sustained well-being.

3. **Strategically Target Investments**

    We employ a spatial conservation design that geographically identifies "Core" areas with high concentrations of high-quality and intact habitat. Through conservation investment, Core areas should be defended from conversion and degradation, expanded to build more functioning and intact habitats, and connected to facilitate wildlife movement and migration.

4. **Accelerate the Pace and Scale of Conservation and Restoration**

    We are committed to expediting the pace and scale of conservation efforts, ensuring that our initiatives effectively address the challenges at hand.

5. **Support and Build Upon Existing Efforts and Capacity**

    WSRRI is grounded in the principles of collaboration, synergy, and efficiency. The Strategy seeks to identify existing efforts and capacity, build upon and support them, and fill gaps to achieve the goal of shrubsteppe landscape conservation and restoration.

6. **Incorporate Diverse and Traditional Perspectives**

    WSRRI aims to engage and collaborate with people from all walks of life, welcoming diverse voices and traditional knowledge and wisdom into our collective work to protect and conserve the shrubsteppe landscape for future generations.

7. **Proactively Addressing Equity and Environmental Justice**

Several human communities within the Columbia Plateau are highly impacted and overburdened by ecosystem degradation. Many of these communities were historically and are currently underserved with respect to wildland fire protection, natural resource management, and ecological restoration. We include targeted actions designed to reduce these impacts and improve community wildland fire resilience and ecosystem health to ensure benefits to all of our communities.

8. **Monitor Results and Adapt Strategies**

We are committed to monitoring our progress and maintaining the flexibility to adapt as needed, striving for continued success in our conservation efforts.

Highly impacted
A community designated by the department of health based on cumulative impact analyses in RCW 19.405.140 or a community located in census tracts that are fully or partially on "Indian country" as defined in 18 U.S.C. Sec. 1151.

Overburdened
A geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities as defined in RCW 19.405.020.

4.2. Committing to Environmental Justice and Equity in the Strategy

Environmental justice and equity are concepts rooted in the belief that everyone, regardless of their socio-economic status, race, or background, should have fair treatment, meaningful involvement in developing and implementing environmental practices, and the chance to live in a healthy and safe environment. The practice of environmental justice and equity requires the recognition that some communities, those that are underserved, highly impacted, overburdened, and vulnerable, often bear a disproportionate burden of environmental challenges, including the impacts of habitat degradation, land use changes, and ecosystem restoration. Achieving environmental justice and equity involves improving awareness that these inequities exist and that there are societal and institutional barriers to addressing them. In the context of this strategy, it means taking proactive steps that involve all communities in achieving and benefitting from the goals of conserving and restoring shrubsteppe habitats and improving protection from wildland fire.

Addressing environmental inequities requires the regular and meaningful involvement of underserved, highly impacted, overburdened, and vulnerable populations across Washington's shrubsteppe landscape in planning, and prioritization of their needs throughout implementation of this strategy. This begins by identifying these communities using existing tools such as the Environmental Health Disparities (EHD) map from the Washington Tracking Network (WTN), a project of the Department of Health, and creating new tools such as the Social Vulnerabilities Index,

Vulnerable populations
Population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to:

(i) adverse socioeconomic factors, such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and

(ii) sensitivity factors, such as low birth weight and higher rates of hospitalization.

used in Oregon specifically for assessing wildfire risk (Oregon State University, 2023). Once identified, communities can be engaged both through existing formal organizations and also through informal networks and direct outreach. Restoration, education and all community engagement efforts can also connect with communities speaking key indigenous languages from Mexico and Guatemala as well as Spanish, as they are common throughout the shrubsteppe region.

Lastly, a commitment to environmental justice requires deliberate and targeted actions to benefit these specific communities in order to reach shared goals of shrubsteppe conservation and restoration and fire protection for all communities. Respecting all cultures in the region means meaningful consultation, assessment, and training on cultural resources to ensure that tribal knowledge, approaches, and artifacts are proactively considered in restoration efforts. Actively seeking vendors for equipment, plant material, and services from underserved communities, as well as implementing workforce development programs to provide jobs and economic opportunities that can be leveraged to better include all communities in achieving and benefiting from the goals of shrubsteppe restoration and fire protection (Ervin, 2022). When developing community wildfire resilience programs, actively identifying and targeting disproportionately impacted communities can assist with reaching communities with greater needs, that lack capacity or simply awareness to take advantage of these programs, and are frequently left out. Ultimately, actions like these engage more people and communities, bringing greater awareness, support, and hands for achieving the shared goals of shrubsteppe conservation and restoration.

WSRRI is committed to these fundamental principles, and this strategy lays the groundwork for developing actions to further assess and integrate EJ and equity principles into shrubsteppe conservation and wildland fire preparedness, response, and recovery.

(Adapted from Sharma 2019)

Environmental Justice
as a goal requires just and fair treatment and involvement of all people of all communities in implementation and development of environmental laws, rules and policies regardless of origin, race, class, and nationality; this goal is achieved when everyone enjoys the same degree of protection against environmental hazards and access to environmental benefits, and each individual has a role in decision making around protecting the environment.

Environmental Equity
is the equitable distribution of the environmental burden, disaster hazards & pollution on all forms of social, economic and political communities. This concept evolves on the premises that no single community should have privilege over other communities in facing environmental disturbances or crisis. Environmental Equity is based on the principle that all people in this world are equal and deserve equal rights and opportunities to enjoy the benefits of the environment around us regardless of any disparity.

4.3. Strategically Targeting Investments – Defend the Core, Grow the Core, Connect the Core

Given the extent of habitat loss across the shrubsteppe landscape, all remaining habitat has conservation value. Yet, there is a need for a way to prioritize action to realize the best conservation outcomes over time. In the Strategy, the approach to strategically target collaborative conservation investments, including funding, capacity, and action application, generally follows a recently developed proactive conceptual model applied throughout shrubsteppe landscapes in the American West, to "Defend the Core, Grow the Core, Mitigate Impacts" (WGA 2020; NRCS 2021; Doherty et al., 2022). This framework requires a landscape-level assessment of habitat quality. It then serves to focus conservation investments in and around high-quality 'core areas' where they are most likely to be effective and cost efficient, and away from more degraded areas where they may be highly costly and ineffective. Across the west, this proactive approach has helped change the conservation narrative into one that begins with protecting healthy landscapes that have no threats or low-level threats and expands outwards towards more threatened and impaired areas (Doherty et al., 2022). WSRRI expands this framework to include connecting the core; maintaining connectivity between areas of high-quality habitat is critical in Washington due to fragmentation across our shrubsteppe landscape.

▶ **Defend the Core**

Defending high-quality core habitat from encroachment of threats, like development, conversion, loss due to wildland fire, and invasive annual grasses, must be the highest priority for WSRRI. Aggressive action to keep core areas intact and healthy is paramount to building resistance and resilience in these places.

> **Resistance**
> *The ability of a system to retain its structure and function when confronted with disturbance, stress, or invasive species (Chambers et al., 2019).*

▶ **Grow the Core**

While cores are being defended, action should also be taken in lesser quality habitat surrounding and adjacent to core areas, to expand the footprint of high-quality habitat. While defending our existing core areas is essential, growing the core is a necessity for long-term conservation and recovery of shrubsteppe habitats and wildlife.

▶ **Connect the Core**

Connecting the core requires action to maintain, over time, open and viable linkages between core areas so that wildlife can continue to move across the landscape and access high-quality habitat. Such action allows for effective demographic and genetic exchange between populations, increasing the resilience and viability of the regional *network* of habitats.

Beyond defending, growing, and connecting the core across the shrubsteppe landscape, the need will remain to mitigate threats to habitats, wildlife, and human communities. Mitigation actions that will be important everywhere include containment and control of invasive annuals and wildland fire suppression and recovery.

To target WSRRI investments strategically and geographically and facilitate the collective approach to Defend the Core, Grow the Core, and Connect the Core, WSRRI partnered with TerrAdapt, a non-profit organization, to implement a collaborative process to identify spatial priorities for Washington. TerrAdapt uses remote sensing and Google Earth Engine to dynamically monitor habitat and connectivity, project future conditions given future climate and land-use scenarios, and prioritize areas for conservation actions to increase resilience.

To facilitate a strategic approach for targeting investment, we mapped Core Areas, Growth Opportunity Areas, Corridors, and Other Habitat.

▶ **Core areas (Cores)**

Core areas are those with the highest quality habitat across the shrubsteppe landscape. Actions targeted in core areas should include protection, as protecting intact high-quality habitat is more efficient than restoring it after disturbance or degradation, as well as threat prevention and abatement. Where disturbances occur in core areas despite protection measures, restoration or enhancements should be high priorities to quickly recover habitat quality.

▶ **Growth Opportunity Areas (GOAs)**

GOAs are areas with significant amounts of habitat remaining that are more degraded than habitat in core areas. Through restoration, habitat quality could increase, thus growing the core. Restored areas within GOAs should be protected from further threats to protect our investments over time.

▶ **Corridors**

Corridors provide paths for wildlife that are relatively free of movement barriers; these paths connect the network of cores and GOAs across the landscape. Further barrier development (e.g., road construction, significant habitat conversion, and development) should be avoided in corridors to maintain their ability to connect high-quality habitat.

▶ **Other Habitat**

These areas still include remaining habitat, but that habitat is too highly degraded, due to patch size or isolation, to be included in core areas, GOAs, or corridors. For long-term conservation of shrubsteppe habitats and species, these areas are important to maintain as habitat and, if and where resources allow, their condition improved over time.

WSRRI's spatial priorities address three different conservation targets, including 1) the dry (xeric) ecosystem), and 2) the wet (mesic) ecosystem, which collectively encompass the breadth of natural habitat types within the shrubsteppe landscape. In addition, spatial priorities for 3) the greater sage-grouse identify core areas, GOAs and corridors for this species, which may have been undervalued in the ecosystem targets alone.

1. Dry (Xeric) ecosystem

In WSRRI's spatial priority setting, this ecosystem includes drier environments where sagebrush and perennial grasslands predominate (Figure 3). Spatial priorities for this ecosystem (Figure 6) are a generalization of the needs for many species associated with these drier environments in the shrubsteppe landscape. Xeric cores represent the largest blocks of native grasslands and shrublands in the region. They contain abundant perennial grass and forb cover, comparatively low amounts of invasive annual grasses, low human footprint, and often at least some sagebrush cover.

Figure 3. Example of Dry (Xeric) Ecosystem in WSRRI Spatial Priority Modeling.

2. Wet (Mesic) ecosystem

In WSRRI's spatial priority setting, this ecosystem represents the wetter environments of the region where wetlands, wet meadows, and riparian habitats predominate (e.g., Figure 4). Spatial priorities for this ecosystem (Figure 7) are a generalization of the needs for many species associated with these habitat types. Mesic cores represent the largest concentration of mesic habitats (wetlands, meadows, and riparian vegetation) with the lowest human footprint. Mesic cores include not only the mesic habitats but locally accessible upland habitats just upslope from the moist areas.

Figure 4. Example of Wet (Mesic) Ecosystem in WSRRI Spatial Priority Modeling.

3. Greater sage-grouse

The greater sage-grouse (Figure 5) spatial priorities (Figure 8) reflect the species' unique life-history and are based largely on empirical data used to model greater sage-grouse habitat quality and habitat connectivity. Greater sage-grouse core areas are not necessarily occupied now, but they contain abundant habitat and correspond well to the recent range of species in the region. Greater sage-grouse GOAs have less habitat and/or lower quality habitat and are therefore less likely to be occupied. However, many have seen occasional use and with additional restoration may help expand the occupied range.

Figure 5. Greater sage-grouse.

Greater sage-grouse require large areas of shrubsteppe habitat dominated by sagebrush. Productive breeding habitat is sagebrush steppe with a diverse herbaceous understory, and springs or wet areas that retain green vegetation in late summer. Birds generally move between winter and summer ranges returning to traditional lek sites in February. Mating occurs at leks where males display to attract females. Females incubate nests on the ground. Nest predation rates are affected by habitat quality because shrubs and residual grasses help hide nests and hens. Some degraded habitat that lacks the grass and forb understory needed for nesting and brood rearing is nonetheless suitable for wintering grouse. Males and females gather together in flocks in winter, as do brood-less hens in early summer. During winter, greater sage-grouse feed almost exclusively on sagebrush; at other times they also feed on forbs. They also eat insects, which are essential in the diet of growing chicks. Greater sage-grouse will also use edges of wheat and alfalfa fields near shrubsteppe habitat. Greater sage-grouse populations in Washington are extremely small and in decline, the largest concentration of birds occur in Douglas County.

WSRRI's Spatial Priority maps can be accessed at https://wdfw.wa.gov/species-habitats/habitat-recovery/shrubsteppe#wsrri. Additional information regarding the methods used to develop WSRRI's Spatial Priorities is provided in Appendix C.

> *The WSRRI spatial priorities can be accessed at https://wdfw.wa.gov/species-habitats/habitat-recovery/shrubsteppe. Additional information is available in Appendix C. Supplemental Information on WSRRI's Spatial Priorities, including:*
>
> ▶ *A brief summary and comparison of already existing maps within the Columbia Plateau, which were assessed for potential use and application to WSRRI;*
>
> ▶ *Detailed methods to define and model WSRRI spatial priorities.*
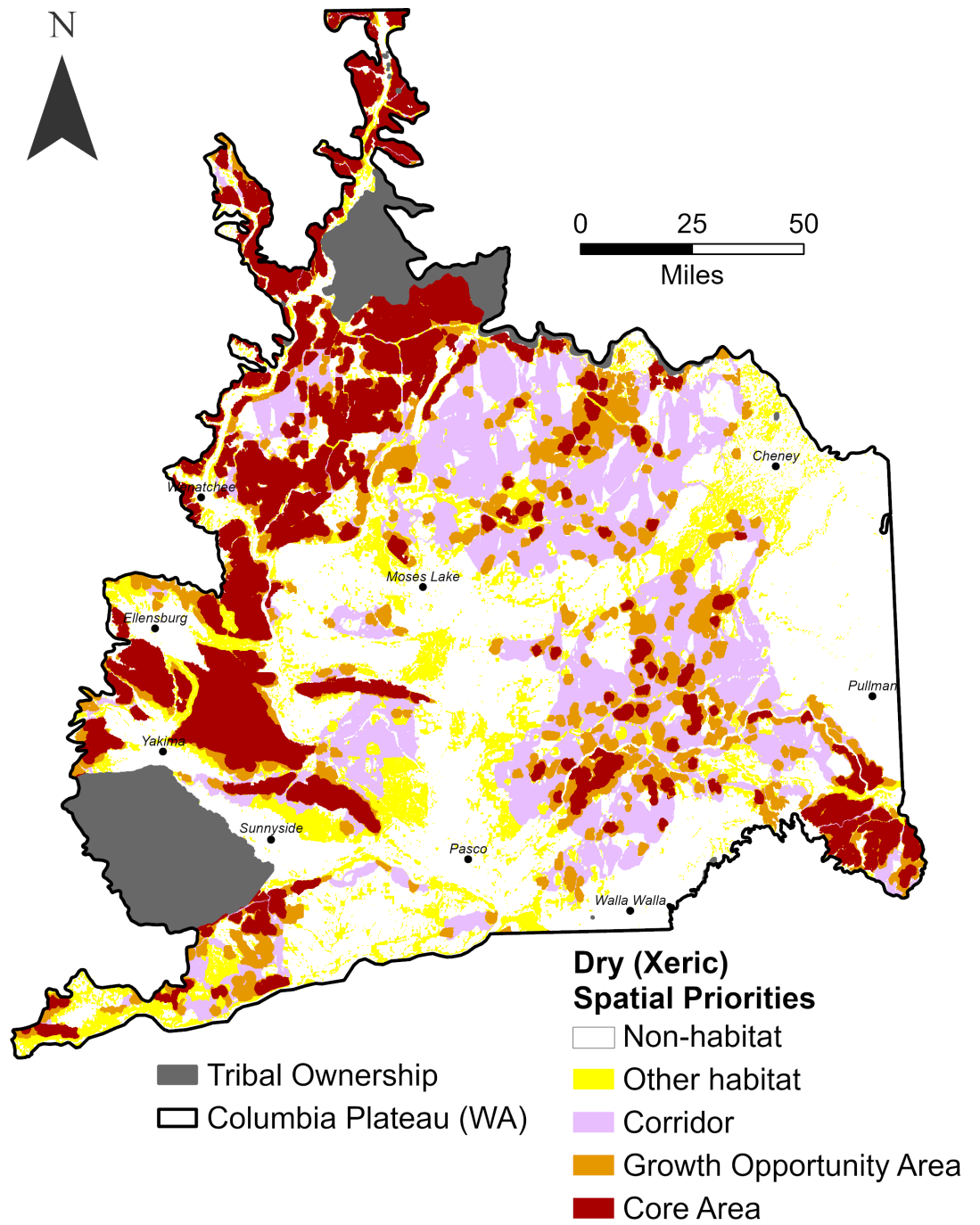
Figure 6. WSRRI's Dry (Xeric) spatial priorities.

Legend:

Dry (Xeric) Spatial Priorities
- Non-habitat
- Other habitat
- Corridor
- Growth Opportunity Area
- Core Area

- Tribal Ownership
- Columbia Plateau (WA)
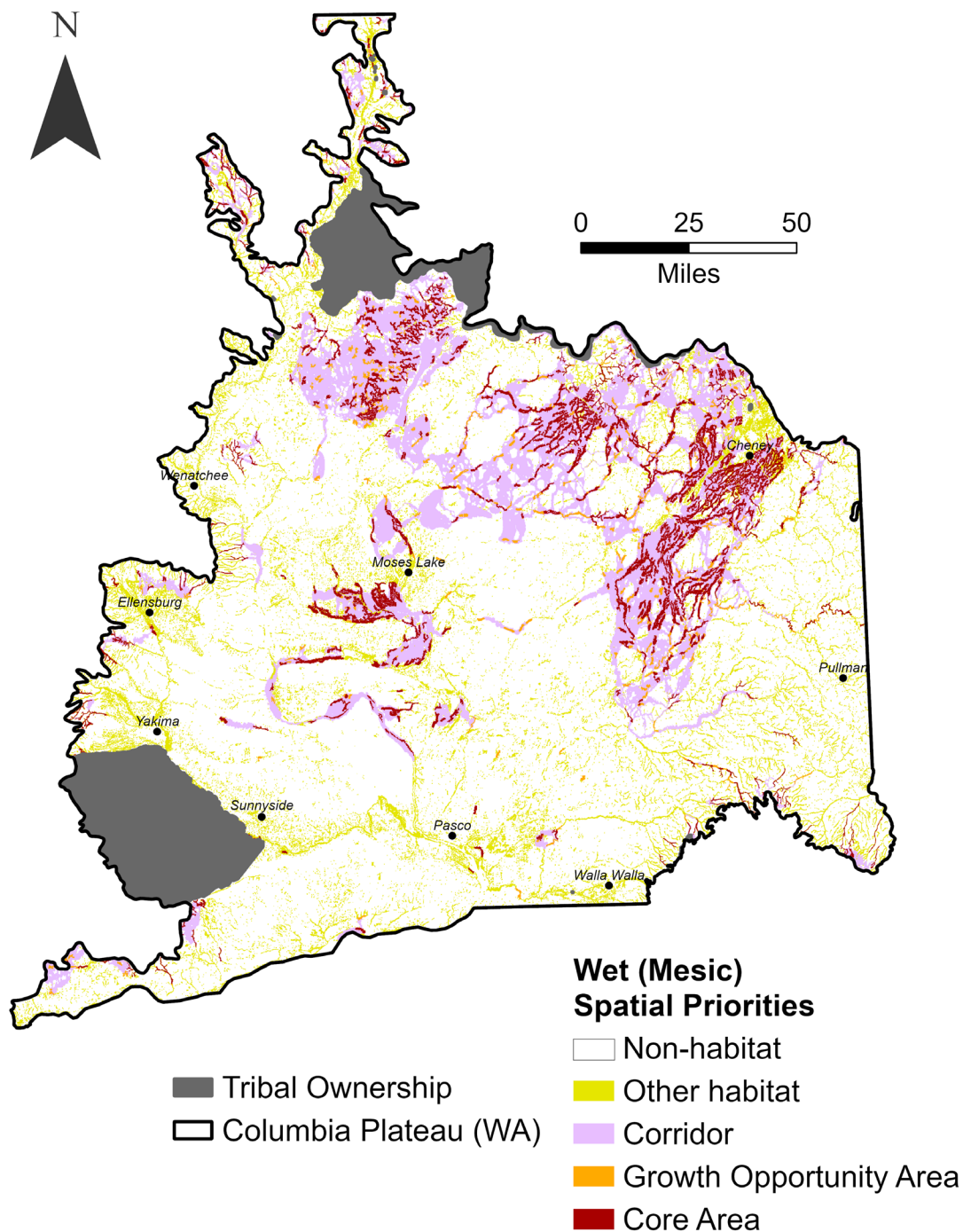
Figure 7. WSRRI's Wet (Mesic) spatial priorities.

Legend — Wet (Mesic) Spatial Priorities:
- Non-habitat
- Other habitat
- Corridor
- Growth Opportunity Area
- Core Area

Tribal Ownership
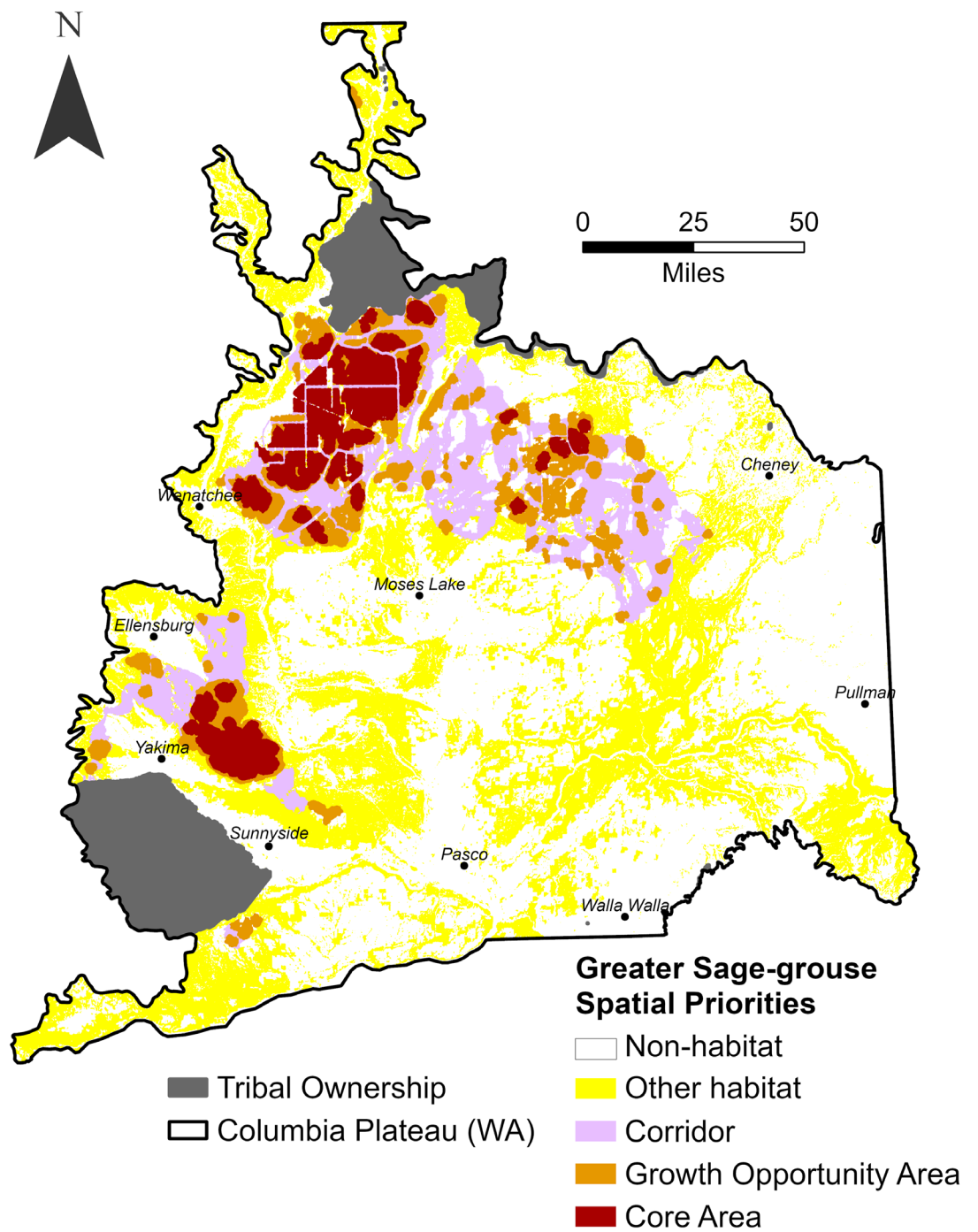Columbia Plateau (WA)

Figure 8. WSRRI's Greater sage-grouse spatial priorities.

5. Goals, Objectives, and Threats

The Strategy presents clear goals and measurable objectives, identifies key threats, and proposes strategic actions for sustainable management of shrubsteppe habitats. The objectives outlined in this strategy vary in specificity based on current information and will be periodically updated to reflect new information and developments in conservation.

5.1. Goals and Objectives

GOAL #1

Human communities in the shrubsteppe landscape are better protected, prepared, and resilient to wildland fire, engaged in shrubsteppe conservation, and economically viable.

▶ **Objective 1 – Community Fire Resistance and Resilience**

Ensure all human communities in the shrubsteppe landscape are engaged in, aware of, and planning for fire resistance, resilience, and recovery by 2029.

▶ **Objective 2 – Community Damage Reduction**

Reduce the present-day adjusted dollar amount of damage, number of structures burned, and families displaced resulting from wildland fires in the shrubsteppe landscape below the 10-year average by 5% for 10 consecutive years beginning in 2029.

*The term **Fire Resistance** is used in this Strategy to refer to the capacity of ecosystems, habitat, species, and human communities to remain largely unchanged when impacted by wildland fire if it occurs.*

__Fire Resilience__ refers to the capacity of ecosystems, habitat, species, and human communities to readily recover from wildland fire.

▶ **Objective 3 – Landowner Engagement**

Establish a baseline and increase the number of local landowners and communities engaged in conservation efforts across the shrubsteppe landscape, aiming for a 15% increase by 2029.

▶ **Objective 4 – Working Lands**

Increase support for working lands to enhance contribution to shrubsteppe wildlife conservation while remaining economically viable.

▶ **Objective 5 – Underserved, Highly Impacted, Overburdened, or English as a Second Language (ESL) Communities**

Identify underserved, highly impacted, overburdened, or ESL communities located within the shrubsteppe landscape and prioritize them for assistance to become more resistant and resilient to wildland fire.

GOAL #2

The extent, frequency, and severity of wildland fire in the shrubsteppe landscape are similar to pre-1800s fire return intervals, while taking into consideration changes in land use, climate, and other modern factors.

▶ **Objective 1 – Fire Frequency**

Identify the likely pre-1800 fire return intervals on all Core Areas and Growth Opportunity Areas areas and manage planned and respond to unplanned fire to achieve this frequency in these landscapes by 2053.

▶ **Objective 2 – Fire Severity/Extent**

By 2053, reduce ecological impact from fire by (1) reducing high severity fire to 1% or less of total acres burned in shrubsteppe Core Areas and (2) reducing high severity fire to 5% or less of total acres burned in Growth Opportunity Areas.

▶ **Objective 3 – Human-Caused Wildfire Starts**

Reduce the number of human-caused starts annually in the planning area to less than 25% of the current 10-year average by 2029.

▶ **Objective 4 – Ecological Damage**

Reduce the extent of core areas burned at high-severity by 5% of the 10-year average per year.

Restoring a More Natural Fire Regime

Wildland fires have played a significant role in shaping the shrubsteppe ecosystem for millions of years. Over the last century, there has been extensive fire suppression due to social and political changes contributing to the degradation of this ecosystem. The Strategy calls for restoring fire regimes similar to those occurring prior to the 1800s when widespread fire suppression was instituted, where feasible and appropriate. While an ambitious goal, addressing this root cause of shrubsteppe degradation is a key to achieving effective and sustainable restoration. To accomplish this, the Strategy recommends the strategic use of prescribed fire. It's explicitly recognized that current conditions must be considered first when implementing prescribed fire, taking into consideration current land uses, the condition of the landscape, wildlife populations, climate, and other factors.

GOAL #3
Habitat quantity and quality is increased to support healthy wildlife populations and communities.

▶ **Objective 1 – Core Areas**

Through management, grow core areas to achieve a net increase of total core area representation across the Columbia Plateau for each of the conservation targets by 2054:

  ▶ Dry (xeric) – Increase core area extent to exceed 21.32% of the landscape;
  ▶ Wet (mesic) – Increase core area extent to exceed 4.66% of the landscape; and
  ▶ Greater sage-grouse – Increase core area extent to exceed 4.62% of the landscape.

▶ **Objective 2 – Growth Opportunity Areas**

Manage growth opportunity areas to increase core areas and avoid net loss of growth opportunity areas through a) conversion to land uses that do not provide wildlife habitat (e.g., development), and b) degradation of growth opportunity areas to other habitat for each conservation target by 2054:

  ▶ Dry (xeric) – Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 10.39% of the landscape;

  ▶ Wet (mesic) – Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 0.95% of the landscape; and

  ▶ Greater sage-grouse – Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 5.30% of the landscape.

Transition of growth opportunity areas to core areas would reflect progress towards Objective 1.

▶ **Objective 3 – Other Habitat**

Manage other habitat to increase growth opportunity areas and core areas and avoid net loss of other habitat through conversion to land uses that do not provide wildlife habitat by 2054:

  ▶ Dry (xeric) – Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 11.25% of the landscape;

  ▶ Wet (mesic) – Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 9.78% of the landscape; and

  ▶ Greater sage-grouse – Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 32.00% of the landscape.

Transition of other habitat to growth opportunity areas and core areas would reflect progress towards Objectives 1 and 2.

▶ **Objective 4 – Connectivity**

Avoid a net loss of connectivity in all corridors and improve connectivity in key corridors that are central and valuable to the larger network of cores.

▶ **Objective 5 – Unique Habitats**

Avoid net loss of unique habitats and features, such as sand dune, talus, Palouse prairie, vernal pools, and others, through conversion to land uses that do not provide wildlife habitat, to support associated SGCN and other wildlife.

WSRRI's spatial priority mapping establishes baseline values against which our progress towards meeting objectives 1-4 can be measured.

WSRRI's spatial priority mapping establishes baseline values against which our progress towards meeting objectives associated with Goal 3 can be measured. For the objectives associated with Goal #3, all baseline landscape-extent values for each spatial priority designation and conservation target, based on WSRRI's spatial priority mapping, are provided in Table 1 below. While 21.32% of the landscape is currently considered core area for the dry (xeric) habitats, only 4.66% and 4.62% of the landscape is core area for the wet (mesic) habitats and Greater Sage-grouse, respectively. As habitat is managed to increase the extent of core area across the landscape (through defending and growing the core), ecological integrity (i.e., habitat quality) also increases, tying back to the language in Goal 3. The spatial priorities were mapped based on summarizing a time series of past annual assessments (5-10 years depending on the conservation target) of the landscape, so it is important to note that parts of core areas, growth opportunity areas, and corridors may not be in good condition today, as very recent fires or conversion likely impacted habitat. TerrAdapt provides additional data (e.g., annual fractional vegetation cover, human footprint) to help WSRRI and partners understand current conditions in these areas. This additional data will allow further prioritization within and among priority areas for where to implement conservation actions like habitat protection, restoration, and barrier mitigation efforts, to meet our objectives.

Relative to Objective 4, while baselines are provided in the table below, landscape extent of corridor is not a good measure of connectivity. Rather, Objective 4 focuses on maintaining connectivity (measured as cost-distance, where increasing cost-distance is a loss of connectivity) in existing corridors and improving connectivity in key corridors across the landscape where they are valuable to important cores. Important cores and associated corridors will be identified in WSRRI's year-one work plan in association with development of the Washington Connectivity Action Plan (currently in progress, with a final product expected in June 2025).

Table 1. Baseline acres and percentages of the Columbia Plateau (CP) in each spatial priority category for each of the three conservation targets and conservation targets combined

Conservation Target	Dry Xeric		Wet Mesic		Greater Sage-grouse		Conservation Targets Combined	
Spatial Priority	Acres	% of CP	Acres	% of CP	Acres	% of CP	Acres	% of CP
Non-habitat	6,241,902	40.99%	10,822,898	71.08%	7,696,853	50.55%	4,496,093	29.53%
Other	1,713,679	11.25%	1,488,993	9.78%	4,872,935	32.00%	2,184,621	14.35%
Corridor	2,444,342	16.05%	2,011,677	13.21%	1,144,899	7.52%	3,552,631	23.33%
Growth Opp	1,581,422	10.39%	144,586	0.95%	807,144	5.30%	1,105,846	7.26%
Core	3,245,560	21.32%	709,223	4.66%	703,730	4.62%	3,913,829	25.70%

To Objective 5, currently, our existing maps and estimates of unique habitats, and processes to reflect change in extent of unique habitats over time, are inadequate to measure success towards Objective 5. This will also be addressed in WSRRI's year-one work plan to ensure we have the means to measure progress towards avoiding net loss of unique habitats for the duration of the Strategy.

GOAL #4

Populations of Species of Greatest Conservation Need and other species are: representative, ensuring they can adapt to changing conditions; resilient so they are able to persist despite disturbance; and redundant, such that they can withstand catastrophic events.

▶ **Objective 1 – State Listed Species**

Achieve a positive trend toward State Recovery Plan objectives for state listed species by 2050.

▶ **Objective 2 – Species of Greatest Conservation Need**

Stabilize and improve population status of unlisted SGCN species by 2050, as indicated by appropriate demographic and/or habitat indicators (e.g., occupancy, distribution, abundance; the extent and quality of habitat).

*The species goal guides us to achieve species populations that are **Resilient**, **Representative**, and **Redundant**, which are principles of conservation biology that are used to describe a species' recovered state. Excerpt, 2016 US Fish and Wildlife Service Framework for Species Status Assessments (2016)*

▶ *Resiliency*
describes the ability of a species to withstand stochastic disturbance. Resiliency is positively related to population size and growth rate and may be influenced by connectivity among populations. Generally speaking, populations need abundant individuals within habitat patches of adequate area and quality to maintain survival and reproduction in spite of disturbance.

▶ *Representation*
describes the ability of a species to adapt to changing environmental conditions over time. It is characterized by the breadth of genetic and environmental diversity within and among populations. Measures may include the number of varied niches occupied, the gene diversity, heterozygosity or alleles per locus.

▶ *Redundancy*
describes the ability of a species to withstand catastrophic events; it's about spreading risk among multiple populations to minimize the potential loss of the species from catastrophic

5.2. Threats

Table 2 describes some of the key threats facing shrubsteppe habitat in the Columbia Plateau and includes driving factors contributing to those threats, associated impacts, and the extent of the threat within Washington's shrubsteppe landscape. Threats were initially identified using the rangewide Sagebrush Conservation Strategy (Remington et al., 2021) and adapted, collaboratively, to be specific to Washington. Some threats described below can both impair or benefit shrubsteppe, but these impacts may conflict at different scales (e.g., impairment at local scale but benefit at global scale) and may be mitigated through how the threat is managed. WSRRI recognizes these tradeoffs specifically for livestock grazing and renewable energy development.

> ### Renewable Energy
>
> *WSRRI recognizes the need for significant additional renewable energy generation and storage to combat climate change, a noted threat to the shrubsteppe landscape and its wildlife and human communities, and meet Washington's decarbonization and electrification requirements. We also acknowledge that direct loss, degradation, and fragmentation of habitat occurs when new renewable energy developments occur. WSRRI recommends focusing development of new renewable energy in areas that avoid impacts to shrubsteppe wildlife and their habitat, including agricultural lands, and to minimizing and mitigating any unavoidable impacts.*

Cow fitted with virtual fence collar. J. Kehne, Conservation Northwest

Livestock Grazing is a Livelihood, a Tool, and a Threat

Since immigrant settlement of the Columbia Plateau began in the 1800s, grazing livestock has been a factor shaping the landscape in addition to other human uses and wildland fire. Many early immigrants were ranchers that grazed cattle, utilizing the forage available in the shrubsteppe. The practice of livestock grazing has evolved over time and today we realize a need for a balance between livestock grazing to support livelihoods and protecting and conserving a dwindling habitat for unique wildlife. Livestock grazing, when managed properly, can be a valuable tool to reduce fuels on the landscape and manage undesirable vegetation. Improper grazing can also be a threat to the shrubsteppe landscape and can cause great damage. The Strategy strives to balance compatible grazing with wildlife habitat management. Ranchers play a vital role in maintaining habitat connectivity for wildlife, oftentimes safeguarding the lands they manage from development. The Strategy provides recommendations to implement sustainable grazing management programs and continue the implementation of post-fire deferred grazing and wildlife-friendly fencing.

Strategies and Actions described in the sections that follow are designed to address these threats; however, WSRRI acknowledges that fully ameliorating many threats is outside of the scope or ability of the Strategy (e.g., climate change).

Table 2. Threats to the shrubsteppe landscape and factors influencing current conditions

Threats	Factors Contributing to Threat	Impacts to Wildlife and Human Communities	Geographic extent within Columbia Plateau
Altered Wildland Fire Regimes	Fire suppression; large-scale non-native annual grass invasives; climate change and resulting hotter and drier conditions; human-caused ignitions; greater human pressure; siting of development	Loss and degradation of habitat through conversion from native shrub-perennial grass communities to fire-prone, non-native, annual grass communities; loss of wildlife and plant individuals and species; loss of prey resources; loss of life and property; loss of ecosystem services; health and economic impacts due to poor air quality and increased costs for services for human health and survival; loss of recreation opportunities; loss of cultural traditions and sites	Landscape-wide, most severe at low-altitudes where environments are hot and dry.
Altered Hydrology	Agricultural and municipal surface and groundwater demand and diversion; historical land use and farming practices; dams; climate change; loss of beavers	Loss and degradation of wetlands and riparian areas; drying of waterbodies and streams; loss of habitat; incision of water courses; water quality degradation; drought; changes in groundwater availability	Landscape-wide, some site-specific areas such as species impacts at Potholes Reservoir
Invasive Plant Species	Ground disturbance; transport vectors and development activities; seed sources; introduction and spread by humans and animals; environmental conditions like climate and water availability favoring invasives; native plant communities	Degraded habitat through alteration of plant community structure and composition; competition with native plant species; contribution to altered wildland fire regimes; changes in ecosystem services (e.g., as forage for pollinators); changes to ecosystem functions (e.g., carbon and water cycles; changes in habitat/range productivity, reducing forage for wildlife and livestock	Landscape-wide, some site-specific areas

Threats	Factors Contributing to Threat	Impacts to Wildlife and Human Communities	Geographic extent within Columbia Plateau
Climate Change	Extreme weather events, such as unusually intense storms, heatwaves, and prolonged droughts exacerbated by human-induced climate change resulting from increased greenhouse gases	Loss and degradation of habitat and food resources; increased temperature; altered hydrology; changes in runoff timing and flooding; drought; increased fire risk; severe weather; changing seasonal conditions that may favor invasive over native species	Landscape-wide
Wild and Free Roaming Horses	Free roaming horses	Loss and degradation of habitat and ecosystem function; trampling of sensitive plants; introduction and spread of invasive plants; reduction of forage and water availability and access for wildlife and livestock; soil erosion where animals congregate,	Specific tribal lands, federal lands, state lands, and private lands
Incompatible Grazing	Poorly managed domestic livestock, improper grazing	Loss and degradation of habitat; trampling of sensitive plants; introduction and spread of invasive species; reduction of forage and water availability for wildlife; soil erosion where animals congregate; degradation of riparian areas around water sources	Landscape-wide, some site-specific areas
Mining and Energy Development	Renewable energy development, (i.e.,solar and wind); mining; transmission lines	Direct habitat removal or fragmentation; introduction of invasive plant species; impacts on surface and groundwater; disruption of habitat connectivity and wildlife movement and migration; increased direct mortality due to increased hazards (e.g., due to increased presence of fences, roads, transmission lines, wind farms)	Landscape-wide, some site-specific areas
Land Use and Development	Land ownership patterns (e.g., checkerboard ownership); land management, zoning and policies; roads; fences; economics (e.g., crop prices); conversion to agriculture; development; population increases; military exercises; recreation	Loss and degradation of habitat; loss of prey resources; isolation of populations; habitat fragmentation; pollution; habitat disturbance; hazards to wildlife (e.g., roads, fences) introduction and spread of invasive species; increased fire risk; forced changes to seasonal migration patterns	Landscape-wide, some site-specific areas

Threats	Factors Contributing to Threat	Impacts to Wildlife and Human Communities	Geographic extent within Columbia Plateau
Small Wildlife Population Size	Habitat loss and degradation; loss of food resources; predation; disease; the separation of wildlife populations into smaller, isolated groups	Increased risk of extinction; inbreeding and reduced variation in the genetic makeup of species; decreased ability to disperse; decreased ability to withstand predation rates or other natural mortality factors; inability to recover from stochastic or catastrophic events such as droughts or disease outbreaks or adapt to changing conditions	Population-specific
Human-associated Predators	Increased abundance and distribution of generalist predators benefiting from human-alteration of habitat	Mortality; increased risk of disease transmission; increased predation risk; higher rates of predation which further contribute to the reduction in genetic diversity and fragmentation of animal populations into smaller, isolated groups.	Landscape-wide
Direct Human Resource Use and Disturbance	Illegal shooting, poisoning, trapping, collecting, recreation (e.g., off-road use), spreading of invasive weed seeds, disturbance of wildlife and habitat	Mortality and disturbance	Landscape-wide, some site-specific areas

6. Enabling Conditions, Strategies, and Actions

6.1. Enabling Conditions

In developing the Strategy, subject matter experts were asked to consider specific mechanisms, structures, and processes necessary to facilitate action implementation and affect change. These are referred to as the "enabling conditions," which are listed below. Within the Key Strategies, each Action is listed with the primary enabling condition associated, but most Actions will require multiple enabling conditions to be in place to be successful.

Table 3. Enabling conditions for the Long-Term Strategy

ℹ️	**Information and Planning** A robust foundation of data and knowledge is essential to inform the Actions. Access to comprehensive, current information about shrubsteppe habitats, their dynamics, and the threats they face is key for success.
🗺️	**Science and Monitoring** Access to existing and development of new ecological and social data and analytical tools is essential for conserving shrubsteppe habitats, understanding of both threats and the efficacy of actions, and effectively tracking ecological changes over time.
👥	**Organization and Governance** Effective organization and governance structures, such as involving relevant agencies, community groups, and conservation organizations, create a framework for collaboration and decision-making.
📄	**Policy and Permitting** Clear and supportive policies and permitting processes are essential for navigating the legal aspects of implementation.
🔨	**Resources and Equipment** Adequate resources and specialized equipment are necessary for fieldwork, research, and implementation of conservation actions.
👤	**Capacity and Training** Building the capacity of individuals and organizations involved in training and skill development ensures that the right expertise is available to implement.
📢	**Outreach and Education** Effective outreach and education efforts engage the broader community, fostering understanding and support for shrubsteppe landscape conservation and community wildfire resiliency. Likewise, the public and partners inform our understanding of threats, needs, and opportunities.
💲	**Funding** Sustained and streamlined funding will be necessary for success.

6.2. WSRRI Key Strategies and Corresponding Actions

Recommended Actions to achieve WSRRI's Goals and Objectives, and address Threats, are organized into five Key Strategies: Community Engagement, Habitat Protection, Habitat Restoration, Species Management, and Wildland Fire Management. WSRRI's spatial prioritization, organization and governance, and monitoring and adaptive management apply comprehensively across all Key Strategies, to guide implementation and realize the best outcomes over time for both wildlife and human communities.

Figure 9. WSRRI Enabling Conditions and Key Strategies encompassed and guided by Spatial Prioritization, Organization and Governance, and Monitoring and Adaptive Management

ACTIONS

The Actions outlined for each Key Strategy in this section represent the long-term efforts recommended, spanning a 30-year horizon, to achieve the Goals and Objectives described above. Actions identified for the short term will be documented in regularly updated implementation work plans (refer to Appendix E).

Because the Strategy is a living document, the Actions represent the current understanding for how to best achieve the Goals and Objectives. The Actions below are recommended for long-term management and conservation of the shrubsteppe landscape with the understanding that updates will follow in the coming years.

6.2.1. Community Engagement Strategy

Community engagement is vital to the success of shrubsteppe protection and conservation to benefit wildlife and human communities in the face of wildland fire. Human behavior and values can have significant positive or negative impacts on the quantity and quality of wildlife habitat for numerous sensitive species in this landscape. It is essential to the success of the Strategy that meaningful community engagement is the bookend to all other actions taken. Without local community commitment, the goals and objectives to protect and conserve Washington's shrubsteppe landscape cannot be achieved.

COMMUNITY ENGAGEMENT ACTIONS

Table 4. Community Engagement Action and Enabling Conditions.

COMMUNITY ENGAGEMENT STRATEGY			
	Understanding human values, perceptions, and needs		
	CE1	**Include social science input** Bolster state agency applied science teams to inform community engagement by evaluating research on behaviors, motivators, barriers, public communications methods, and engagement. Incorporating social science insights will ensure well-informed and effective engagement approaches.	Policy and Permitting
	Ensuring strategic communication		
	CE2	**Engage with communities in the shrubsteppe landscape through social science** Engage with and inform communities in the shrubsteppe landscape about wildlife habitat and wildland fire preparedness. Employ applied social science on human behavior, motivation, barriers, and communication.	Outreach and Education
	CE3	**Create a joint-agency community engagement plan** Collaboratively create a comprehensive community engagement plan involving multiple agencies, including WDFW, SCC, DNR and others. Develop customized and consistent messaging for varying aspects of engagement with communities in the shrubsteppe landscape. Develop a Tribal Engagement Plan in cooperation with tribal nations to ensure strong communication and coordination regarding stewardship of the shrubsteppe landscape.	Organization and Governance
	CE4	**Tailor community engagement and raise awareness** Enhance public perception of the value of shrubsteppe habitats for both humans and wildlife. Develop customized approaches of community engagement based on specific local needs and priorities.	Information and Planning
	CE5	**Establish a resource library** Develop a comprehensive resource library, available to agencies and partners that houses tools and resources related to community outreach such as workshop curriculum or WSRRI fact sheets.	Information and Planning

Conducting sustained and amplified engagement

COMMUNITY ENGAGEMENT STRATEGY			
	CE6	**Partner with a variety of local organizations representing all communities to amplify engagement** Leverage and model engagement endeavors of organizations that equitably build networks and provide education to their local communities on wildland fire risk and the importance of wildlife in the shrubsteppe landscape.	Information and Planning
	CE7	**Build upon existing resources for information sharing** Build upon existing initiatives by utilizing effective community engagement campaigns, partnering with trusted Community Based Organizations (CBOs) for information dissemination and open dialogue, and collaborating with conservation districts (CDs) for assistance with outreach tools and data related to landowners and communities in the shrubsteppe landscape. Minimize redundancy in information collection and outreach efforts.	Information and Planning
	CE8	**Ensure and welcome diverse participation** Emphasize engagement to support underserved, highly impacted, overburdened, vulnerable, and/or English as a Second Language (ESL) communities to encourage participation in shrubsteppe habitat conservation. Find opportunities to break down barriers to engagement, such as financially supporting individuals and communities to participate.	Outreach and Education

Building and supporting capacity

	CE9	**Support local organizations with outreach and engagement** Collaboratively identify and support capacity building and training opportunities for local agencies and organizations, especially conservation districts and non-profit organizations.	Capacity and Training
	CE10	**Support local organizations to implement Community Wildfire Protection Plans (CWPPs)** Support local organizations and jurisdictions to facilitate coordinated implementation of priority work identified in Community Wildfire Protection Plans.	Capacity and Training
	CE11	**Enhance agencies' public communications and engagement** Conduct comprehensive training sessions for agencies to enhance their skills in public communications and engagement with communities in the shrubsteppe landscape.	Capacity and Training

Providing grazing and working lands outreach & education

	CE12	**Develop and maintain a WSRRI grazing management webpage and companion handbook** Provide audience-appropriate information on geography-specific general technical rangeland management recommendations. Include contact information for local agency and resource personnel, public agency missions, conservation programs, emergency programs, and other resources helpful to livestock producers.	Resources and Equipment
	CE13	**Promote rangeland educational opportunities** Promote programs such as the Young Ranchers Program, Future Farmers of America, 4-H, Envirothon, and others.	Outreach and Education

6.2.2. Habitat Protection Strategy

Private lands constitute approximately 75% of the Columbia Plateau in Washington, making private landowners and managers key partners in shrubsteppe habitat protection and restoration. Government influence of private land management is achieved through both regulatory means and voluntary incentive programs. WSRRI's interest is to inform, enhance, and accelerate coordinated action on the ground, whether that action is driven by voluntary programs or regulation. Strategic conservation will require targeted and dedicated application and improvement of regulatory and voluntary approaches. Further, our success will require the full strength of our diverse partnerships to effectively work with landowners and producers to bring those benefits to bear. Multiple partners are actively building and maintaining relationships with landowners to influence habitat protection and management. The Strategy is intended to provide a pathway to improve habitat protection programs and increase opportunities, while strengthening partnerships by increasing capacity and coordination to better work with landowners and capitalize on habitat protection opportunities.

▶ **Washington's Growth Management Act**

Washington's Growth Management Act (GMA) requires cities and counties to develop a comprehensive plan to manage population growth. Under GMA, all jurisdictions are required to adopt critical areas regulations; these regulations help preserve the natural environment, maintain fish and wildlife habitat, protect drinking water, and protect the public from geological hazards and flooding. As defined in RCW 36.70A.030(6): "Critical areas" include the following areas and ecosystems - (a) wetlands; (b) areas with a critical recharging effect on aquifers used for potable water; (c) fish and wildlife habitat conservation areas (FWHCAs); (d) frequently flooded areas; and (e) geologically hazardous areas. Cities and counties are required to include the best available science in developing policies and development regulations to protect the functions and values of critical areas (RCW 36.70A.172).

To "protect" a critical area means to provide for "no net loss of ecosystem functions and values" (no net loss), providing habitat sufficient for fish and wildlife populations to persist in the long-term and avoiding isolated subpopulations. The GMA requires that, after avoiding and minimizing effects to the extent possible, unavoidable disturbance and loss of ecosystem function must be offset with adequate and appropriate restoration. Protecting critical areas involves a variety of strategies taken by cities and counties, from the adoption of conservation policies in comprehensive plans to the adoption of local regulations through Critical Area Ordinances (CAO), which provide the administrative review and approval process for regulating land uses that may impact critical areas (Ousley et al., 2007). Once adopted, a Critical Area Ordinance's standards apply to individual permits rather than the underlying GMA requirements. Every decade, cities and counties are required to update their Critical Area Ordinances to incorporate new best available science. The GMA (RCW 36.70A.020) also requires jurisdictions to "...maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. Encourage the conservation of productive forestlands and productive agricultural lands and discourage incompatible land uses." Jurisdictions have a great deal of responsibility for managing land uses and protections under the GMA through land use designations and protection of both habitat and agricultural lands.

> *No net loss* is a principle commonly applied in environmental management and conservation policy aiming to balance the loss of biological diversity or ecosystems in one area with the restoration, enhancement, or preservation of biodiversity in another, so that the overall quantity and quality remain unchanged.

▶ **Voluntary Stewardship Program**

In 2011, the Legislature amended the GMA and established the Voluntary Stewardship Program (VSP). VSP provides an alternative approach to protecting Critical Areas within agricultural lands to support agricultural viability and environmental protection. In participating counties, agricultural landowners can enroll in VSP through their county or conservation district and receive technical assistance to improve their operation and advance stewardship of Critical Areas. Examples of VSP projects could include implementing best management practices such as hardscape manure storage, planting riparian vegetation buffers, installing livestock exclusion fencing around waterways, using low or no-till practices, and more. The program allows agricultural landowners to leverage federal and state funding to implement best management practices that support their operations and a sustainable environment. VSP is operated locally by counties or conservation districts with participation from local stakeholders who serve on advisory boards.

▶ **Other Voluntary Incentive Programs**

In addition to VSP, multiple state agencies offer non-regulatory voluntary incentive programs that are meant to protect habitat or preserve agricultural land (e.g., conservation easements) or can influence and improve habitat management through practice implementation and practice improvement. At the federal level, incentive programs funded through the Farm Bill (e.g., Conservation Reserve Program [CRP], Environmental Quality Incentives Program [EQIP], etc.,) enhance habitat value in Washington's shrubsteppe landscape. Each program provides different incentive types, such as technical assistance to plan practices, financial assistance for practice implementation, and easement acquisition funding. Many of these incentive programs have, to date, been important for the conservation of shrubsteppe wildlife (e.g., Schroeder & Vander Haegen, 2006).

▶ **Data, tools, and recommendations to inform land protection**

WDFW's Priority Habitats and Species (PHS) Program is the agency's primary means of transferring fish and wildlife information from resource experts to local jurisdictions, landowners, and others who use it to inform programs and actions to protect and restore habitat. The Washington Administrative Code refers to PHS in sections dealing with Critical Area Ordinances, Shoreline Master Programs, and the Essential Facilities Siting Evaluation Council, and PHS information is used primarily by local jurisdictions to implement and update land use plans and development regulations under the Growth Management Act and Shoreline Management Act. However, PHS is also a valuable resource in non-regulatory contexts and can and has been used to inform voluntary, incentive-based programs.

By providing lists, maps, and management recommendations, PHS addresses four central questions:

1. Which species and habitats are priorities for management and conservation?
2. Where are these habitats and species located?
3. What should be done to protect these resources when land use decisions are made?
4. How effective are current efforts at conservation of these resources?

▶ Change to achieve net habitat gain

As stated above, WSRRI is designed to inform and enhance both state regulatory and voluntary programs to accomplish the defense, growth and connection of core areas. While GMA does require no net loss through protection of critical areas, it does not require restoration. Because such a large percentage of the shrubsteppe landscape in Washington has already been lost, mitigation through further no net loss alone will be insufficient for habitat and species recovery in this landscape. Rather, a focus on regenerating habitat through restoration and improvement of management practices, facilitated through multiple programs, could result in net habitat gain across the landscape. To achieve this important work, trade-offs and compromises will be necessary to protect ecosystem function on private lands.

The actions in this section collectively address both the execution of GMA and the implementation of voluntary incentive programs, to enhance the benefits that both bring to wildlife and human communities across the shrubsteppe landscape. This includes:

1. Improving data, tools, and recommendations to inform land protection;
2. Supporting local jurisdictions in GMA implementation;
3. Increasing participation in voluntary incentive programs;
4. Increasing innovative approaches and funding support;
5. Improving application of conservation easements;
6. Supporting partners to deliver incentives;
7. Developing local grazing networks; and
8. Enhancing grazing management programs.

Monarch caterpillar on milkweed.   M. Atamian

HABITAT PROTECTION ACTIONS

Table 5. Habitat Protection Actions and Enabling Conditions.

		Improving data, tools, and recommendations to inform land protection	
HABITAT PROTECTION STRATEGY	**HP1**	**Identify and address data gaps** Identify and rectify gaps in the extent and quality of geospatial data to facilitate effective, long-term monitoring of land use impacts and ensure that counties achieve no net loss. Collaborate across data managers to identify changes in vegetation cover and land use to enhance monitoring and analysis capabilities.	Science and Monitoring
	HP2	**Complete PHS management recommendations for all Priority Habitats** Support local jurisdictions in protecting FWHCAs and others engaging in voluntary, incentive-based conservation by completing PHS management recommendations for all Priority Habitats in the shrubsteppe landscape, including for Biodiversity Areas and Corridors.	Information and Planning
	HP3	**Develop guidance and tools for offsetting mitigation** Expand PHS management recommendations to include guidance on locations, quantities, and types of offsetting mitigation recommended for Priority Habitats and Species to inform FWHCA conservation and land use in general. Work with local jurisdictions and project proponents to incorporate baseline conditions, monitoring, and recommended mitigation ratios for unavoidable impacts. Establish or increase mitigation ratios for PHS Priority Habitats across the shrubsteppe landscape to emphasize the relative significance and value of shrubsteppe landscapes and associated habitats and facilitate defending, growing, and connecting the core.	Information and Planning
	HP4	**Integrate climate resiliency in planning** Account for changing climate factors, including severe weather events, climate patterns, and landscape conditions, during all habitat conservation and land use planning, especially during the periodic update cycle. To develop adaptive management strategies and integrate climate resilience, provide climate resiliency data to and collaborate with local jurisdictions and partners to conduct risk assessments, incorporate climate data and projections, and continually monitor and update local conservation plans.	Information and Planning
	HP5	**Explore use of WSRRI spatial priorities to inform Critical Area Ordinance updates** Determine the best application of WSRRI Spatial Priorities to GMA planning and implementation, including Critical Area Ordinance periodic updates. If determined to be applicable and prudent, incorporate WSRRI Spatial Priorities into WDFW data, tools, and recommendations to guide decisions on the application of avoidance and minimization tools, such as low-density zoning, incentive programs, and higher compensatory mitigation ratios.	Information and Planning
	HP6	**Employ WSU's Least-Conflict Solar Siting Project results in renewable energy development** Work with state and local leaders to formalize the adoption and application of the collaborative Least-Conflict Solar Siting mapping tool and maps facilitated through WSU (2023). Capitalize on this work, which was aimed at protecting Washingtons' unique and diverse habitat and agricultural lands, while still producing solar energy to meet the state's needs, by standardizing and expecting application of these tools across renewable energy developers.	Information and Planning

		Supporting local jurisdictions in GMA implementation	
HABITAT PROTECTION STRATEGY	**HP7**	**Enhance technical assistance to local jurisdictions** Provide technical assistance to local jurisdictions seeking support in updating and implementing plans and regulations for FWHCA designation and protection. Equip agency staff providing technical assistance with the necessary training and resources, including updated reference planning documents and management recommendations based on BAS. Provide support to local jurisdictions' Information Technology and Geographic Information Systems staff in receiving and integrating spatial data useful for informing FWHCA designation and protection.	Capacity and Training
	HP8	**Enhance planning tools and data access for local jurisdictions** Provide local jurisdictions with improved planning tools, high-quality data, management recommendations, and other supporting documents to support designation and protection of FWHCA. Update the Critical Areas checklist. Develop or reference model CAOs for local jurisdictions to utilize in designation and protection efforts. Make this information publicly available and easily accessible to promote transparency and utilize various means of communication and information dissemination to increase planners' and elected officials' awareness and use of available tools and data.	Information and Planning
	HP9	**Increase long-term monitoring and adaptive management of Critical Area Ordinances** Support local jurisdictions in existing programs and encourage new programs to increase long-term monitoring and adaptive management of CAOs to assess the success of achieving NNL. Partner with volunteer jurisdictions to pilot new monitoring and adaptive management programs.	Science and Monitoring
	HP10	**Boost local jurisdiction capacity to designate and protect FWHCAs** Increase the funding and capacity of local jurisdictions to designate and protect FWHCAs in their land use plans and regulations to allow for more comprehensive integration of planning tools and data available. Support increased funding and capacity for jurisdictions specifically to upgrade Information Technology and Geographic Information Systems to effectively leverage data provided by state agencies and hire consultants to provide technical support during periodic updates.	Capacity and Training
	HP11	**Encourage local jurisdictions to influence renewable energy development** Work with local jurisdictions to utilize their energy permitting authority to influence the siting and development of energy projects to minimize impacts on Priority Habitats and Species. Effectively convey to each jurisdiction Priority Habitats and Species data through updates to GMA plans and regulations, including periodic updates. Engage with local jurisdictions to amend land use maps, zoning codes, CAOs, and other development regulations to better protect, restore, and enhance ecological functions.	Policy and Permitting
	HP12	**Integrate habitat protection and restoration in local planning and tax incentives** Engage with local planning departments and policymakers to encourage the inclusion of habitat protection and restoration considerations in land-use plans and zoning regulations. Explore property tax incentives tailored to encourage habitat protection and restoration and evaluate potential tax benefits for landowners engaged in these actions.	Information and Planning

	HP13	**Expand options to achieve no net loss** Establish methods for achieving no net loss of ecosystem function. Explore tools like compensatory mitigation banks and in-lieu fee programs, learning from those in place for wetlands, to conserve shrubsteppe habitats. Such options would be the highest priority, especially in Core, Growth Opportunity Areas, and Corridors.	Organization and Governance
		Increasing participation in voluntary incentive programs	
	HP14	**Conduct comprehensive evaluations of existing incentive programs** Thoroughly evaluate existing voluntary incentive programs to identify gaps and areas for improvement, assess both barriers to and motivators for landowner participation, and establish ways to enhance their effectiveness in addressing the needs of shrubsteppe habitat and working lands conservation.	Information and Planning
HABITAT PROTECTION STRATEGY	**HP15**	**Disseminate Best Management Practices (BMPs) associated with existing incentive programs** Create a comprehensive catalogue of existing voluntary incentive programs and associated BMPs to clearly define the practices supported by individual programs while ensuring those BMPs are accessible, user-friendly, and adaptable, where possible, to meet the varied needs of potential program participants. Regularly update and disseminate BMPs to participants, program staff, landowners, and other relevant stakeholders to foster consistent understanding and application. Offer training workshops, webinars, or one-on-one consultations to address landowner's questions and provide practical guidance throughout their participation in the programs. Provide resources, such as educational materials and online tools, to help landowners understand the requirements of the incentive programs.	Outreach and Education Information and Planning
	HP16	**Streamline incentive programs to increase enrollment** Apply lessons learned through comprehensive evaluations of existing incentive programs to coordinate, streamline, and inform landowners of opportunities, ensuring they can make full use of available programs. Enhance landowner access and enrollment by simplifying the application process, providing clear information about available programs, and offering guidance to navigate these programs effectively. Tailor support services to address the unique needs and challenges faced by private landowners in participating in the programs.	Outreach and Education
	HP17	**Support farm succession planning and land ownership transition planning** Provide resources to farmers and landowners interested in developing succession plans for agricultural operations and/or land ownership transitions. Develop opportunities to incorporate conservation incentives and encourage habitat protection.	Outreach and Education
		Increasing innovative approaches and funding support	
	HP18	**Strategically target delivery of voluntary incentive programs** Prioritize, where possible, incentive delivery in Core Areas, Growth Opportunity Areas, and Corridors, to effectively protect and restore shrubsteppe habitats. Provide clear and informative materials that highlight the benefits and opportunities associated with participating in incentive programs. Effectively communicate the goals, objectives, and requirements of the incentive programs to ensure understanding and awareness.	Outreach and Education

HABITAT PROTECTION STRATEGY	**HP19**	**Quantify and value ecosystem services** Utilize economic models and other methods to quantify and financially value ecosystem benefits in the shrubsteppe landscape, such as carbon sequestration. Incorporate the methodology and results as appropriate into incentive programs.	**Information and Planning**
	HP20	**Adequately fund existing programs and streamline funding procedures** Ensure that conservation programs for agricultural producers and landowners are well-funded and supported, accessible, and efficient by leveraging state and federal initiatives and capitalizing on existing relationships from national programs like the Farm Bill. Support state-funded voluntary incentive-based programs that already protect wildlife habitat, like the VSP. Ensure comprehensive funding at project initiation to prevent delays and ensure smooth implementation. Consider funding multiple projects on a single site within a biennium to amplify conservation outcomes.	**Funding**
	HP21	**Create and fund a Washington State-funded incentive program modeled after and intended to complement the Federal Conservation Reserve Program** Establish a comprehensive and effective framework of state-funded voluntary, incentive-based approaches that are tailored to Washington needs. Encourage private landowners to actively participate in land conservation, for the conservation of wildlife habitat, enhancement of biological diversity, and promotion of sustainable land management practices. Collaboratively and clearly define the program's development steps, goals, and eligibility criteria, and connection to federal programs. Publicize the program widely through a comprehensive and targeted communication strategy that communicates the benefits and incentives available under the program, emphasizing its value to landowners and its contribution to wildlife conservation and habitat preservation.	**Organization and Governance**
	HP22	**Create a WSRRI Habitat Protection Investment Account to support sustainable funding for shrubsteppe habitat protection** Develop a dedicated program specifically tailored to shrubsteppe protection, recognizing the potential for such a program to signal the importance of this habitat, attract additional funding, and garner public support. Assess the viability of a dedicated program versus integration with existing initiatives. Optimize outcomes by considering benefits and limitations.	**Organization and Governance**
	HP23	**Engage in Federal Farm Bill development to improve delivery and outcomes in Washington** Engage in the development of the Federal Farm Bill to preserve and enhance programs vital for wildlife conservation, including the State Acres for Wildlife Enhancement (SAFE) program within CRP, and improve their delivery and application in Washington State. Collaborate closely with Federal Legislators, national and regional associations (e.g., the Association of Fish and Wildlife Agencies and its regional counterparts), and other states, as well as State Legislators and the Governor's Office, to secure sufficient federal funding for applicable Farm Bill programs and address administrative barriers to their conservation effectiveness (e.g., the cap on acreage enrollments in Douglas County).	**Policy and Permitting**
	HP24	**Enhance and promote increased utilization of the Public Benefit Rating System (PBRS) and Conservation Futures Programs** Incentivize counties to adopt the rating system, a voluntary land conservation mechanism available to local governments under the Open Space Tax Act, more widely. Encourage counties to adopt local conservation futures programs to conserve open space lands. Create and convey best practices and model language for these programs.	**Policy and Permitting**

HABITAT PROTECTION STRATEGY	**HP25**	**Promote conservation contiguity** Offer bonus incentives for habitat protection and restoration on private lands adjacent to each other, or private lands adjacent to public lands, to increase the size of contiguous habitat blocks.	Policy and Permitting
	HP26	**Promote "Buy, Protect, Sell" programs** Increase and promote "buy, protect, sell" programs like the Farm Protection Land Access Program at SCC's Office of Farmland Preservation.	Outreach and Education
	HP27	**Bring additional federal incentives to Washington's shrubsteppe** Work with federal partners, including the Natural Resources Conservation Service (NRCS), the Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (USFWS), to bring financial resources associated with the Bipartisan Infrastructure Law and other current and future federal funding streams to compliment WSRRI state funding and implement strategic actions.	Funding
		Improving application of conservation easements	
	HP28	**Establish a dedicated conservation easement program for the shrubsteppe landscape** Tailor a new voluntary easement program to address multiple threats facing the shrubsteppe landscape, allowing for both perpetual and term easements to meet landowner and conservation needs. Develop model conservation easement conditions specifically designed for shrubsteppe habitat protection, as well as for working lands that serve as habitat. Incorporate practices that promote economic viability while preserving and enhancing habitat, ensuring both conservation and working lands sustainability.	Organization and Governance
	HP29	**Improve easement stewardship cost estimates and include these costs in program funding** Include ongoing stewardship funding as part of the program to ensure effective easement management and desired conservation outcomes. Analyze stewardship costs and utilize existing templates to create effective work plans. Develop accurate calculations for resource-intensive stewardship activities on large properties to ensure sustainable conservation.	Information and Planning
	HP30	**Bolster conservation easement programs through specialized technical assistance** Engage specialists in ecosystem health and grazing management in conducting comprehensive assessments of properties to inform easement management and monitoring. Support and increase easement holder capacity by establishing third-party specialists they can work with to develop grazing management plans and to perform grazing monitoring and assessments.	Capacity and Training
	HP31	**Fill geographic gaps in capacity to hold and manage conservation easements** Address partner gaps by identifying areas where a strong local partner does not exist to hold conservation easements for habitat, rangeland, and agricultural lands, and explore solutions to fill these gaps. Focus on refining coordination and capacity to streamline processes, seize opportunities for collaboration, and enable actionable measures.	Capacity and Training

HABITAT PROTECTION STRATEGY		**Empowering partners to deliver incentives**	
	HP32	**Enhance and empower land trust capacity to realize significant contributions to shrubsteppe conservation** Increase Land Trust involvement by 1) leveraging land trusts to manage privately-owned shrubsteppe parcels, 2) providing resources to support land trust efforts to conserve shrubsteppe habitats, 3) exploring land transfer options for long-lasting protection and outlining perpetual preservation plans, and 4) consulting with and supporting the Shrubsteppe Affinity Group within the Washington Association of Land Trusts to facilitate collaboration among land trusts and partners working in the shrubsteppe landscape.	Capacity and Training
	HP33	**Partner with other organizations and entities that influence and inform shrubsteppe and working lands conservation and management** Explore potential partnerships and collaborations with other organizations and entities that influence and inform shrubsteppe and working lands conservation and management to leverage resources and expertise and meet shared priorities to mutual landowner and conservation benefit. Examples include the Arid Lands Initiative (https://aridlandsinitiative.org/) and Responsible Recreation Initiative (https://www.recreateresponsibly.org/). Implement joint initiatives that integrate habitat conservation and working lands preservation.	Capacity and Training
	HP34	**Increase staff capacity to provide technical assistance** Allocate resources for dedicated agency and partner staff to implement habitat protection and restoration programs. Fund additional technical staff within agencies and partners to increase their collective ability to work directly with landowners on site to increase effective management of working lands to benefit the landowner and wildlife. Necessary technical expertise includes grazing management, habitat restoration for various species and groups (e.g., grouse, pollinators), and monitoring and evaluation.	Capacity and Training
	HP35	**Enhance support services across partners to strengthen engagement of private landowners** Collaborate with relevant organizations, agencies, and land trusts to enhance support available to private landowners, promote knowledge sharing, facilitate access to funding opportunities, and enhance the capacity of private landowners to participate in and benefit from incentive programs. Pool resources, expertise, and networks to offer a comprehensive range of support, including financial assistance, technical expertise, and ongoing monitoring and evaluation. Ensure adequate capacity at the local level to be responsive to landowner requests for information and assistance. Coordinate the efforts of agencies and partners providing technical assistance, standardizing training to facilitate effective collaboration and ease the enrollment process for landowners.	Capacity and Training
		Developing local grazing networks	
	HP36	**Establish centralized and coordinated regional local grazing networks to assist livestock producers** Create networks to serve as structured forums for local collaboration among professionals and livestock producers to 1) be a learning and support network and 2) provide support and coordination during times of emergency. These networks will reference models in other states that are working well, tie in with existing groups, and set up a pilot grazing network within Core Areas at the local or Regional Implementation Team level (see Organization and Governance; Section 8).	Organization and Governance

	HP37	**Create cohorts of learners to build community and deepen learning experiences** Through the local grazing networks, promote shared learning and community development around rangeland management for conservation. Hold workshops and field tours on emerging rangeland management topics on a consistent basis.	Organization and Governance
		Enhancing grazing management programs	
	HP38	**Explore the implementation of voluntary incentive based grazing management programs that align with WSRRI goals and objectives** Leverage, utilize, adapt, and form voluntary and incentive-based grazing management programs for WSRRI core areas and GOAs, in collaboration with grazing subject matter experts, to support native plant communities and working lands viability.	Policy and Permitting
	HP39	**Develop understanding of Conservation Reserve Program (CRP) grazing policies during emergencies** Explore potential changes to federal policy to establish wildland fires as emergencies and allow for adaptive management and flexibility to incorporate compatible grazing on CRP-enrolled lands under an approved grazing management or conservation plan that will maintain and enhance wildlife habitat while allowing for temporary grazing while burned grazing lands recover. Work with NRCS and the Farm Services Agency (FSA) to define standards and guidelines for such flexibility.	Policy and Permitting
	HP40	**Incorporate principles of adaptive management in grazing management programs to maintain and enhance shrubsteppe habitat** Explore policy changes to grazing programs, such as the Federal Emergency Deferred Grazing Program, to incorporate adaptive management and greater flexibility, allowing producers to access grasses when ready and where such access would not impair wildlife habitat or extend deferment where habitat recovery is slow.	Policy and Permitting
	HP41	**Explore barriers and opportunities of state and federal contracts for all public agency grazing management lease program requirements** Explore policy changes to develop more user-friendly contracts and better alignment between contracts in federal and state grazing management lease programs.	Policy and Permitting
	HP42	**Support technical assistance resources for "Do-It-Yourselfers"** Fund programs to create tours, workshops, booklets, and other resources for producers who work on fencing, plantings, fence markers, and other projects without contracted assistance.	Policy and Permitting
	HP43	**Support innovative approaches to grazing management** Use emerging technologies and innovative techniques, such as virtual fencing, to support grazing management.	Information and Planning
	HP44	**Maintain funding for Wildlife-Friendly Fencing Program** Assess wildlife-friendly fencing needs and develop a request for funding from the state legislature or explore grant funding based on this assessment. Prioritize wildlife-friendly fencing in wildlife movement areas and migration paths.	Funding

HABITAT PROTECTION STRATEGY

HABITAT PROTECTION STRATEGY	**HP45**	**Better understand relationships between grazing, wildland fire, and fire resiliency actions** Conduct research and track current grazing practices to better understand how grazing management intersects with wildland fire and actions to increase resiliency, such as fuels reduction and prescribed burning.	Information and Planning
	HP46	**Establish dedicated capacity to support grazing programs** Create a part- or full-time position to lead WSRRI grazing programs and ensure that rangeland programs and resources are supported, consistently updated, and available to producers and communities.	Capacity and Training
	HP47	**Invest in collaborative grazing and infrastructure enhancement** Invest in infrastructure needs, such as fencing or watering facilities, to support effective rotational grazing and ensure habitat protection. Identify funding sources and allocate resources for critical improvements, particularly for areas under Multiple-Use Category ownership with grazing activities and established conservation easements. Explore opportunities to site virtual fence towers on public lands.	Policy and Permitting
	HP48	**Promote collaborative grazing management** Leverage the potential of collaboration with neighboring landowners who share an interest in coordinated grazing and habitat preservation. Facilitate partnerships with those adjacent to DNR or public grazing landscapes, pooling resources and expertise to maximize the impact of protection initiatives.	Organization and Governance
	HP49	**Partner with grazing management professionals for monitoring enhancement** Recognizing the significance of grazing management and the challenges associated with monitoring, explore collaboration with grazing management professionals to enhance monitoring efforts. This could involve establishing a partnership with conservation districts to ensure comprehensive and effective monitoring through techniques such as photo points and measurements.	Capacity and Training

6.2.3. Habitat Restoration Strategy

Habitat restoration efforts have been underway for decades on private and public lands throughout the shrubsteppe landscape. However, these efforts have not been coordinated in a cohesive way across that landscape. When the 2020 wildfires burned, the collective ability of landowners and land managers to respond at the scope and scale of the impact was limited due to lack of collective and coordinated capacity and resources to respond effectively. Key resources were missing such as a coordinated clearinghouse that could deploy trained on-the-ground personnel to high need areas, and adequate native plant materials available to restore burned areas during the critical ecological window that occurs immediately following wildfire and before the ground freezes. Expanding partners', landowners', and land managers' collective capacity to implement restoration, in turn creates our shared ability to pivot resources to burned areas at an appropriate scale and within a limited timeframe, as needed in response to fire.

The Habitat Restoration Key Strategy is action-oriented, focusing on collaborative efforts and best practice sharing among WSRRI partners to restore vitality to these landscapes. Key actions include restoring degraded habitats with native vegetation to enhance pre- and post-wildfire resistance and resilience, strategically controlling invasive species like cheatgrass, and significantly scaling up planning and implementation capacity for widespread restoration. The strategy is also focused on protecting cultural resources through well-supported review processes, sourcing locally adapted native plant materials for restoration and employing adaptive management to continuously refine these actions based on evolving knowledge. Through these actions, we aim to provide habitat to ensure the long-term health and sustainability of wildlife and people that inhabit the shrubsteppe landscape.

> ### *Wildland Fire Fuels Management and Shrubsteppe Restoration*
>
> *Successful wildland fire management in the shrubsteppe hinges on a series of integrated actions including effective fire response planning and preparation, response and mitigation, strategic fuel reduction, and reestablishing more natural fire regimes, while supporting the overarching goal of restoring the shrubsteppe ecosystem. Non-native annual grasses are the primary wildfire risk indicators in the shrubsteppe landscape because they introduce continuous and highly flammable fuel conditions. While native shrubs like sagebrush and bitterbrush burn intensely, they are less consistent predictors of wildfire risk. The Strategy recommends decreasing annual grasses while encouraging native perennials through restoration.*

The WSRRI approach is aimed at building restoration capacity across the landscape and focusing the shared use of that capacity toward priority areas, irrespective of land ownership. By sharing expanded resources and services, WSRRI can be responsive to restoring habitats impacted by wildfires while also creating more resilient conditions in non-fire years.

Successful habitat restoration in the shrubsteppe will include actions in the following areas:

▶ **Collaboration and Information Sharing**

Actions focus on organization and support of collaboration among WSRRI partners, sharing of best practices, and development of shared strategies and projects.

▶ **Restore Degraded Habitat**

Promotion of integrated methods to replace non-native vegetation with native plant communities that are adapted to fire and that consequently can regenerate naturally after fire. This restoration strategy mimics succession; first re-establishing or enhancing native perennial grasses, followed by augmenting with native forbs and shrubs as needed, and as is practical. Restoring native plant communities will provide better habitat for wildlife, enhance ecosystem resiliency, increase carbon sequestration, and improve soil health.

▶ **Invasive Plant Control**

Suppression of invasive plants is a key component of habitat restoration efforts. Invasive plants compete with native plants, interfering during restoration with establishment of native seedlings, which are slow-growing and easily overwhelmed especially by annual grass weeds. Further, the annual grass such as cheatgrass is transforming the shrubsteppe landscape providing carpets of fine fuels that drive a feedback loop of increasing wildland fire scale and frequency.

▶ **Restoration Implementation Capacity**

A vast increase of planning and especially implementation capacity is needed to achieve landscape scale habitat restoration objectives. Actions outline several paths to scale-up existing capacity to meet these needs in Washington's shrubsteppe landscape.

▶ **Cultural Review Processes**

Careful, clear, and supported processes and adequate capacity are essential to ensure that cultural resources are protected during the pursuit of wildlife habitat restoration.

▶ **Native Plant Materials**

Native plant ecotypes that are adapted to Washington conditions are critical for persistence on the landscape and to support locally adapted native wildlife species.

▶ **Evaluate Habitat Conditions and Expand Knowledge Base**

Promote the integration of adaptive management principles and ongoing learning into action implementation.

HABITAT RESTORATION ACTIONS

Table 6. Habitat Restoration Actions and Enabling Conditions.

		Collaborating and sharing information	
HABITAT RESTORATION STRATEGY	**HR1**	**Delineate WSRRI management regions within the shrubsteppe landscape** As needed to match capacity increases, phase in the establishment and use of defined management regions to optimize restoration and weed management efforts, streamline resources, and enhance collaboration. Align regions with distribution of Core Areas, Growth Opportunity Areas, and Corridors; seed zones; and other pertinent considerations.	Information and Planning
	HR2	**Form and support a structured expert collaboration forum and network of habitat restoration practitioners** Collaborate to streamline resources, allow for information exchange, and optimize funding allocation. Foster continuous interaction among restorationists by hosting and facilitating WSRRI-sponsored and supported working groups, workshops, and field visits where partners and Tribes can share best practices, data, and insights on habitat restoration and invasive weed management. Use these forums to elevate collaborative project development to cultivate and implement projects eligible for WSRRI support.	Organization and Governance
	HR3	**Host and maintain an informative webpage** Create a comprehensive webpage as a central repository for Washington-relevant shrubsteppe restoration information such as up-to-date resources, restoration manuals, best practices, and local case studies. Connect to existing biome-wide resources such as those of the Intermountain West Joint Venture and Western Association of Fish and Wildlife Agencies. Ensure the information is language accessible for Spanish speakers and speakers of relevant Indigenous languages.	Information and Planning
	HR4	**Define restoration techniques and goals** Outline a comprehensive restoration framework by delineating restoration techniques and objectives across various project types and habitats including post-fire recovery, invasive grass management, shallow soils, riparian restoration, CRP-type field restoration, and wet meadows. Ensure each uses an ecologically informed approach to elicit natural succession and guided plant community recovery. Additionally, compile reference conditions and site data to define targeted ecosystem vegetation goals, such as at Natural Area Preserves.	Information and Planning
	HR5	**Use sound ecological principles and incorporate valuable insights and resources** Integrate lessons from implementation of Farm Bill programs such as Conservation Reserve Program State Acres For Wildlife Enhancement (CRP SAFE), tribal insights, cultural/NEPA guidance, and existing land-use plans to synergize WSRRI restoration initiatives	Information and Planning

	Restoring degraded habitat	
HR6	**Resource and service delivery** Utilize and vastly increase WSRRI base funding to deliver and share resources and services such as project design, on-the-ground personnel, native plants, and cultural resources review capacity to restore habitat in priority places to benefit wildlife and people.	Organization and Governance
HR7	**Project solicitation and generation** Strengthen WSRRI project solicitation and generation processes to be clear, transparent, and approachable to increase landowners' access to and use of WSRRI resources and services. Ensure accountability and input from local stakeholders. Provide WSRRI capacity to support landowners in proposal development and project design.	Organization and Governance
HR8	**Pre-fire restoration** Improve ecological integrity, wildfire resistance and resiliency, and habitat suitability for target SGCN. Strategically focus restoration efforts in Core Areas, Growth Opportunity Areas, and Corridors with the aim to replace non-native with native vegetation, emphasizing establishment of foundational native bunch grasses. Add native shrubs and forbs as desired and as is practical.	Resources and Equipment
HR9	**Post-fire restoration** Create a distinct post-wildfire response fund that utilizes WSRRI-enhanced restoration capacity to address immediate needs post-wildfire in Core Areas, Growth Opportunity Areas, and Corridors.	Funding
HR10	**Funding** Pursue additional funding for WSRRI supported pre-fire resiliency restoration and post-fire restoration programs through Washington state legislature, federal partners such as Bureau of Land Management (BLM), Bureau of Reclamation (BOR), US Fish and Wildlife Service (USFWS), Natural Resources Conservation Service (NRCS), Farm Services Agency (FSA), and other grants programs and entities.	Funding
HR11	**Improve lands not enrolled in incentive programs** Work with landowners and producers to improve habitat for wildlife by converting non-native plant communities to native bunchgrass and forb communities. Explore opportunities as private lands come out of incentive programs, such as through contract expiration.	Policy and Permitting
HR12	**Create new funding options to protect and restore degraded lands** Expand state acquisition and easement funding opportunities to allow for consideration of lands that are highly degraded but have restoration potential and are strategically located adjacent to high quality habitat in Core Areas, Growth Opportunity Areas, and Corridors. Prioritize restoration on lands protected through these new funding options to increase habitat availability and effectively grow the Core through both protection and restoration.	Funding

HABITAT RESTORATION STRATEGY

Increasing restoration implementation capacity		
HR13	**Establish and support regional restoration teams** (Figure 10, Tables 7 and 8) Create dedicated regional teams of expert coordinators, technicians, and crews, strategically aligning placements with WSRRI management regions, as they become established and adapting team size to region-specific factors such as size, geography, and travel demands. ▶ **Expand professional restoration capacity within WSRRI partners** Hire and train restoration practitioners committed to expanding and improving shrubsteppe habitats. Retain their expertise by promoting them as they become increasingly skilled. Explore potential for shared positions. ▶ **Pool resources** Explore opportunities to pool resources, such as equipment, expertise, or funding, to collectively address restoration needs and invasive plant infestations. Ensure adequate equipment is available, stored securely, appropriately maintained, and staged across the landscape to facilitate efficient implementation of projects by regional teams.	Capacity and Training Resources and Equipment
HR14	**Facilitate restoration training opportunities** Enhance restoration expertise through participation in established training programs and informal educational trainings and information exchange by experienced professionals. Consider bringing trainers from Great Basin to Washington for targeted training to ensure comprehensive knowledge transfer.	Capacity and Training
HR15	**Engage professional restoration contractors** Support local economies and incentivize marketplaces by demonstrating need and creating a reliable stream of restoration projects. Build relationships with local agricultural and weed management contractors and facilitate expansion into habitat restoration services. Identify and prioritize contractors from impacted communities.	Capacity and Training
HR16	**Explore creative partnerships with landowners to implement habitat restoration activities across ownerships** Develop working relationships with landowners and producers skilled in habitat restoration actions. Develop contracts, where possible, to utilize those skills to implement actions across ownerships.	Capacity and Training
Conducting cultural resources review		
HR17	**Develop and implement cultural resource consultation documents and processes** Enhance cultural resource consultation for habitat restoration by developing comprehensive documentation and processes that encompass specific restoration actions, clear workflows, designated points of contact, historical land use documentation, informed communication with tribal members about areas treated with herbicide, efficient batch consultations, and thorough project documentation.	Policy and Permitting
HR18	**Establish programmatic agreements with DAHP and Tribes** Develop programmatic agreements, where possible and desirable, with the Department of Archaeology and Historic Preservation (DAHP) and Tribes for WSRRI-funded activities. Draw insights from existing examples, such as agreements between US Fish and Wildlife Services (USFWS) and State Historic Preservation Office (SHPO).	Policy and Permitting

HABITAT RESTORATION STRATEGY

	HR19	**Conduct pre-emptive cultural surveys** Implement a proactive cultural resource assessment strategy by collaborating with restoration practitioners to identify priority restoration areas in Core Areas, Growth Opportunity Areas, and Corridors. Conduct extensive desktop reviews to identify areas with documented cultural resources of restoration impact concern and engage in tribal outreach, potentially involving ethnographic research and consultation with elders to ensure recognition of traditional cultural sites.	**Policy and Permitting**
	HR20	**Expand archeological capacity** Increase archeological capacity at entities that implement habitat restoration including leveraging opportunities to share archeologist staff and resources between entities. Ensure appropriate training for field staff such as inadvertent discovery training. Address capacity gaps, if possible and desired, within Tribes and at DAHP.	**Capacity and Training**
	Controlling invasive plants		
HABITAT RESTORATION STRATEGY	**HR21**	**Use a data-driven approach to manage the spread of invasive plant species** Emphasize the importance of data and evidence-based decision-making in securing funding. Demonstrating the economic and ecological impacts of effective weed management can help justify investment in long-term monitoring and adaptive management. ▶ **Understand invasion sources and pathways** Consider animal dispersal, roads, human movement, and other pathways as vectors for invasion management. ▶ **Prioritize core areas for protection and treatment** Focus efforts on safeguarding Core Areas while addressing identified invasion sources and pathways to effectively control and mitigate the spread of invasive plant species. ▶ **Use standardized prioritization metrics** Develop a set of standardized criteria and metrics for assessing the severity and impact of invasive plants within each county or WSRRI Region. This will enable a consistent and data-driven approach to prioritizing management efforts. ▶ **Sequence management options** Use evidence-based best management practices to sequence management options. ▶ **Ensure data sharing and integration** Coordinate with weed boards and Invasive Species Council to use a shared database or GIS platform to store and analyze invasive species data. Ensure data compatibility and integration among counties, WSRRI partners, and TerrAdapt for a comprehensive regional perspective. ▶ Use modern systems for efficient data collection, sharing, customization, and analysis (such as ArcGIS or Survey123) to enhance decision-making and collaboration while ensuring data governance and continuous improvement.	**Information and Planning**
	HR22	**Assess funding models and mechanisms** Conduct a comprehensive assessment of how different entities, such as counties and conservation districts, set up funding structures for noxious weed boards. This analysis should consider the specific legal frameworks, like RCW 17.10, and the historical evolution of these funding mechanisms, including shifts from enforcement to education. Understanding these variations will provide insights into how to effectively interact with these entities to leverage and secure additional support.	**Funding**

HR23	**Influence policy** Promote policies at the county, state, and federal levels that prioritize invasive and noxious weed management and provide resources for ongoing efforts. Collaborate with lawmakers and agencies to shape legislation that addresses funding gaps.	Policy and Permitting
HR24	**Build local capacity** Establish and strengthen local teams dedicated to building capacity for invasive weed management, ensuring that they are well-equipped with the necessary skills and resources to manage and control invasive species. Additionally, explore opportunities for collaboration with Cooperative Weed Management Areas (CWMA) across the state to leverage their expertise and resources for enhanced invasive weed control efforts.	Capacity and Training
HR25	**Conduct public engagement** Involve the public through outreach and awareness campaigns, encouraging reporting of invasive species sightings and promoting responsible land management practices. Develop and implement a language accessible, comprehensive community education program focused on raising awareness about the impact of invasive species on the landscape and ecosystems. Build upon and enhance work done by local county weed boards and Washington Invasive Species Council.	Outreach and Education

Improving availability of native plant materials

HR26	**Develop shrubsteppe native seed strategy** Compile information about provenance and currently available supply of native plant ecotypes. Conduct gap analysis of what is available and what is needed and identify seed zones to use as framework to guide production investments. Develop and include recommendations for mechanisms to expand production and recommended habitat restoration seed mix prescriptions that establish appropriate plant communities and provide wildlife species benefit (e.g., greater sage-grouse preferred forbs, pollinator nectar and host plants) while maximizing establishment probability and minimizing cost.	Information and Planning
HR27	**Enhance availability of desirable local ecotypes and mixes** ▶ Engage with existing native grass seed propagators to secure rows of plantings with yield dedicated to WSRRI projects. ▶ Create marketplace demand for local ecotype forb production; explore opportunities to subsidize costs to develop production protocols for species not currently in production. ▶ Facilitate and ease contracting processes such as through exploring use of Indefinite Delivery Indefinite Quantity (IDIQ) contract types and utilizing state master contracts. ▶ Continue partnership with Sustainability in Prisons Program (SPP) to provide Washington-sourced sagebrush seeds and plugs while providing outreach, education, and job training for the conservation field to incarcerated populations for incarcerated communities. Assess need for plug production and expand as appropriate with additional producers. ▶ Facilitate expansion of landscape-scale shrub planting approaches using locally sourced seed by expanding the supply of such seed. Explore new ways to produce shrub seed like the sagebrush seed orchard pilot project with SPP. As appropriate, expand seed orchard efforts into the wild landscape and include other shrub species such as bitterbrush, rabbit brush, and other sources of sagebrush to encompass a wide breadth of local ecotypes and subspecies. ▶ Use WSRRI-supported crews and volunteers to wild-collect seed for propagation. Expert restoration coordinators should guide the collection locations, species, and ecotypes to be collected.	Resources and Equipment

HABITAT RESTORATION STRATEGY

HABITAT RESTORATION STRATEGY	**HR28**	**Maintain a ready supply of seed** Establish agreements with existing storage facilities to have a supply of seed available to respond after fire in Core Areas, Growth Opportunity Areas, and Corridors. Expand seed storage capacity in alignment with increasing personnel and equipment capacity to deploy and utilize seed in restoration and fire-response projects.	Resources and Equipment
	HR29	**Enhance collaboration and personnel capacity** Hire or contract shrubsteppe seed coordinator. Participate in regional and national seed collaboratives.	Capacity and Training

Evaluating habitat conditions

HR30	**Monitor restoration efficacy** As appropriate, develop and utilize standardized monitoring protocols and data collection templates to assess project success and ecosystem health that allow for comparison between projects, sites, and various partner-led efforts.	Information and Planning
HR31	**Expand remote sensing and field-based monitoring** Use emerging technologies in remote sensing and cloud computing (e.g., TerrAdapt) to dynamically monitor temporal dynamics of the regional landscape, including invasive species, native grasses, shrubs, and other indicators of habitat quality. Complement the satellite-based monitoring data with robust field-based monitoring that can be used to help train and validate remotely sensed data and verify site conditions prior to implementation of measures like habitat restoration or invasive species control.	Science and Monitoring
HR32	**Evaluate habitat restoration needs post-fire** Establish quick reaction teams to respond immediately after a fire to conduct assessments of wildfire severity and restoration opportunity on the ground. Ensure that WSRRI teams don't duplicate existing efforts; assess NRCS, BLM, and DNR programs and design WSRRI efforts to fill gaps (e.g., wildlife habitat conditions).	Information and Planning

Expanding the knowledge base

HR33	**Conduct applied research to refine restoration and weed management techniques** As feasible, incorporate management trials and experimental design into active restoration and weed control efforts. Encourage academic and other researchers to develop weed management and habitat restoration research projects that align with WSRRI needs and priorities. Provide guidance and support in proposal development including objective setting, budget, and project design.	Information and Planning
HR34	**Research how restoration and weed management treatments affect fire severity, fire response, and post-fire recovery**	Information and Planning

Table 7. WSRRI Habitat Restoration Staffing Structure

WSRRI Habitat Restoration Team Staffing Structure			
Position type/title	**Position function**	**Skills/qualifications**	**Structure**
Expert Restoration Coordinator	Sets strategic vision; Identifies shared goals with partners; Coordinates with other program leads to achieve shared goals; Designs, plans, and consults on restoration projects; Guides and mentors technical staff and crews; Navigates and ensures necessary permitting is in place;	Expert level applied ecological restoration knowledge; experience leading teams; demonstrated follow-through; creative thinking and problem-solving; strong communication and organizational skills; knowledge of permitting requirements	Dedicated full time positions; Can be dispersed among different entities, but if dispersed requires commitment to the collaborative work; at least three positions, one each in identified WSRRI regions
Skilled Restoration Technician	Leads and guides actions of restoration crews and volunteers. Conducts on-the-ground habitat restoration actions such as seeding, planting, weed spraying, fence marking, fence building, fence removal. Conducts vegetation assessment, vegetation monitoring.	Land management experience including operating large equipment such as tractors, seed drills, etc. Ability to identify common vegetation; weed certification; commercial driver's license	Dedicated full time positions supervised by and within the region/entity as expert restoration coordinators; two FTE per region.
Restoration Crew	Conducts on-the-ground habitat restoration actions such as seeding, planting, weed spraying, fence marking, fence building, fence removal.	Ability to self-motivate, follow direction, work in inclement weather, interest in land management and restoration.	Temporary surge crews to be hired/used for peak times of year. Typically, 4-6 individuals per crew. Could be WCC, ACE, Americorps, Vetcorps, seasonal crews, or others.
Volunteers	Conducts on-the-ground restoration actions such as planting, fence marking, seed collection.	Interest in conservation and restoration	Project specific needs. Ideally coordination and facilitation led by a separate entity

Table 8. WSRRI Habitat Restoration Equipment Needs

WSRRI Habitat Restoration Team Equipment Needs		
	Equipment	**Structure**
Minimum threshold	Staff vehicles, ATV, spray set-up, tractor, pneumatic/hydraulic fence post pounder, trailer, hand-tools, foam markers, portable air compressor, auxiliary fuel tanks	Duplicated in each region
Regular, specialized need	Seed drill + trailer, large capacity vehicle capable of towing equipment, heavy-tined harrows, coil-packers, broadcast seeders, harrow seeders, weed wicks, UTVs, tractor mounted plug-planters, ripping shank for tractors, disc tiller, fabric mulch application machine, bulk herbicide tank, hand-planting shovels and seedling tote bags, skid steer with hydraulic fence post pounder, folding-deck mower	Shared among regions/entities.
Specialized, infrequent need	Air-seeders, rubber-track tractors, aerial application services	Rented as needed
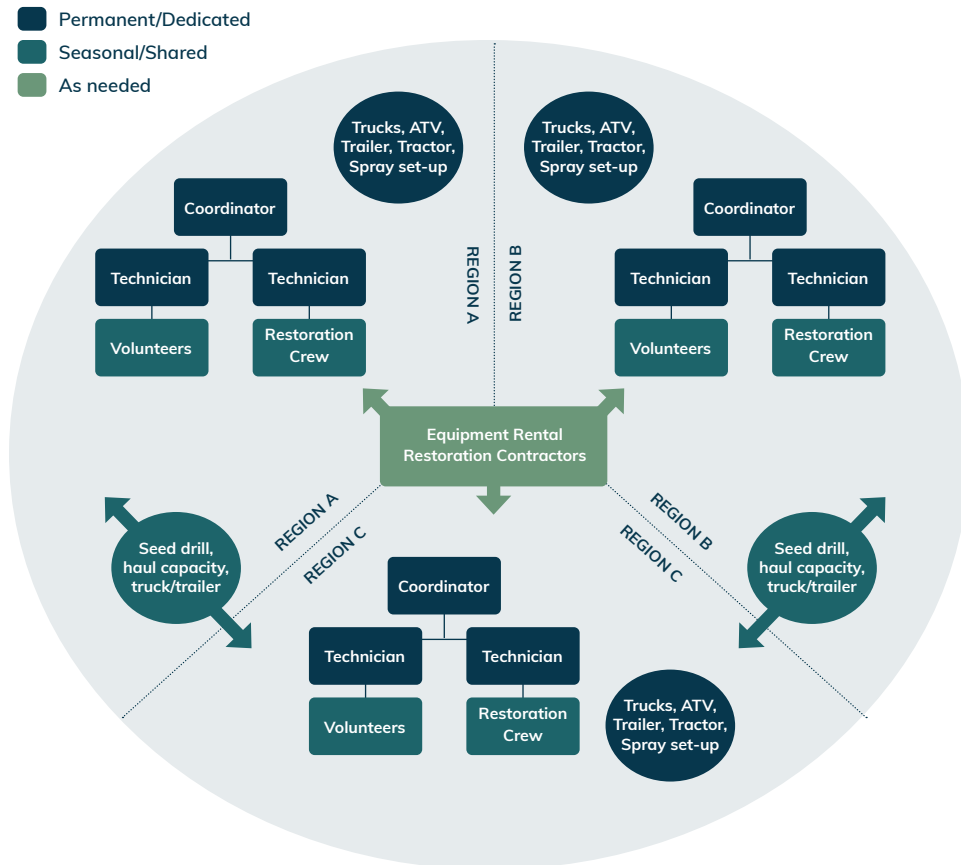
Figure 10. Conceptual design outlining restoration teams within WSRRI management regions

6.2.4. Species Management Strategy

The Species Management Strategy actions are meant to complement the Habitat Protection, Community Engagement, Wildland Fire Management, and Habitat Restoration actions that we expect to broadly benefit all wildlife species, including both game and non-game, and both common and rare. The Species Management Strategy actions are focused on SGCN and may be duplicative of actions in other species conservation plans such as the Washington State Wildlife Action Plan (SWAP; WDFW, 2015) or species-specific recovery plans. Here, we aim to amplify programmatic actions that support shrubsteppe wildlife and identify those things that are needed to bolster populations in addition to actions necessary in the other strategies. For a fuller breadth of actions for individual SGCN, refer to the SWAP and/or species-specific recovery plans.

WSRRI Species Management Strategy focuses primarily on wildlife that occur in terrestrial environments, inclusive of birds and amphibians using mesic (wet) habitats within the shrubsteppe landscape. Salmonids and other fish are not a primary focus.

SPECIES MANAGEMENT ACTIONS

Table 9. Species Management Actions and Enabling Conditions.

	Surveying and monitoring Species of Greatest Conservation Need		
SPECIES MANAGEMENT STRATEGY	**SM1**	**Prioritize and implement baseline surveys for shrubsteppe SGCN** Conduct initial surveys as a first step to establish baseline information about species distribution, habitat occupancy, and other considerations. Each biennium, target a set of species for baseline surveys efforts. This may include developing and piloting new survey protocols. Initial survey protocols should consider future needed monitoring in their design and make recommendations for monitoring frequency and approach. As of 2024, the following SGCN wildlife from the 2015 State Wildlife Action Plan require baseline surveys. Future survey needs may expand to additional species, including plants, as guided by newer iterations of the State Wildlife Action Plan. ▶ Burrowing owl *(Athene cunicularia)* ▶ Loggerhead shrike *(Lanius ludovicianus)* ▶ Sandhill crane *(Antigone canadensis)* ▶ Night snake *(Hypsiglena ochrorhyncha)* ▶ Ringneck snake (Diadophis punctatus) ▶ Sagebrush lizard *(Sceloporus graciosus)* ▶ Sharp-tailed snake *(Contia tenuis)* ▶ Short-horned lizard *(Phrynosoma hernandesi)* ▶ Striped whipsnake *(Masticophis taeniatus)* ▶ Tiger salamander *(Ambystoma tigrinum)* ▶ Woodhouse's toad *(Anaxyrus woodhousii)* ▶ Black-tailed jackrabbit *(Lepus californicus)* ▶ White-tailed jackrabbit *(Lepus townsendii)* ▶ Badger *(Taxidea taxus)* ▶ Merriam's shrew *(Sorex merriami)* ▶ Hoary bat *(Lasiurus cinereus)* ▶ Silver haired bat *(Lasionycteris noctivagans)* ▶ Spotted bat *(Euderma maculatum)* ▶ Townsend's big eared bat *(Corynorhinus townsendii)* ▶ Monarch butterfly *(Danaus plexippus)* ▶ Morrison's bumble bee *(Bombus morrisoni)* ▶ All other shrubsteppe SGCN invertebrates		ℹ️ Information and Planning

SPECIES MANAGEMENT STRATEGY	**SM2**	**Conduct regular monitoring of SGCN populations to assess status and trend** Track population health as a critical aspect of understanding how threats and conservation measures are affecting species. Build from baseline survey information to develop and implement efficient and regular monitoring strategies for each SGCN, grouping species together as appropriate for efficiency. As of 2024, baseline surveys have occurred for the following species, and some have established regular monitoring protocols. Continue and expand monitoring as protocols are developed for these and other species. ▶ Ferruginous hawk *(Buteo regalis)* ▶ Golden eagle *(Aquila chrysaetos)* ▶ Greater sage-grouse *(Centrocercus urophasianus)* ▶ Columbian sharp-tailed grouse *(Tympanuchus phasianellus columbianus)* ▶ Sage thrasher *(Oreoscoptes montanus)* ▶ Sagebrush sparrow *(Artemisiospiza nevadensis)* ▶ Brewer's sparrow *(Spizella breweri)* ▶ Cinnamon teal *(Anas cyanoptera)* ▶ Northern leopard frog *(Lithobates pipiens)* ▶ Columbia Basin pygmy rabbit *(Brachylagus idahoensis)* ▶ Washington ground squirrel *(Urocitellus washingtoni)* ▶ Townsend's ground squirrel *(Urocitellus townsendii)*	**Information and Planning**
	SM3	**Increase capacity for Community Science** Implement Community Science programs by partnering with local organizations and recruiting volunteers to actively participate in species data collection and project coordination. Increase capacity in agencies and other entities to hire dedicated positions to train and direct volunteers to opportunities on public lands, coordinate with biologists to facilitate volunteer engagement in survey and monitoring efforts and develop data collection and management tools to support project implementation.	**Capacity and Training**
		Developing a comprehensive approach to disease management	
	SM4	**Conduct comprehensive assessments** Perform thorough assessments and execute suitable measures to manage diseases where feasible and appropriate, ensuring the protection of (SGCN).	**Information and Planning**
	SM5	**Mitigate disease** When feasible, implement strategies to minimize impact from various diseases including but not limited to tularemia, plague, chronic wasting disease, highly pathogenic avian influenza, and rabbit hemorrhagic disease. Strategies may include implementing vaccination programs to protect Columbia Basin pygmy rabbits from the latter.	**Resources and Equipment**

Conducting conservation translocations as needed

SM6	**Evaluate and plan for species reintroductions and augmentations** Conservation translocations (e.g., reintroduction, augmentation) are an important, yet inherently costly and risky conservation tool used to recover populations of species at-risk. Prior to and adaptively throughout implementation, use International Union for the Conservation of Nature (IUCN) guidelines to ensure a full suite of considerations including biological, ecological, social, cultural, and regulatory effects of translocations are incorporated into feasibility and implementation plans.	**Information and Planning**
SM7	**Implement reintroductions and augmentations** Following IUCN guidelines, conduct and evaluate the effectiveness of Columbia Basin pygmy rabbit, Columbian sharp-tailed grouse, and northern leopard frog conservation translocation programs. Assess the effectiveness of previous greater sage-grouse conservation translocation efforts and determine the need for future efforts. Where feasible and appropriate, conduct conservation translocations for black-tailed jackrabbits, white-tailed jackrabbits, Washington's ground squirrel, Townsend's ground squirrel, and burrowing owls. Additional species may be identified as candidates for conservation translocations in the future.	**Information and Planning**

Minimizing SGCN impact from non-native and human-associated predators

SM8	**Minimize threats to SGCN amphibians from non-native aquatic species** ▶ Remove non-native fish from SGCN-inhabited wetlands and waterbodies. Develop and prioritize waterbodies to target for removal by considering SGCN status, threats, and recovery efforts; removal feasibility and cost; and likelihood of reinvasion. ▶ Reduce or eliminate fish stocking in prioritized SGCN-occupied waterbodies while identifying and promoting alternative sites for recreational opportunities. ▶ Strategically manage bullfrog populations to support the recovery of northern leopard frogs, particularly in areas where new populations of northern leopard frogs are being established.	**Resources and Equipment**
SM9	**Manage human-associated terrestrial predators impacting SGCN populations** ▶ Develop and implement a comprehensive raven monitoring and management plan to benefit greater sage-grouse, Columbian sharp-tailed grouse, and other shrubsteppe SGCN populations. ▶ Establish a targeted outreach program directed at key audiences concerning generalist predator threats (e.g., common ravens and coyotes) and methods to diminish their impact to SGCN by reducing their proximity and presence on the landscape. Methods include removing perches and food subsidies such as carcass piles and trash. ▶ Reduce perches for avian predators in proximity to greater sage-grouse and Columbian sharp-tailed grouse leks, burrowing owl nesting areas, and other vulnerable aggregations. When feasible, bury power and transmission lines and use virtual fencing. Remove abandoned farm equipment.	**Information and Planning** **Outreach and Education**

SPECIES MANAGEMENT STRATEGY

Minimizing impacts to SGCN individuals from built infrastructure

SM10	**Develop and implement Best Management Practices** Collaboratively develop and actively implement Best Management Practices (BMPs) to minimize the impact of large-scale human infrastructure on SGCN. These BMPs should encompass a broad suite of built infrastructure, including energy and agriculture, and be strategically designed to address specific threats to SGCN. Examples include minimizing impact from operation of wind and solar energy generation, irrigation canals, and fencing.	Information and Planning
SM11	**Minimize bird and bat mortality** Implement measures to reduce mortality among bats, raptors, and other birds due to human infrastructure, notably wind turbines. This includes conducting research on bat and bird migration patterns to inform effective minimization strategies.	Policy and Permitting
SM12	**Enhance water management** Strengthen water management strategies, particularly in areas used for nesting and breeding animals like sandhill cranes and northern leopard frogs. These strategies should focus on mitigating vulnerabilities that affect vital life stages, such as fluctuating water levels during breeding windows that can flood or strand eggs and nests.	Resources and Equipment
SM13	**Facilitate natural movement and minimize mortality from barriers** Construct wildlife crossings in areas of high wildlife-vehicle collisions. Create crossings and exit strategies for water canal barriers. Include consideration for species with local and small-scale movement needs.	Resources and Equipment
SM14	**Facilitate natural movement by removing or easing fencing barriers** Work with willing landowners to replace or retrofit traditional fencing on the landscape with wildlife friendly versions such as those with smooth wire or with virtual fencing. In proximity to grouse leks, ensure fences are marked to minimize collisions. Explore opportunities to install virtual fence towers on public lands, thereby providing coverage for surrounding landscape and incentivizing landowner use of virtual fence technology.	Resources and Equipment

Minimizing impact from human actions and disturbance

SM15	**Mitigate threats from lead ammunition** Address threats to raptors and other scavengers stemming from lead contamination by minimizing the presence of lead in the environment. Work with North American Non-Lead Partnership to collaboratively minimize the unintended impacts of lead ammunition on wildlife.	Outreach and Education
SM16	**Minimize impact from pesticides** Reduce pesticide spraying in agricultural fields and along roadsides that have adverse effects to SGCN such as those adjacent to foraging and roosting sites of Townsend's big-eared bats or to native milkweed habitat for monarch butterflies. Neonicotinoid-based pesticides can be very harmful and have direct impacts to seed-eating birds and pollinators, and indirect impacts by reducing invertebrates that are the base of the food chain. Minimize use of rodenticides to reduce impact to ferruginous hawks, golden eagles, and burrowing owls preying on small mammals.	Policy and Permitting
SM17	**Minimize lethal control** Decrease lethal removal of SGCN such as jackrabbits, badgers, and ground squirrels by measures such as using outreach to promote non-lethal alternatives or by restricting shooting and poisoning methods.	Policy and Permitting

SPECIES MANAGEMENT STRATEGY

SPECIES MANAGEMENT STRATEGY	**SM18**	**Identify and minimize or eliminate recreational disturbance to vulnerable SGCN sites such as off-road vehicle use of SGCN breeding sites or hibernacula**	Outreach and Education
		Explicitly linking species-specific considerations in habitat protection and restoration efforts	
	SM19	**Conduct habitat suitability assessments** Conduct thorough assessments to define and map suitable habitat for SGCN by developing species-specific habitat suitability models. Analyze factors such as vegetation types, terrain features, and ecological conditions to create precise habitat suitability maps using GIS tools.	Science and Monitoring
	SM20	**Prioritize habitat protection and restoration efforts** Apply habitat suitability data to prioritize habitat restoration and protection efforts within Core Areas, Growth Opportunity Areas, and Corridors. Direct resources to areas where SGCN are most likely to thrive, ensuring efficient conservation allocation.	Science and Monitoring
	SM21	**Consider SGCN in restoration planning and implementation** Integrate necessary specific SGCN habitat features (e.g., nectar and other food plants for pollinators; vegetation structure important for nesting or cover from predation; and rocks, substrate, or other unique features) to overall plans for shrubsteppe ecological restoration. Collaborate with stakeholders to implement these plans, monitor progress, and make necessary adjustments for the long-term conservation of SGCN and their ecosystems.	Information and Planning
	SM22	**Conduct outreach to communicate SGCN life history and conservation needs to restoration practitioners, landowners, and land managers**	Outreach and Education
		Conducting strategic research for SGCN conservation	
	SM23	**Conduct research necessary to conserve and restore SGCN populations, with particular emphasis on applied research questions with management implications** ▶ Include demographic research to identify sources of mortality and vulnerable life stages; research to improve understanding of habitat needs, seasonal movements, and dispersal; and research on intra-specific competitive interactions.	Information and Planning

6.2.5. Wildland Fire Management Strategy

WILDLAND FIRE IN THE SHRUBSTEPPE LANDSCAPE

Wildland fires have played a significant role in shaping Washington's shrubsteppe landscape for millions of years. Fire is a natural part of this landscape, and it is known to be important as a key driver of fundamental ecological processes that create and maintain productive shrubsteppe habitats. It is understood to play a role in regulating plant and animal communities, regulating the cycles of plant and animal diseases, cycling nutrients, as well as other ecological processes (Miller & Rose, 1999). In addition to naturally occurring fire, Indigenous Peoples in Washington and throughout the United States, prescriptively set fires to "promote specific species and a diversity of species that are culturally important for food, medicine, fiber, forage for wildlife, as well as other purposes" (Boyd, 1999), further shaping animal and plant communities across the landscape.

One of the challenges in understanding the historical fire regimes in the shrubsteppe landscape is the scarcity of concrete evidence of past fire scars. A lack of fire scars is common in sagebrush-dominated ecosystems (Brunson & Carter, 1992) since sagebrush does not tolerate fire well and often does not persist after. Inferences have been drawn from fire scars of long-lived trees along forested ecotones (Remington et al., 2021), but such inferences probably have limited applicability to more open shrubsteppe habitats, though localized estimates of fire return intervals range from a few decades in colder-moister shrubsteppe near those forested ecotones (Miller and Heyrdahl, 2008) to hundreds of years in hotter-drier systems (Bukowski and Baker, 2013).

Over the last century, there has been extensive fire suppression and prohibition of Indigenous burning practices (Miller et al., 2005) due to social and political changes that have prioritized suppressing all wildland fires as soon as they occur. During the last few decades, several factors, including fire suppression, land-use changes, the spread of invasive grass species, and prolonged drought, have led to an increase in fire size and severity across the shrubsteppe landscape (Balch et al., 2013; Remington et al., 2021; Smith, 2023). This altered fire regime has resulted in the transformation of native shrub-perennial grass communities into fire-prone, non-native annual plant communities, creating a positive feedback loop that results in heightened fire severity and an accelerated fire cycle (D'Antonio & Vitousek, 1992). Invasion by non-native, annual grasses creates a more continuous fuel bed than native bunchgrass systems, facilitating the spread of fire and increasing the extent, frequency and severity. Further, the rapid proliferation of non-native invasive grass species like cheatgrass, which can dominate bare soil postfire, and can provide enough fuel for another fire within two years (Pilliod et al., 2017). Cheatgrass also cures earlier than native grasses, providing receptive fuel for fire earlier in the year, contributing to extending the period in which fires are likely to occur in this landscape. Consequently, this transition to non-native annuals has contributed to movement further away from pre-1800 fire return intervals, even in the last 25 years (Figure 11).

While wildfire is a natural disturbance in the shrubsteppe landscape, the recent alteration of fire regimes is unprecedented. Longer fire seasons are occurring with increasing fire extent, frequency, and severity (Remington et al., 2021; Brooks et al., 2015; Baker, 2013). Wildland fire cycles have accelerated and extended to a point where postfire recovery struggles to keep pace (Baker, 2006). The result in recent years is a landscape faced with wildland fires with greater extent, frequency and severity and a transformation into fire-prone non-native communities.

The Strategy calls for, where feasible and appropriate, restoring fire regimes that are like those that were occurring prior to the 1800's when widespread fire suppression policies and practices were instituted. While this is an ambitious goal, it's one believed necessary to address a root cause of the increase in fire extent, frequency, and severity. Addressing root causes in the restoration of ecological systems, while a much more challenging objective, is believed to be a more effective and sustainable approach for achieving true ecosystem restoration. To accomplish this, the Strategy recommends the strategic use of prescribed fire

as a tool for managing fuels to reduce the extent, frequency, and severity of wildland fire, restore habitat and wildlife populations, and protect sensitive wildlife species and human communities. It is explicitly recognized that current conditions must be considered first when applying prescribed fire as a tool, taking into consideration current land uses, the condition of the landscape, wildlife populations, climate, and other factors. Another consideration is it is often the case that other vegetation management tools such as grazing, mowing, discing, and herbicidal treatments must be used in concert with, and frequently before, the use of prescribed fire to achieve the desired management outcomes. Lastly, it's recognized that there is still much to learn and understand concerning the use of prescribed fire as a management tool, as is the case with most aspects of ecological management and restoration. As such, employing an adaptive management approach is recognized as critical, prioritizing ongoing evaluation and improvement of management practices involving the use of prescribed fire.

COORDINATION WITH THE WASHINGTON STATE WILDLAND FIRE PROTECTION 10-YEAR STRATEGIC PLAN

The Washington State Wildland Fire Protection 10-Year Strategic Plan (DNR, 2019) provides a blueprint for effective wildland fire protection in Washington and informs wildland fire policy and resource decisions in Washington State. The plan is part of an overall strategy to fundamentally change the future trajectory of wildland fire in Washington. This plan is anchored in the National Cohesive Wildland Fire Management Strategy (WFLC, 2014) and aligned with the state's 20-Year Forest Health Strategic Plan - Eastern Washington (DNR, 2018). It focuses on building resilient landscapes, fire-adapted communities, and safe, effective wildfire response. The plan also focuses on wildfire prevention, reducing human-caused ignitions, and post-fire recovery. The WSRRI Wildland Fire Management Strategy applies and tailors the principles and approaches identified in these foundational plans to the specific needs of shrubsteppe conservation and restoration.

Wildland Fire Protection on Unprotected and Under-protected Shrubsteppe Lands

There are approximately 358,000 acres of land in southeastern Washington where there is no agency with jurisdictional responsibility for providing fire protection. These lands are referred to as "unprotected lands". There are also many more acres where fire protection is very limited due to their remote nature and under-resourced nature of the agencies providing protection. Much of this land is shrubsteppe habitat that burns frequently, and improving protection for it is a priority. To address this, the WSRRI wildland fire work group, as well as the Wildland Fire Advisory Committee, recommend amending 76.04 RCW to assign DNR authority to provide wildland fire protection on all wildlands in Washington state.
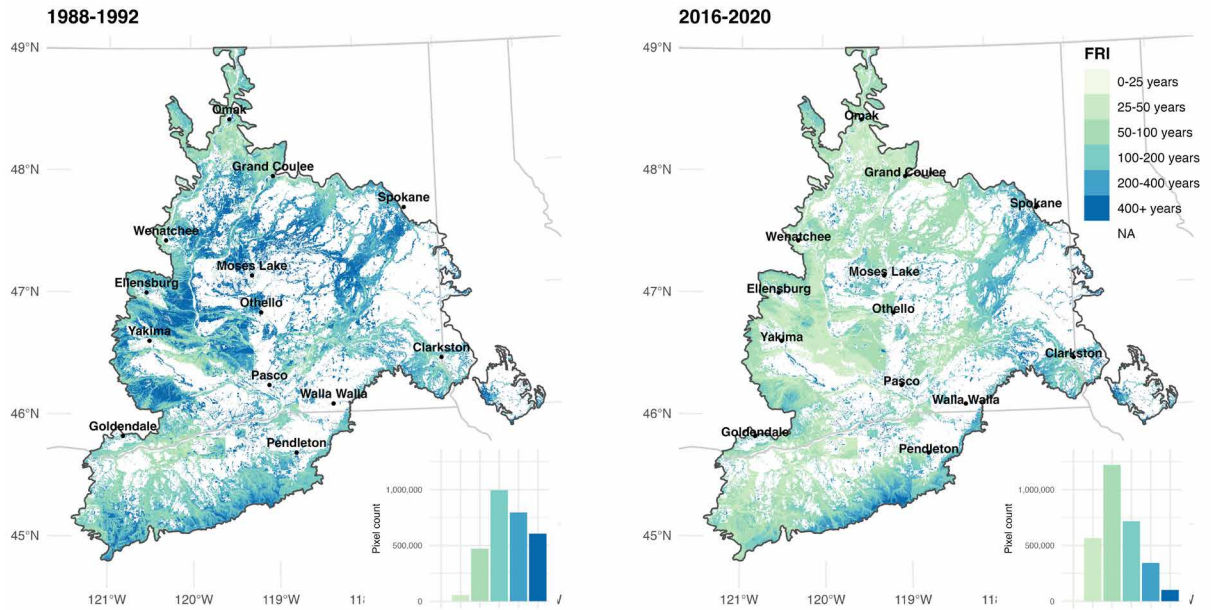
Figure 11. Estimated Fire Return Intervals (FRI) calculated from burn probabilities averaged over the 1988-1992 fire seasons (left) and the 2016-2020 fire seasons (right). Note that these estimates of the FRI are considered slightly overestimated (Smith, 2023).

Further, the WSRRI Wildland Fire Management Strategy also builds upon the work of the Wildland Fire Advisory Committee's SHB 2561 Report (WFAC, 2019). This report lays out recommendations for protecting "unprotected lands" in Washington State, 358,000 acres of largely shrubsteppe landscape that are not under the jurisdiction of any fire protection agency. It also builds upon the recommendations for strengthening community programs for helping homeowners engage in mitigating the risks from wildland fire and recommendations for better protecting non-English speaking residents during wildland fire emergencies.
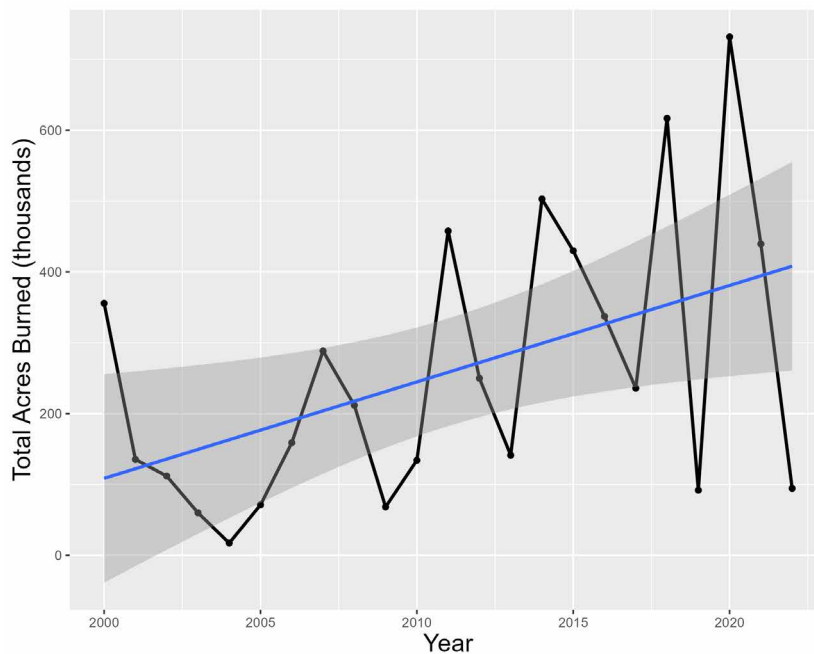
Figure 12. Total acres burned across the Columbia Plateau from 2000-2022

WILDLAND FIRE MANAGEMENT

Implementing successful wildland fire management is critical for shrubsteppe conservation. Achieving success with wildland fire management requires a series of integrated and dependent actions such as effective pre-fire response planning and preparation, fire response, mitigating risk and improving community protection, strategic fuel reduction, and reestablishing more natural fire regimes. Importantly, these actions must be implemented in a way that recognizes and supports the overarching goal of restoring ecological functions and processes that result in a healthy shrubsteppe ecosystem.

Research by Smith (2023) highlights that non-native annual grasses and forbs are the primary wildfire risk indicators in Washington's shrubsteppe because they introduce continuous and highly flammable fuel conditions to what is naturally a landscape that is characterized by discontinuous fuels, and as a result, naturally fire resistant. While native shrubs like sagebrush and bitterbrush also burn intensely, they are less consistent predictors of wildfire risk, and it is the presence of a continuous grass fuel bed that increases wildfire risk. With the pervasive growth of annual grasses, fires can spread rapidly and intensely. Since shrubs are essential for many SGCN, including the greater sage-grouse and Columbia Basin pygmy rabbit, fuel reduction efforts should focus on decreasing annual grasses while encouraging native perennials. Strategies for invasive grass reduction include grazing, mechanical and chemical treatments, prescribed fire, which must be followed by the essential step of planting native grass, forb, and shrub communities. Strategies that remove biomass, like grazing, are helpful for providing short-term reductions in fuels, but strategies that address preventing seed set and emptying the soil seed bank of their seed provide longer term benefits and can ultimately be a more sustainable and effective strategy. Strategic creation of fuel breaks can be an effective tool for mitigating negative impacts of wildfire but should be completed within the context of landscape-scale ecosystem management.

POTENTIAL OPERATIONAL DELINEATIONS

One key planning tool identified for effectively managing wildland fire in the shrubsteppe is the development of Potential Operational Delineations (PODs). "PODs are spatial units or containers defined by potential control features, such as roads and ridge tops, within which relevant information on (landscape) conditions, ecology, and fire potential can be summarized. PODs combine local fire knowledge with advanced spatial analytics to help managers develop a common understanding of risks, management opportunities, and desired outcomes to determine fire management objectives" (Potential Operational Delineations, USDA Rocky Mountain Research Station, 2023). Applications for PODs figure prominently in the strategies and actions developed here for wildland fire management in the shrubsteppe.

THE FIRE REHABILITATION PROCESS

An important component of the national wildland fire response system is the wildfire rehabilitation process. Though largely focused on federal lands currently, the process is applicable to all lands and to post fire restoration in the Washington shrubsteppe landscape. There are three phases of rehabilitation following wildfires identified in the national system, including Fire Suppression Damage Repair, Emergency Stabilization – Burned Area Emergency Response (BAER), and Long-Term Recovery and Restoration.

▶ **Fire Suppression Damage Repair**

This involves immediate post-fire actions taken to repair damages and minimize potential soil erosion and impacts resulting from fire suppression activities and usually begins before the fire is contained, and before the demobilization of an incident management team. This work repairs the hand and bulldozer lines, roads, trails, staging areas, safety zones, and drop points used during fire suppression efforts.

► **Emergency Stabilization**

This involves a rapid assessment of burned watersheds by the BAER team to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on federal lands and take immediate actions to implement emergency stabilization measures before the first major storms. Fires result in loss of vegetation, exposure of soil to erosion, and increased water run-off that may lead to flooding, increased sediment, debris flow, and damage to critical natural and cultural resources. BAER actions such as seeding, mulching, installation of erosion and water run-off control structures, temporary barriers to protect recovering areas, and installation of warning signs may be implemented. BAER work may also replace safety related facilities; remove safety hazards; prevent permanent loss of habitat for threatened and endangered species; prevent the spread of noxious weeds and protect critical cultural resources.

► **Long-Term Recovery and Burned Area Rehabilitation**

This includes longer term restoration efforts, often taking place for many years after a wildfire. Burned Area Rehabilitation (BAR) supports the healing process and provides a "bridge" to long-term recovery. Allocation of BAR funds involves a rigorous and competitive process to evaluate projects to ensure the most critical areas receive treatment first. This phase utilizes non-emergency actions to improve fire-damaged lands that are unlikely to recover naturally and to repair or replace facilities damaged by fire that are not critical to life and safety. This phase may include restoring burned habitat, reforestation, other planting or seeding, monitoring fire effects, replacing burned fences, interpreting cultural sites, treating noxious weed infestations, and installing interpretive signs (Post Fire Recovery, National Interagency Fire Center, 2023).

Northern leopard frog.   S. DeMay

Table 10. Wildland Fire Management Actions and Enabling Conditions.

		Improving fire response and mitigation	
WILDLAND FIRE MANAGEMENT STRATEGY	**WF1**	**Develop Potential Operational Delineations (PODs) and Potential Control Lines (PCLs)** Develop PODs and PCLs across the shrubsteppe landscape for fire response planning and ensure collaboration and understanding across agencies. Prioritize completing this in landscapes with Core Areas, Growth Opportunity Areas, and Corridors first and landscapes that are adjacent next. ▶ Identify shrubsteppe Core Areas, GOAs, and Corridors for protection when developing PODs. ▶ Identify priority shrubsteppe cultural values and resources when developing PODs. ▶ Use the Washington Natural Heritage, Priority Habitat and Species, and NRCS Ecological Site Descriptions (ESD) databases to identify ecological values at risk when developing PODs. ▶ Ensure important species and habitat restoration sites are identified as priority areas to protect when unplanned ignitions occur, a fire is inconsistent with current management actions, and plans are in place to provide rapid initial attack and sustained protection efforts. ▶ Prioritize assigning resource advisors to work with fire suppression and management crews when activities are occurring around Core Areas and species and habitat restoration sites. ▶ Engage with fire districts, landowners, and other stakeholders to identify PCLs. ▶ Incorporate data from the Quantitative Wildfire Risk Assessment (QWRA) for the region. Also contribute input to the development of the next QWRA update regarding identification of Highly Valued Risks and Assets (HVRAs) associated with priority shrubsteppe habitat areas as well as relevant POD data.	**i** Information and Planning
	WF2	**Collect and maintain data on fire occurrence, ignition source, extent, fire severity, and fire response, in the shrubsteppe to inform future response efforts and landscape management** ▶ Identify DNR as a primary data manager for wildland fire in shrubsteppe landscapes. Develop policies and practices for improving multi-agency sharing of fire data with DNR and build DNR capacity to collect and maintain data on fires. ▶ Refine and coordinate methods among state and federal agencies for mapping fire severity in the shrubsteppe and complete mapping after all fires in shrubsteppe landscapes. Compile fire severity maps annually and report total acres burned by severity class, habitat classification (core, growth, connective) and trends. ▶ Collect, analyze and report spatial cross-jurisdictional fire ignition source data for use in refining strategies and actions to reduce human ignitions and support strategic placement and maintenance of PCLs.	**i** Information and Planning

WILDLAND FIRE MANAGEMENT STRATEGY	**WF3**	**Improve ability to forecast wildfires** ▶ Forecast probabilities via fire weather and fuel forecasting at meaningful spatial and temporal management scales across the shrubsteppe to better inform proactive management/mitigation actions (e.g., fire restrictions) during periods where high severity fires are likely. ▶ Use existing fire risk modeling in forecasting for shrubsteppe landscapes. ▶ Increase the number of Remote Automatic Weather Station (RAWS) sites in the shrubsteppe landscape to better inform management to achieve WSRRI goals and objectives. Maintain and calibrate RAWS stations.	Information and Planning
	WF4	**Improve inter-agency communication during fire response** ▶ Develop systems to ensure all fires in the shrubsteppe are reported to a dispatch center, documented and mapped appropriately. ▶ Support better integration of radio frequencies among fire response agencies and aircraft operating on responses in the shrubsteppe landscape which is often served by rural fire districts with limited radio capacity and potentially limited radio tower coverage.	Information and Planning
	WF5	**Improve multi-agency fire data sharing** ▶ Develop and implement policies for improving sharing of fire data across agencies, including through the NIFC Enterprise Geospatial Portal (EGP) and DNR. ▶ Ensure fire data reporting and sharing practices are included in wildland fire response-related inter-agency agreements.	Policy and Permitting
	WF6	**Expand fire management coverage on currently unprotected and under-protected lands which are largely in the shrubsteppe landscape** ▶ Ensure that all lands in Washington's shrubsteppe have an assigned fire response entity with the mandate, jurisdiction, authority and capacity to respond to wildland fire. ▶ Amend 76.04 RCW to assign DNR authority to provide wildland fire protection on all wildlands in Washington, extending protection to approximately 385,000 acres of land in eastern Washington which currently does not have established wildland fire protection. ▶ Have DNR identify and develop contracts and agreements with local fire protection agencies to provide initial attack response where possible.	Policy and Permitting
	WF7	**Facilitate the development of policies within land management agencies with jurisdiction over shrubsteppe landscapes** for incorporating fire management and restoration actions consistent with WSRRI Long-Term Strategy into delegations of authority to incident management teams managing fires on their lands ▶ Expand the actions taken during Fire Suppression Damage Repair to include actions that support shrubsteppe restoration where feasible. ▶ Avoid actions in Fire Suppression Damage Repair that may negatively impact shrubsteppe restoration. ▶ Determine if changes to current Washington law are needed to facilitate inclusion of ecological restoration activities in Fire Suppression Damage Repair phase and make recommendations if changes are needed.	Policy and Permitting

WILDLAND FIRE MANAGEMENT STRATEGY	**WF8**	**Facilitate the development of policies within land management agencies with jurisdiction over shrubsteppe landscapes for incorporating fire management and assessments for restoration actions consistent with WSRRI Long-term Strategy into the Burned Area Emergency Response assessment, Emergency Stabilization and analogous state assessment and recovery processes**	Policy and Permitting
	WF9	**Facilitate consistent coordination among all entities implementing fire planning and response in the shrubsteppe landscape** ▶ Develop agreements between and among federal and state agencies and local/county fire districts to facilitate funding and implementation across the shrubsteppe. ▶ Establish a work group to coordinate fire detection and reporting between agencies. ▶ Ensure collaboration and understanding across agencies in implementation of PODS, including during pre-season meetings, trainings and fire response team in-briefings.	Organization and Governance
	WF10	**Increase capacity to plan and respond to wildfire in the shrubsteppe** ▶ Prioritize increasing initial and sustained attack capacity that provides protection for Core Areas, species and habitat restoration sites. ▶ Build DNR capacity to protect currently unprotected lands. ▶ Increase capabilities for detecting fire starts in the shrubsteppe, such as deploying detection camera systems. ▶ Increase fire management capacity to reduce initial attack response time to less than one hour for first resource on scene. ▶ Enhance abilities and capacities of local and rural fire districts to respond to fire in the shrubsteppe. ▶ Increase capacity to collect fire related data to support planning and response (see above).	Capacity and Training
	WF11	**Provide learning opportunities for fire managers related to:** ▶ WSRRI Spatial Priorities (Core Areas, Growth Opportunity Areas, Corridors and Other Habitat) ▶ Identified species critical habitat (federal, local jurisdiction); ▶ PODs ▶ Fire response specific to shrubsteppe environments for DNR and rural fire districts serving shrubsteppe landscapes ▶ Training on planning and implementing fire ignitions during suppression activities in the shrubsteppe that minimize detrimental impacts to shrubsteppe habitats and support the goals of conservation and restoration	Capacity and Training
	WF12	**Develop and provide Burned Area Emergency Response (BAER) teams with specific guidance for shrubsteppe restoration and conservation after fire**	Capacity and Training

WF13	**Reduce the number of human-caused fire starts in shrubsteppe landscapes through outreach and education** ▶ Increase enforcement and engagement for corrective actions (e.g., burning during a burn ban). ▶ Conduct regular language-accessible public awareness campaigns regarding the risk of fire in the shrubsteppe. ▶ Engage transportation departments, electric utilities/transmission line operations and railroads to ensure fire preventative best practices along rights-of-ways in shrubsteppe landscapes. ▶ Review fire ignition source data annually to refine ignition prevention outreach and engagement strategies specific to shrubsteppe landscapes.	Outreach and Education
WF14	**Increase awareness of shrubsteppe fire risk and ecology** ▶ Work with all participating partners to amplify outreach and education impact with landowners, managers and visiting public.	Outreach and Education
Conducting pre-fire fuels reduction		
WF15	**Develop the necessary information and guidance for managing fuels to reduce the risk of unplanned, high-severity fires, consistent with ecosystem management objectives and support the use of prescribed and managed fire, in addition to other fuels management approaches, in shrubsteppe landscapes** ▶ Map priority shrubsteppe lands where fire return intervals can be restored to more natural regimes and areas where it currently cannot. Update this regularly. ▶ Identify and prioritize areas in need of pre-fire fuels reduction. ▶ Identify areas where cheatgrass is dominant and prioritize treatment.	Information and Planning
WF16	**Use PODs for fuels mitigation planning** ▶ Establish and implement a holistic, landscape scale vegetation management plan that manages age class and distribution of shrub species across the shrubsteppe landscape. ▶ Restore natural fire return intervals using prescribed and unplanned ignitions on priority shrubsteppe lands where it is appropriate.	Information and Planning
WF17	**Where consistent with ecosystem and wildlife habitat goals, promote and incentivize fuels management and fire resilience practices on private lands** ▶ Promote these practices in federal incentive programs, such as the Conservation Reserve Program, where they are consistent with ecosystem management goals. ▶ Provide incentives for these practices on private lands where management would not result in loss of important wildlife habitat.	Policy and Permitting
WF18	**Work collaboratively with ranching NGOs and livestock producers to support and provide incentives for the use of prescribed fire and other fuels management tools on grazing lands.** ▶ Provide BMPs and other technical support to NGOs and livestock producers for employing prescribed fire.	Policy and Permitting
WF19	**Clarify regulations, policies, and planning steps for the use of prescribed and managed fire.** ▶ Clarify burn plan development and implementation process with permitting agencies, practitioners and land managers.	Policy and Permitting

(Left vertical heading:) WILDLAND FIRE MANAGEMENT STRATEGY

WILDLAND FIRE MANAGEMENT STRATEGY	**WF20**	**Develop model agreements appropriate for shrubsteppe landscapes for DNR, local, federal, and non-profit partners to put into place to ensure resources are readily accessible and interoperable when conditions are right for prescribed fire**	Policy and Permitting
	WF21	**Establish crews with capacity to implement fuels mitigation with specific training for implementation in shrubsteppe environments** ▶ Work with the Washington Prescribed Fire Council to set up crews to implement pre-fire action in the shrubsteppe.	Capacity and Training
	WF22	**Build capacity for post-fire vegetation management (see Restoration Strategy).**	Capacity and Training
	WF23	**Increase coordination in landscape level prescribed fire (Rx) planning in the shrubsteppe** ▶ Increase training to ensure a competent interoperable Rx practitioner workforce. ▶ Increase and coordinate regional National Wildfire Coordinating Group (NWCG) training opportunities. ▶ Build on the DNR certified burner program. ▶ As appropriate, support participating and holding Prescribed Fire Training Exchanges (TREX) or having burn sites where TREX could be implemented in shrubsteppe landscapes. ▶ Research and identify potential interest and development of Prescribed Burn Associations (PBA's). PBAs could be used as a mechanism to support private landowners in helping each other to safely use Rx fire to meet mutual objectives.	Capacity and Training
	WF24	**Establish an equipment pool available for use by agricultural lands owners for fuels treatment work**	Resources and Equipment
	WF25	**Increase social acceptance of Rx fire in communities located in the shrubsteppe**	Outreach and Education

		Improving community fire protection	
WILDLAND FIRE MANAGEMENT STRATEGY	**WF26**	**Implement Potential Operational Delineations (PODs) and Potential Control Lines (PCLs) for fuels management, wildland fire preparedness, and wildland fire response planning and ensure collaboration and understanding across agencies** ▶ Use Potential Operational Delineations (PODs) for supporting prioritization of community protection actions. ▶ Further refine identification and prioritization of values at risk. ▶ Identify and prioritize various fuel treatments and maintenance schedules. ▶ Further refine identification and prioritization of areas for treatment to improve structure resistance to wildland fire. ▶ Integrate across planning efforts to increase coordination, efficiency and effectiveness.	**ⓘ** Information and Planning
	WF27	**Complete an assessment of existing Community Wildfire Protection Plan (CWPP) coverage** ▶ Identify communities within the shrubsteppe that do not have a current plan. Identify which of these communities are classified as underserved, highly impacted, or ESL.	**ⓘ** Information and Planning
	WF28	**Collect information to support community fire planning** ▶ Identify a database structure to track community fire planning and resistance and resilience actions across the shrubsteppe and connect with the Forest Health Tracker. Identify which communities and towns within the shrubsteppe need support with CWPPs or the wildfire section of a fire hazard plan and other FAC plans. Communicate this to the DNR Community Resiliency Program and the SCC. ▶ Track fire response time data in the shrubsteppe. ▶ Identify and develop central contact list for Community Emergency Managers within the shrubsteppe. ▶ Identify and collect information on underserved, highly impacted, overburdened, vulnerable, or ESL communities within or near the wildland fire urban interface to identify local priorities and effective communication and engagement strategies.	**ⓘ** Information and Planning

	WF29	**Support and expand Community Wildfire Protection Planning within the shrubsteppe landscape**	
WILDLAND FIRE MANAGEMENT STRATEGY		▶ Effectively message public awareness of the need for taking individual responsibility for improving safety and preparedness for wildland fire. ▶ Identify and prioritize communities in the shrubsteppe that need fire planning support and communicate this to the DNR Community Resiliency Program and SCC. ▶ Ensure 100% of communities in the shrubsteppe are planning for fire resistance and resilience and have community wildfire protection plans (CWPPs) current to the last 5 years at a county level by 2029. CWPPs should include - ▶ Plans and capacity for community fire protection coordination and implementation. ▶ Areas prioritized for fuels reduction. ▶ Areas prioritized for treatment of structural ignitability. ▶ Increase the total number or percentage of communities in the shrubsteppe that are managing flammable vegetation around the community and in the WUI and are participating actively as Firewise USA Sites. ▶ Increase support for shrubsteppe community participation in the Washington Fire Adapted Community Network. Develop and support shrubsteppe community-focused program initiatives. ▶ Identify opportunities for communities to engage with fire suppression organizations in their planning. ▶ Develop an objective for number of shrubsteppe acres where resistance and resilience has been achieved, as well as how these acres are distributed to produce effective results, for achieving community protection. ▶ Identify opportunities for communities to engage in post-fire planning and implementation. ▶ Support planning by Community Organizations Acting in Disasters (COADs). Identify which provide services for communities classified as underserved, highly impacted, overburdened, vulnerable, or ESL and prioritize them for support. ▶ Increase participation of local municipal parties in planning.	**ⓘ** Information and Planning
	WF30	**Improve data collection during fire response** ▶ Develop systems to ensure all fires in the shrubsteppe are reported to a dispatch center, documented and mapped appropriately.	**ⓘ** Information and Planning
	WF31	**Define and develop dedicated, initiative-wide and local coordinating capacity to support implementation of community fire protection actions and address implementation needs** ▶ Identify existing capacity via agencies, organizations, and community groups across the shrubsteppe landscape. ▶ Define appropriate organization structure and framework to support implementation of existing plans related to community fire protection.	Organization and Governance

WILDLAND FIRE MANAGEMENT STRATEGY	**WF32**	**Support development and continued work of organizations that support community fire protection planning and implementation** These organizations could include: ▶ Community Organizations Acting in Disasters ▶ Conservation districts ▶ Non-governmental Organizations ▶ Resource Conservation and Development Council	Organization and Governance
	WF33	**Strengthen application of Washington's Wildland Urban Interface code** ▶ Encourage local planning departments and municipalities to adhere to the Wildland Urban Interface code. ▶ Develop statewide zoning requirements for wildland fire protection for home development and construction in the Wildland Urban Interface specific to the shrubsteppe.	Policy and Permitting
	WF34	**Increase state resources for local governments, conservation districts, fire districts, and community organizations to work with private landowners and communities to reduce flammable vegetation, harden structures, and create defensible zones around structures** Increase emphasis on aiding those serving communities classified as underserved, highly impacted, or ESL. ▶ Identify which communities and towns need support with CWPPs and other FAC plans. Communicate this to the DNR Community Resiliency Program. ▶ Support communities in accessing funding programs for resilience and resistance actions (e.g., community Wildfire Defense Grants, FEMA funding, wildfire defense fund). ▶ Include information concerning shrubsteppe habitat protection priorities in educational materials and training concerning fuels reduction measures.	Resources and Equipment
	WF35	**Increase grant opportunities and increase support for participation in existing grant programs for wildfire preparedness by residents of communities within the shrubsteppe landscape** ▶ Prioritize aiding organizations that provide support for communities classified as underserved, highly impacted, overburdened, vulnerable, or ESL.	Resources and Equipment
	WF36	**Increase funding for the creation of informational materials, education, and engagement**	Funding
	WF37	**Increase available resources for home hardening inspections and for recommended updates and modifications to increase fire resiliency**	Resources and Equipment
	WF38	**Increase capacity and staff support for effective planning and implementation of CWPPs** ▶ Increase capacity for CWPP planning, preparing updates, and implementing actions identified in CWPPs. ▶ Increase availability of crews (such as Washington Conservation Corps and DNR Camp Crews) available for vegetation or fuels management and community preparedness projects. ▶ Provide training to crews and others to implement actions prescribed in CWPPs.	Capacity and Training

WILDLAND FIRE MANAGEMENT STRATEGY	**WF39**	**Provide effective community training to increase preparedness** ▶ Reach and train community members to increase fire preparedness using tools such as Fire Adapted Communities, Firewise USA sites, wildfire mitigation best management practices, and Wildfire Ready Neighbors. ▶ Increase community engagement in training opportunities by increasing the number of bilingual educators and practitioners for training and implementation.	**Capacity and Training**
	WF40	**Increase awareness and education about community fire protection** ▶ Create materials specific to shrubsteppe wildfire preparedness. ▶ Partner with schools, NGOs, agencies, and local fire districts to educate people about the shrubsteppe ecosystem, how to protect homes and communities from wildland fire and the costs and benefits of prescribed fire. ▶ Create K-12 programs on community fire protection that meet state learning standards and adult education programs. ▶ Support local partners such as fire districts and others to implement fire prevention programs. ▶ Dedicate resources to expand existing programs by organizations that are already active in communities located within the shrubsteppe, particularly those in communities classified as underserved, highly impacted, overburdened, vulnerable, or ESL, to educate community members about how to prepare before, during, and after fire. ▶ Identify and support trusted community partners to help engage communities and provide education. ▶ Provide resources to work with community leaders to prepare them to educate others on this topic.	**Outreach and Education**
	WF41	**Create outreach and education materials using information from Fire Adapted Communities, Firewise USA sites, Wildfire mitigation best management practices, Wildfire ready neighbors** ▶ Implement outreach on resources for home improvement and Wildfire Ready Neighbors assessments.	**Outreach and Education**
		Delivering emergency and post-disaster recovery response resources for working lands	
	WF42	**Improve and better coordinate emergency services for working lands communities in the shrubsteppe** ▶ Include working lands and agricultural communities in emergency planning efforts, including plans for emergency grazing, livestock evacuation and sharing of recovery resources. Develop and maintain pre-disaster emergency plans for livestock producers within the shrubsteppe landscape. Include a plan for livestock evacuation and staging areas in each pre-disaster emergency plan.	**Organization and Governance**
	WF43	**Establish a centralized communication mechanism during emergencies** ▶ Establish a clearinghouse resource during emergencies to serve as a "one-stop shop" to increase accessibility of information for livestock producers and farmers. Identify a person within the pilot grazing network or community to serve as the coordinating point of contact during emergencies and to serve as liaison to consolidate available resources, develop informational materials, and connect livestock producers with federal, state, and local assistance resources.	**Organization and Governance**

	WF44	**Establish clear emergency grazing resources** ▶ Develop a grass banking plan in each pre-disaster emergency plan, with identified potential locations for livestock producers to take animals to temporarily access grazing while resting burned pastures to allow for recovery (i.e., CRP, cover crop, cropland, neighbors).	**ⓘ** Information and Planning
	WF45	**Develop training and counseling resources for natural resource professionals** ▶ Provide trauma training or counseling for natural resource agency personnel on how to interact with those in emergencies. Ease the mental health burden for natural resource professionals when assisting victims in emergencies, possibly through partners like the Red Cross.	**👤** Capacity and Training

Field enrolled in Conservation Reserve Program.   M. Atamian

7. Organization and Governance Plan

WSRRI's anticipated organization provides a structural blueprint for realizing the conservation goals of the Strategy and its governance is important for effective oversight. Below is a detailed diagram and description of a conceptual comprehensive governance and management structure, including an ongoing Steering Committee, a WSRRI Program Manager, an Advisory Group, and Regional Implementation Teams. Bolstered by technical, resource, and financial support afforded by the legislature and through WDFW, DNR and SCC, these groups and individuals (further described below) form the backbone of WSRRI's efforts to conserve, provide fire protection, and restore shrubsteppe to meet the needs of the state's shrubsteppe wildlife and human communities. We envision that the conceptual structure will mature over the Strategy's 30-year implementation, adjusting and changing to meet the needs of the partners and communities it aims to support.

Strategy Implementation Framework

Regional Implementation

North Central — South Central — East

Lead Representative | Lead Representative | Lead Representative

Example Topical Forums: Restoration, Grazing Management, Community Wildfire Protection and Planning

The Regional Implementation Framework is currently conceptual and will undergo adaptation through a collaborative process.

Governance / Management

Base Funding $1.75 Million/Year

3-year Implementation Work Plan

Steering Committee WDFW, DNR, SCC

Staff Support Program Manager

Advisory Group

Advisory Group

◯ Groups
▢ Staffing

Figure 13. Conceptual Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI) Implementation Framework

THREE-YEAR IMPLEMENTATION WORK PLAN

To complement and facilitate the implementation of WSRRI's overarching 30-year vision of a resilient landscape achieved through collaborative partnerships for the benefit of wildlife and human communities, we will develop iterative and regularly updated implementation work plans that outline specific actions, and short-term steps to be taken towards those actions. Further, these work plans will encompass federal, state, and partner actions, clearly identifying roles and responsibilities. Short-term work plans will ensure that the 30-year strategic objectives for the conservation, restoration, and resilience of Washington State's shrubsteppe wildlife and ecosystems are translated into specific, actionable steps.

Work plans will be developed by March of each biennium's first fiscal year to ensure there is adequate time to integrate identified priorities into agency legislative requests and partner legislative agendas for the subsequent biennium. To achieve this outcome, a work plan will be developed every 2-years (due in March of even numbered years), but each will span a 3-year duration (second fiscal year of first biennium + both fiscal years of subsequent biennium; e.g., July 2024 – June 2027). Every 2-years, the current work plan will be revisited, with the third year updated as year one of the next 3-year work plan; each new work plan will be accompanied by a report of the prior biennial accomplishments (Figure 14). The 3-year implementation work plan will inform resource needs, including plant materials, equipment, capacity and funding, and help to prioritize distribution of those resources across the shrubsteppe landscape (Figure 15).
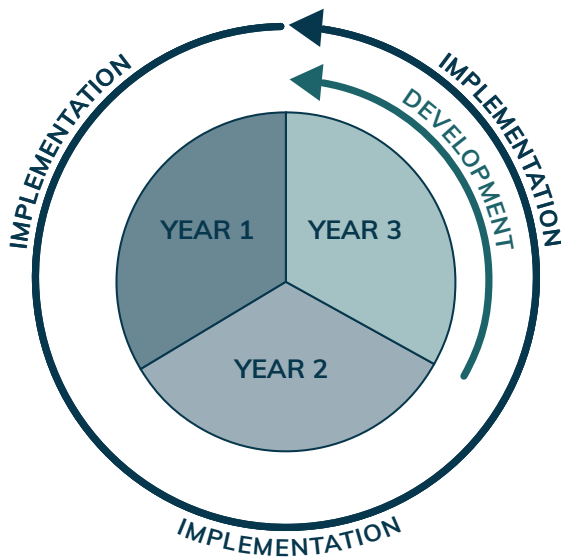
Figure 14. WSRRI 3-year work plan cycle
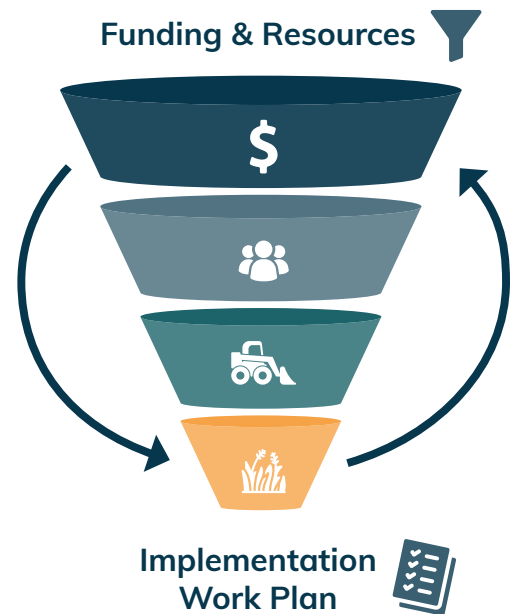
Figure 15. The WSRRI 3-year implementation work plan will inform resource needs and help prioritize distribution.

WSRRI STEERING COMMITTEE (WDFW, DNR, SCC)

The Steering Committee, comprised of representatives from WDFW, DNR, and SCC, has and will continue to play a pivotal role in providing strategic direction and decision-making in development of the Strategy, and looking forward, in its implementation. This committee ensures WSRRI's work remains true to the original spirit and intent of the collaboration of the three agencies and the investment by the Washington Legislature in this work. The Steering Committee will be responsible for collaboration necessary to align WSRRI priorities with state agencies, Tribes, and other partners responsible for natural resource conservation and wildland fire resiliency in the shrubsteppe landscape. This includes the integration of WSRRI considerations into agency Legislative requests based on the 3-year implementation work plans and the approval of programmatic priorities, processes, and procedures. The Steering Committee also serves as the governing body, ensuring that timely adaptive management of the Strategy occurs.

WSRRI PROGRAM MANAGER

The WSRRI Program Manager will play a leading role within WSRRI, advancing WSRRI's objectives by ensuring seamless implementation coordination. The Program Manager will oversee various functions, including facilitating collaboration between the Steering Committee, the Advisory Group, and Regional Implementation Teams to establish current priority actions, processes, and procedures; monitoring and reporting on WSRRI progress; and managing overall communications. Additionally, the Program Manager will facilitate and support the development of implementation work plans, engage in grant development and management to support strategic action implementation, and facilitate the design of monitoring and adaptive management plans. This role may also include facilitating topical forum discussions across Regional Implementation Teams and program-wide to encourage collaboration and effective problem-solving.

ADVISORY GROUP

The Advisory Group, a diverse body comprising representatives from state and federal agencies, Tribes, community members, farmers and ranchers, agricultural interests, funding organizations, subject matter experts, and other various stakeholders, will provide valuable input, expertise, and feedback, ensuring a comprehensive and inclusive perspective in advancing WSRRI's objectives. This group will advise the WSRRI Program Manager and Steering Committee on current priorities, processes, and procedures formulated based on work plans. Additionally, the Advisory Group can assist with securing funding, recommend priorities and criteria for allocating resources within WSRRI, and provide input to Regional Implementation Teams and recommend policy changes to the Steering Committee. The Advisory Group's collective wisdom and collaborative efforts are instrumental in guiding WSRRI towards its conservation and restoration goals.

REGIONAL IMPLEMENTATION TEAMS

While still conceptual, Regional Implementation Teams, comprised of key partners from existing conservation networks and frameworks already engaged in shrubsteppe management, will be integral to locally implementing the Strategy. Building on already existing partner capacity and work, but integrated into and supported by the WSRRI organization structure, these teams, with strong support from their Lead Representatives (see below) will create regional implementation work plans, pursue funding for region-specific needs, implement restoration and wildland fire resiliency projects and outreach, work with landowners and community members, and conduct additional activities tailored to the distinct characteristics of each region, all in line with overarching WSRRI goals and objectives. These teams, in close collaboration with local stakeholders, Tribes, landowners, and communities, will be vital in driving effective on-the-ground conservation and restoration, ensuring the success of WSRRI. The organization of these regional groups, currently conceived as three, representing the East, North Central, and South Central areas of the shrubsteppe landscape, may be phased in over time.

Within the Regional Implementation Teams, Lead Representatives will foster collaboration, coordination, innovation, and inclusive engagement, and support Regional Implementation Teams in creating work plans, pursuing funding, and other activities. These individuals will serve as dedicated points of contact for each regional team, ensuring that key practitioners are represented, and that their priorities and expertise are channeled effectively into the development and execution of regional implementation work plans.

Lead Representatives will convene and facilitate information exchange between Tribes, stakeholders, experts and partners across their region, and will collaborate closely with the WSRRI Program Manager to align the Region's priorities with the overarching strategy, and ensure that regional needs and priorities are well integrated into the broader framework. In some cases, a member or members of already existing forums may fulfill the role of Lead Representatives.

TOPICAL FORUMS

Topical Forums, a dynamic component of WSRRI, are expected to bring together subject matter experts from across Regional Implementation Teams and the WSRRI partner network, to address specific management issues or opportunities critical for effectively implementing the WSRRI strategy. Such issues or opportunities may include grazing management, restoration implementation, novel invasive species control approaches, and others. Topical forums may be suggested at any level of the WSRRI organizational structure and will likely be convened by the WSRRI Program Manager. Topical Forums will serve to share information, address concerns and solve problems across regional implementation teams and the WSRRI network as a whole.

ACTIONS:

To develop an effective governance structure for WSRRI, the following actionable steps should be considered:

1. **Establishing Steering Committee Consolidation and Empowerment:**
   - ▶ Formalize the roles and responsibilities of the Steering Committee members in an agency Memorandum of Agreement/Understanding between WDFW, DNR, and SCC.
   - ▶ Streamline regular meetings and decision-making processes.
   - ▶ Ensure a mechanism exists between the three agencies for shared resources efficiency.
   - ▶ Work with the WSRRI Program Manager to develop a mechanism for soliciting and integrating input from the Advisory Group and Regional Implementation Teams.
   - ▶ Establish a multi-agency community engagement plan for WSRRI implementation.

2. **Operationalizing the WSRRI Program Manager Role:**
   - ▶ Define the Program Manager's responsibilities, including liaison roles, programmatic oversight, and communication management.
   - ▶ Establish expectations and protocols for collaboration with and between the Steering Committee, Advisory Group, Regional Implementation Teams, and other staff, and formalize these expectations and protocols in a WSRRI governance plan.
   - ▶ Implement a system for monitoring and reporting progress towards goals and objectives.

3. **Establishing the Advisory Group:**
   ▶ Formalize the roles and responsibilities of the Advisory Group through the development of a group charter.

   ▶ Define the selection criteria for diverse representatives, considering fostering environmental justice and equity.

   ▶ Develop a framework for the Advisory Group to provide input into WSRRI Implementation as appropriate per the Advisory Group charter.

   ▶ Facilitate regular interaction between the Advisory Group and the Steering Committee.

4. **Forming Regional Implementation Teams (RIT):**
   ▶ Establish criteria and a process for the selection of Regional Implementation Team Lead Representative and guidance for assembling RIT composition, ensuring representation of local interests, expertise, and environmental justice and equity.

   ▶ Develop a structured approach for creating regional work plans.

   ▶ Implement a process for securing and allocating funding for region-specific projects.

   ▶ Initiate a comprehensive assessment to identify regions with urgent conservation needs and readiness for action. Prioritize these areas based on ecological significance, stakeholder engagement, and potential for impactful outcomes.

   ▶ Develop and implement a phased rollout plan. This plan should be flexible, allowing for adjustments based on evolving environmental conditions, stakeholder feedback, and the success of early implementations.

   ▶ Establish a dynamic feedback mechanism to continuously evaluate and adapt the phasing strategy, leveraging insights gained from initial rollouts to inform the expansion to other regions.

5. **Integrating Lead Representatives in Regional Teams:**
   ▶ Define the selection process for Lead Representatives in each region.

   ▶ Establish a communication protocol (see WSRRI-wide communication plan) between the Lead Representatives, Program Manager, Tribes, and stakeholders.

   ▶ Create an efficient mechanism for regular reporting and feedback to the Program Manager from Lead Representatives.

6. **Convening Topical Forums:**
   ▶ Identify topics requiring specialized attention on an ongoing basis as Strategy implementation moves forward.

   ▶ Integrate insights from Topical Forums into the broader Strategy as part of both implementation of the Strategy and to inform adaptive management cycles.

7. **Enhancing WDFW, DNR, and SCC Agency Support:**
   ▶ Tailor support teams and resources to the specific needs of WSRRI regions.
   ▶ Where appropriate, develop a flexible deployment strategy for expert coordinators, technicians, and field crews.
   ▶ Regularly evaluate the effectiveness of support provided and adjust as necessary.

8. **Securing and Managing Funding:**
   ▶ Outline a clear funding strategy, including sources, allocation, and management.
   ▶ Develop and maintain a catalog of potential funding sources for WSRRI and a process and criteria for selecting funding opportunities to pursue.
   ▶ Implement a robust monitoring and reporting system to track the utilization and impact of WSRRI resources and services.

9. **Ensuring Continuous Review and Adaptation:**
   ▶ Establish a regular review process for the entire governance structure.
   ▶ Implement a feedback mechanism to incorporate learnings and adapt strategies.
   ▶ Ensure that governance adaptations align with the overarching 30-year vision of WSRRI.

10. **Fostering Collaboration with Tribes:**
   ▶ Nurture communication pathways to ensure strong collaboration opportunities.
   ▶ Establish a forum for regular information sharing on updates, successes, and challenges.
   ▶ Work together to solve problems and achieve shared goals.

11. **Encouraging Stakeholder Engagement and Communication:**
   ▶ Develop a comprehensive communication plan to engage all stakeholders.
   ▶ Create platforms for sharing information, updates, and successes of WSRRI.
   ▶ Foster a culture of transparency, inclusivity, and collaboration.

PROGRAMMATIC WSRRI PROJECT IDENTIFICATION PROCESS

In WSRRI's initial two years of project implementation, we primarily identified projects through formal solicitations for project applications from partners, landowners and Tribes. Moving forward, in addition to general solicitations for project proposals, and particularly for habitat restoration, WSRRI will take a pro-active approach to identify highly valuable projects across the landscape, plan them in concert with landowners, and solicit input to ensure that the projects are poised to be effective. Then, as appropriate, WSRRI will take a lead role in implementing those projects.

Key steps to develop such an approach:

1. **Establish a Clear Process for Project-based Resource and Service Delivery:**
   ▶ Develop clear criteria for identifying and developing projects, including criteria for prioritizing what kinds of projects will have the highest priority. These should align with WSRRI long-term goals, focusing on habitat protection, restoration, species management, fire management, working lands support, and community engagement.
   ▶ Prioritize projects with the greatest potential contribution to shrubsteppe restoration and conservation, with emphasis on delivering value to wildlife, especially to SGCN.
   ▶ Ensure that WSRRI projects follow spatial priorities, but also allow for flexibility to respond quickly to new wildfires.

2. **Engage Existing Capacity to Identify, Plan, and Execute Projects:**

   ▶ Collaborate widely to convene teams of public employees and other WSRRI partners to generate complete projects that align with WSRRI priorities as above.

   ▶ Ensure that as new positions join WSRRI, they immediately are assigned roles within project teams.

   ▶ Seek to diversify expertise within these teams to facilitate robust, comprehensive project designs that are likely to succeed.

3. **Develop a Transparent Project Review Process:**

   ▶ Assemble groups of shrubsteppe stakeholders and Tribes to review projects, ensuring that WSRRI's resources are spent wisely. Strive for wide participation that includes natural resource scientists, public employees of WSRRI, private landowners, Tribes, conservation groups, and community organizations.

   ▶ Require clear, measurable outcomes for projects. Support stakeholder and Tribal review groups by carefully facilitating group meetings so they are organized and efficient.

4. **Facilitate Collaboration and Leverage Additional Funding Sources:**

   ▶ Encourage projects that bring together multiple stakeholders and Tribes, leveraging additional funding sources and in-kind contributions to maximize impact.

   ▶ Expand WSRRI's capacity by identifying and securing supplementary funding sources, including government grants, private donations, and public-private partnerships.

5. **Regularly Review and Adapt the Project Generation Process:**

   ▶ Establish a regular review mechanism to evaluate the effectiveness of the project generation process and the impact of supported projects.

   ▶ Remain adaptable, updating the project generation strategy as needed to respond to changing conditions in the shrubsteppe landscape and evolving conservation priorities.

The proposal solicitation and generation process will be refined to encourage contributions from diverse groups and individuals seeking innovative and impactful projects that align with WSRRI goals. Local communities, ecological experts, and conservation groups will be key contributors, with coordinators and partners aiding in designing effective proposals.

8. Monitoring and Adaptive Management Plan

The actions in the WSRRI Long-Term strategy will be implemented over a 30-year period in the face of uncertain climate conditions, natural disturbances, socio-economic changes, and shifting demands on natural resources. Monitoring the implementation and effectiveness of these actions is essential to ensure that conservation partners meet our collective management objectives. Adaptive management is an approach to management that emphasizes structured learning through decision making for situations where knowledge is incomplete, and managers must act despite uncertainty regarding management outcomes (Walters, 1986).

The Adaptive Management process (Figure 16) is often depicted as a cycle and uses a set of steps to evaluate a problem and integrate monitoring and evaluation into management, often as an iterative process (Leffler & Sheley, 2012; Allen et al., 2017). Adaptive management focuses on learning and adapting through partnerships of managers, scientists and others to learn together how to create and maintain sustainable resource systems. A big part of the adaptive management cycle is dependent on reliable data to inform evaluation and adjust the strategy's conservation actions. Therefore, for each major goal and associated objectives, metrics have been proposed to track progress towards achieving the goals.

Adaptive Management Process
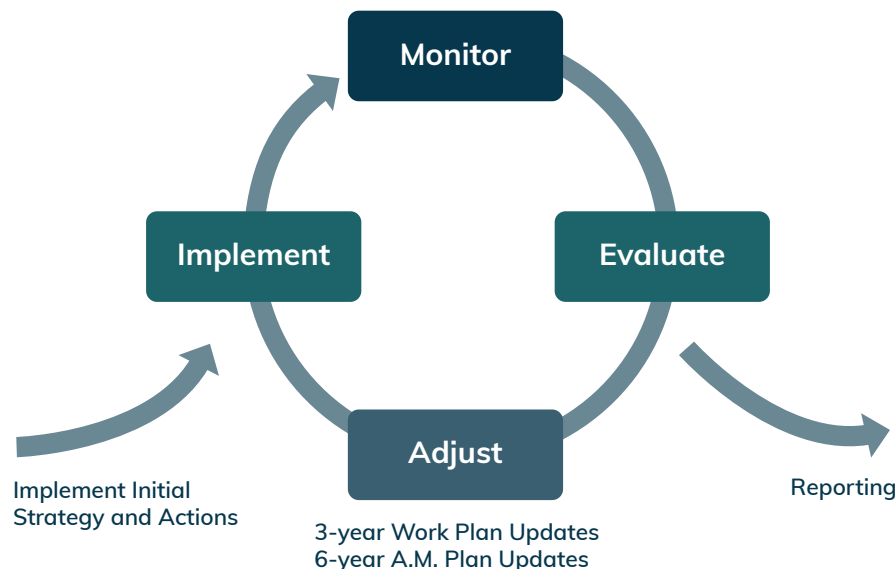
Figure 16. Adaptive Management process. Work plan and adaptive management plan updates represent opportunities to adjust during implementation.

The purpose of this monitoring and adaptive management section are to:

1. Introduce metrics, their various spatial and temporal qualities, and the metric types that WSRRI will use for tracking progress toward objectives; and
2. Provide the full suite of potential metrics discussed for WSRRI application.

The monitoring and adaptive management plan, including metric selection, will be refined as part of the first Implementation Plan.

METRICS

Potential metrics for WSRRI (Table 11) were identified collaboratively through the development of the Strategy.

Metrics are used to evaluate progress toward achieving the goals and objectives and whether the actions have the desired effect. Metrics were defined for each objective in the Strategy, with a particular focus on leveraging existing, ongoing monitoring within agency programs that also addresses the needs of this plan. Metrics can be measured at multiple spatial and temporal scales.

▶ **Spatial Scale**

Many metrics will be tracked at the landscape scale (i.e., one measure for the Columbia Plateau or shrubsteppe landscape as a whole), but where appropriate, smaller scales (e.g., county, site) will be applied.

▶ **Temporal scale**

While most metrics can be tracked on an annual basis, some metrics require longer time scales to assess actual outcomes. Shrubsteppe and rangeland systems are dynamic systems influenced by multiple disturbances, and metrics will not necessarily trend in a linear fashion from year to year, and longer temporal scales are advised (Allen et al., 2017). Monitoring frequency will be explicit to each selected metric.

The potential WSRRI metrics fall into four broad categories:

1. **Participation**

These metrics assess landowner, community, and partner engagement in programs important for shrubsteppe conservation, planning and wildfire resilience. Participation metrics can be used to assess if enough programs are being utilized.

2. **Spatial**

These metrics track the implementation of conservation practices across the landscape, with an emphasis on where practices have been implemented. Programmatic metrics are often paired with Participation metrics. To the extent possible, implementation data should be made spatially explicit– in other words, where are these conservation efforts taking place on the landscape? In addition, spatially explicit implementation data will allow staff using TerrAdapt spatial assessments to test if they can detect a response of management actions using remote sensing data.

3. **Habitat**

These metrics track changes in habitat or ecological quality. Metrics may be appropriate at both site and landscape scales and are dependent on the land management action and specific strategy objective. Metrics may come from a variety of sources such as on the ground field sampling or remote sensing data sources (e.g., aerial imagery or satellite imagery).

a. **Landscape**

TerrAdapt can measure changes in the ecological integrity score (Dry-Xeric and Wet-Mesic) and habitat suitability (greater sage-grouse) across Core Areas, Growth Opportunity Areas, Corridors, and Other Habitat for each of the conservation targets. TerrAdapt as well as other satellite products (e.g., Monitoring Trends in Burn Severity (MTBS)) can also provide estimates on important plant functional groups related to habitat and fire risk such as sagebrush cover or annual grasses. These metrics will be used to help demonstrate our effort to "defend the core, grow the core, and connect the core."

b. Sub-Landscape

TerrAdapt, and other remotely sensed products, as well as field data, can provide estimates across large areas (tens of thousands of acres) within the project boundary (e.g., county, watershed, wildlife area scale). Using metrics within specific geographies within the Columbia Plateau provides a clearer understanding about how the system may be responding to different strategy actions.

c. Site

Field data and/or higher resolution imagery (e.g., NAIP, drone data) can measure habitat and ecological attributes associated with specific conservation and restoration action. For example, monitoring vegetation recovery after prescribed fire, monitoring restoration or weed treatment effectiveness.

d. Field validation data

With many ecological metrics the decision-making framework should allow for and rely on multiple lines of evidence. Using both remotely sensed and on the ground data (e.g., NRI, AIM), as well as each dataset's uncertainty and bias are important to guide the adaptive management cycle. Additionally, field data can help to validate and improve remotely sensed data products over time.

5. Wildlife

These metrics track the success of the Species Management Strategy by tracking status of species populations. Recognizing that habitat is a key factor influencing wildlife populations, the above habitat metrics are also informative for species management. WDFW performs a status review for state-listed species every five years that includes recommendations for status classifications, including uplisting, downlisting, and delisting. WSRRI uses these changes in classification as a metric for tracking progress towards achieving recovery goals. For SGCN that are not state listed, WDFW prepares a new SWAP every 10 years that provides a qualitative assessment of the species status; the latest SWAP was conducted in 2015. Finally, species-specific metrics may apply such as appropriate demographic and/or habitat indicators such as occupancy, distribution, abundance, the extent and quality of habitat.

Work Plan updates are currently scheduled for every three years (see the Organization and Governance section for more details). Appendix E describes the first Work Plan (2024-2026), which includes refinement of metric selection. Once finalized, Monitoring and Adaptive Management Plan reviews will take place every six years. During these planned reviews, metrics will be evaluated relative to WSRRI objectives and scientific advancements, and any new information will be incorporated into planning efforts. If needed, actions and strategies will be adjusted.

Table 11. Potential metrics for each goal and objective.

Objective	Outcomes	Potential Metrics
GOAL #1: Human communities in the shrubsteppe are better protected, prepared, and resilient to wildland fire, engaged in shrubsteppe conservation, and economically viable.		
Objective 1 - Community Wildland Fire Resistance and Resilience	Ensure all human communities in the shrubsteppe are engaged in, aware of, and planning for fire resistance, resilience, and recovery by 2029.	Percent of counties have county-wide CWPPs by 2029. Currently all but two counties have CWPPS, but some are >10 years old.
		Percent of projects/actions identified in county-wide CWPPs that have been completed (i.e. fire lines and fuel treatments).
		Number of wildfire education actions executed under CWPPs including informational events, youth programs, developing response plans, and fire-resistant landscaping education.
Objective 2 - Community Damage	Reduce the present day adjusted dollar amount of damage, number of structures burned, and families displaced resulting from wildland fires in the shrubsteppe landscape below the 10-year average by 5 % for 10 consecutive years beginning in 2029.	Annual damage in dollar value from DNR damage/fire reports, USDA damage assessments, and from insurance industry reports (10-year average).
		Number of structures burned (10-year average).
		Number of families displaced (10-year average).
Objective 3 - Landowner Engagement	Establish a baseline and increase the number of local landowners engaged in conservation efforts across the shrubsteppe landscape aiming for 15 % increase by 2029.	Percent of acres of private land where Core Areas exist for each conservation target (greater sage-grouse, Dry-Xeric ecosystem, Mesic-Wet ecosystem, and Combined).
		Number of landowners and acres actively engaged in long-term protection measures through voluntary incentive programs.
		Total acres of private land protected through conservation easements.
Objective 4 - Working Lands	Increase support for working lands to enhance contribution to shrubsteppe wildlife conservation while remaining economically viable.	Acres of public and private "working lands" where Core and Growth Opportunity Areas exist for each conservation target (greater sage-grouse, dry-xeric ecosystem, mesic-wet ecosystem, and combined).
		Number of landowners who receive assistance in implementing deferred grazing practices.
		Total acres of land that has undergone deferred grazing after wildland fires.
		Total acres (public or private) covered by grazing management plans.
		Acres of land actively utilized for farming or ranching (gets to ability to note loss of working lands and/or farmers/ranchers)
		Dollars of damage to agricultural businesses and operations (farming and ranching) that is reported to USDA/FSA is reduced over time.

Objective	Outcomes	Potential Metrics
Objective 5 - Underserved, Highly Impacted, Overburdened, or English as a Second Language (ESL) Communities	Identify underserved, highly impacted, overburdened, or ESL communities located within the shrubsteppe landscape and prioritize them for assistance to become more resistant and resilient to wildland fire.	Number of engagement events held and attendance. Events can be held as standalone by agencies (i.e. the conservation districts) or in partnership with CAFÉ and Nuestra Casa.
		Number of underserved, highly impacted, overburdened or ESL individuals provided with assistance for projects that increase community fire resistance and resilience.
GOAL #2: The extent, frequency, and severity of wildland fire in the shrubsteppe landscape are similar to pre-1800s fire return intervals, while taking into consideration changes in land use, climate, and other modern factors.		
Objective 1- Fire Frequency	Identify the likely pre-1800 fire return intervals on all Core Areas and Growth Opportunity Areas and manage planned and respond to unplanned fire to achieve this frequency in these landscapes by 2053.	Metrics could include the fire return intervals in years for Replacement Fires (High Severity >75 % of canopy burned) and Mixed Fires (Lower Severity <25 %). Track internals in combined prioritization area for the 3 conservation targets and only look at Core Areas and GOAs.
Objective 2 - Fire Severity/ Extent	By 2053, reduce ecological impact from fire by (1) reducing high severity fire to 1% or less of total acres burned in shrubsteppe Core Areas and (2) reducing high severity fire to 5% or less of total acres burned in Growth Opportunity Areas.	10-year average of high severity burn area as percent of total burned acres in Cores and GOAs.
Objective 3 - Human-caused wildfire starts	Reduce the number of human-caused starts annually in the planning area to less than 25% of the 10-year average by 2029.	10-year average of human caused starts as a percent of total wildfire starts.
Objective 4 - Ecological Damage	Reduce the extent of Core Areas burned at high-severity by 5% of the 10-year average per year, for 10 consecutive years beginning in 2029.	10-year average of high severity burn area as percent of total acres burned in Core Areas and GOAs.
GOAL #3: Habitat quantity and quality is increased to support healthy wildlife populations and communities.		
Objective 1 - Core Areas	Through management, grow core areas to achieve a net increase of total core area representation across the Columbia Plateau for each of the conservation targets by 2054: ▶ Dry (xeric) - Increase core area extent to exceed 21.32% of the landscape; ▶ Wet (mesic) - Increase core area extent to exceed 4.66% of the landscape; and ▶ Greater sage-grouse - Increase core area extent to exceed 4.62% of the landscape.	Acres of Core Area for each conservation target (greater sage-grouse, dry-xeric ecosystem, mesic-wet ecosystem, and combined).
		Mean habitat suitability score or ecological integrity score for Core Areas for each conservation target should be increasing over 10-year timeframe. Note TerrAdapt classifies habitat as Low, Medium and High suitability.
		Acres of GOA that have transitioned to Core for each conservation target.

Objective	Outcomes	Potential Metrics
Objective 2 - Growth Opportunity Areas (GOA)	Manage growth opportunity areas to increase core areas and avoid net loss of growth opportunity areas through a) conversion to land uses that do not provide wildlife habitat (e.g., development), and b) degradation of growth opportunity areas to other habitat for each conservation target by 2054: ▶ Dry (xeric) - Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 10.39% of the landscape; ▶ Wet (mesic) - Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 0.95% of the landscape; and ▶ Greater sage-grouse - Avoid net loss of growth opportunity area extent to sources (a) and (b) such that growth opportunity area extent is less than 5.30% of the landscape. ▶ Transition of growth opportunity areas to core areas would reflect progress towards Objective 1.	Total acres of GOA for each conservation target. Mean habitat suitability score or ecological integrity score for GOAs for each conservation target should be increasing over 10-year timeframe. Percentage of the GOAs relative to the overall xeric-dry and mesic-wet ecosystems.

Objective	Outcomes	Potential Metrics
Objective 3 - Other Habitat	Manage other habitat to increase growth opportunity areas and core areas and avoid net loss of other habitat through conversion to land uses that do not provide wildlife habitat by 2054: ▶ Dry (xeric) - Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 11.25% of the landscape; ▶ Wet (mesic) - Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 9.78% of the landscape; and ▶ Greater sage-grouse - Avoid net loss of other habitat to land uses that do not provide wildlife habitat such that other habitat area extent is less than 32.00% of the landscape. ▶ Transition of other habitat to growth opportunity areas and core areas would reflect progress towards Objectives 1 and 2.	Acres of Other shrubsteppe habitat for each conservation target.
Objective 4 - Connectivity	Avoid a net loss of connectivity in all corridors and improve connectivity in key corridors that are central and valuable to the larger network of cores.	Connectivity, Fragmentation and Resistance metrics calculated by TerrAdapt to monitor the overall connectivity within the shrubsteppe landscape. These assessment metrics considers factors like habitat quality, distance between Core Areas, and the presence of corridors. Connectivity metric should be increasing, while Fragmentation and Resistance metrics should be decreasing over time.
		Presence or absence of designated connectivity corridors and their overall health and functionality.
		Acres of corridor with new conservation efforts for each conservation target.
		Mean habitat suitability score or ecological integrity score for corridors for each conservation target should be increasing over 10-year timeframe.
		Wildlife Movement Monitoring: Employ advanced tracking technology (e.g., GPS collars) to monitor the movement of key species and assess their ability to traverse connectivity corridors.

Objective	Outcomes	Potential Metrics
Objective 5 - Unique Habitats	Avoid net loss of unique habitats and features, such as sand dune, talus, Palouse prairie, vernal pools, and others, through conversion to land uses that do not provide wildlife habitat, to support associated SGCN and other wildlife.	Change in area of extent of inland sand dunes in PHS mapping.
		Change in area of extent of talus slope and cliff areas in PHS mapping.
		Habitat Suitability score or ecological integrity score change within Unique habitats areas as mapped by PHS.
GOAL #4: Populations of Species of Greatest Conservation Need are representative, ensuring they can adapt to changing conditions; resilient so they are able to persist despite disturbance; and redundant, such that they can withstand catastrophic events.		
Objective 1 - State Listed Species	Achieve a positive trend toward State Recovery Plan objectives for state listed species by 2050.	Population Number (10-year average)
		Acres enrolled in sharp tailed grouse SAFE/CRP program.
		Breeding Season Population Number (10-year average)
		Number of management units with active leks.
		Acres of greater sage-grouse Core and GOA
		Acres enrolled in greater sage-grouse SAFE/CRP program.
		Population Number (5-year average) in designated Recovery Areas: Sagebrush Flat and Beezly Hills.
		Percent Sagebrush Landcover that overlays species potential range.
		Acres enrolled in pygmy rabbit SAFE/CRP program.
		5-year average of breeding pairs
		Acres enrolled in Ferruginous hawk SAFE/CRP program.
		Population Estimate of breeding pairs.
		Annual recruitment percent
		Mesic habitat suitability within Species Potential Range.
		Expert opinion of status by WDFW.
		Mesic habitat suitability within Species Potential Range.
Objective 2 - Species of Greatest Conservation Need	Stabilize and improve population status of SGCN species by 2050, as indicated by appropriate demographic and/or habitat indicators (e.g., occupancy, distribution, abundance; the extent and quality of habitat).	Track trend in appropriate demographic or habitat indicator such as population size, distribution, occupancy, extent and quality of habitat.
		Number of SGCN with a state conservation plan.
		Areas of Core and Growth Opportunity Area in Mesic conservation target. Compare Winter and Summer Range per WDFW mapping.

9. Conclusion and Acknowledgments

Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI), fueled by legislative support and guided by a three-agency Steering Committee, is committed to preserving and revitalizing the shrubsteppe landscape of Washington State for the wildlife and human communities that call this place home. Success will only occur if the people that steward and live on these lands see their priorities and responsibilities reflected in the Strategy, feel ownership of it, and see value in implementing it. The team developing the Strategy has worked diligently to reflect these priorities and responsibilities in the mission, vision, goals, and actions. We remain committed to understanding how to continuously improve the Strategy to ensure it reflects shared priorities. By balancing strategic wildlife habitat protection and restoration with sustainable working lands management, and engaging a broad range of shrubsteppe communities, stakeholders, and Tribes, the initiative seeks to foster a wildfire resilient and thriving landscape.

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WSRRI Steering Committee members Allen Lebovitz (DNR), Hannah Anderson (WDFW), and Shana Joy (SCC).   Photo: J. Juelson

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Glossary

▶ **Actions**

Actions serve as the more detailed level of implementation in the long-term plan. These are the specific types of activities that implementers will pursue associated with accomplishing the strategies.

▶ **Biome Impacts**

A biome is a large ecological area with distinct flora, fauna, and climate. Biome impacts are those that affect the entire biome, like climate change, which can alter temperature and precipitation patterns across the entire shrubsteppe biome, impacting its overall health and biological diversity.

▶ **Columbia Plateau**

An ecoregion located in eastern Washington and northern Oregon, characterized by shrubsteppe habitats and grasslands with extensive areas of dryland farming and irrigated agriculture (Sleeter et al., 2012). Used interchangeably in the Strategy with shrubsteppe landscape.

▶ **Communities**

▶ **Human Communities**

can be defined in many ways, but often implies a connection to place, including geographic space, that people value.

▶ **Ecological Communities**

refer to a group of species that are commonly found occupying the same geographical area at the same time.

▶ **Conservation Easement**

A conservation easement is a legal agreement between a landowner and a land trust or government agency that limits specific uses of the land to protect its conservation values in perpetuity or for a defined duration.

▶ **Core Areas/Core**

Those areas with significant local amounts of high-quality habitat for one of the conservation targets. Habitat within core areas is highly connected.

▶ **Corridors**

The most efficient connections between Core Areas and between Growth Opportunity Areas, following routes that minimize exposure to unsuitable habitats and movement barriers.

▶ **Corvid**

A member of the bird family Corvidae including crows, ravens, jays, and magpies.

▶ **Ecological Integrity**

The ability of an ecosystem to support and maintain a community of organisms comparable to that of natural and/or undisturbed habitats.

▶ **Ecosystem**

The natural environments in which species of plants and animals live, the interrelationships between them, and their relationships with the non-living physical environment, including water, climate, and soil.

▶ **Ecosystem Function**

Ecosystem function refers to the intrinsic ecological processes and the resultant services that are carried out within an ecosystem. These include biological, geochemical, and physical processes that are critical for the survival of living organisms and the maintenance of biodiversity.

▶ **Environmental Justice**

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, rules, and policies. Environmental justice includes addressing disproportionate environmental and health impacts in all laws, rules, and policies with environmental impacts by prioritizing vulnerable populations and overburdened communities, distributing resources and benefits equitably, and eliminating harm.

▶ **Equity**

A fair and just, but not necessarily equal, allocation intended to mitigate disparities in benefits and burdens that are based on current conditions, including existing legacy and cumulative impacts, that are informed by cumulative environmental health impact analysis.

▶ **Fire Damage**

Fire damage measured by annual damage in dollar value by selected reporting agency (e.g., Insurance Industry Reports).

▶ **Fire Recovery**

Human-led efforts to repair and restore property and natural resources after a fire.

▶ **Fuel Management**

As defined by the Western Association of Fish and Wildlife Agencies (WAFWA), fuel management refers to the strategic manipulation and reduction of combustible materials in forests and wildland areas, such as vegetation and organic matter, that can feed wildfires.

▶ **Fire Intensity**

The amount of energy or heat given off by a fire at a specific point in time, or the energy output from fire.

▶ **Goals**

The high-level descriptors of the outcome you wish to create or produce. Goals are qualitative in nature and describe more of the "what" and "why", versus the quantitative and measurable "how" statement. Goals clearly relate to and deliver on the Vision Statement.

▶ **Growth Opportunity Areas**

Areas with significant local amounts of habitat but in a more degraded condition compared to Core Areas. Habitat within Growth Opportunity Areas is highly connected.

▶ **Highly Impacted Community**

A community designated by the WA Department of Health based on cumulative impact analyses in RCW 19.405.140 or a community located in census tracts that are fully or partially on "Indian country" as defined in 18 U.S.C. Sec. 1151.

▶ **Implementation Work Plan**

These are the specific tasks or activities that implementers of the plan will pursue associated with accomplishing the strategy. Tasks are specific, measurable, time-bound, and clearly deliverable.

▶ **Landscape Impacts**

Changes or disturbances that affect large areas of land, spanning multiple ecosystems or habitats. Landscape impacts often involve alterations in land use, such as urban development or large-scale agriculture, that significantly modify the natural landscape patterns and ecological processes.

▶ **Low-Income**

Household incomes as defined by the department or commission, provided that the definition may not exceed the higher of eighty percent of area median household income or two hundred percent of the federal poverty level, adjusted for household size.

▶ **Mesic**

An environment or habitat containing a moderate or well-balanced supply of moisture throughout the growing season. In WSRRI's spatial priority setting, the mesic ecosystem represents the wetter environments of the region where wetlands, wet meadows, and riparian habitats predominate.

▶ **No Net Loss**

No net loss is a principle commonly applied in environmental management and conservation policy aiming to balance the loss of biological diversity or ecosystems in one area with the restoration, enhancement, or preservation of biodiversity in another, so that the overall quantity and quality remain unchanged.

▶ **Objectives**

An objective is a specific outcome that defines the goal. Objectives lead to quantitative metrics that allow one to measure and track progress to success. More specifically, this is the quantitative WHAT that makes high-level goals more attainable and actionable. Objectives are generally written to be "SMART" – Specific, Measurable, Attainable, Relevant, and Timely.

▶ **Other Shrubsteppe Areas**

Areas of native habitat that are not otherwise included within the boundaries of Core Areas, Growth Opportunity Areas, or Corridors. These areas have not been converted but are likely degraded (e.g., by high human footprint or invasive species).

▶ **Over-Burdened Community**

A geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities as defined in RCW 19.405.020.

▶ **Protection**

Any action that prevents incompatible land uses that cause loss of habitat. Possible actions include land acquisition, conservation easements, land swaps, and management. Protection actions can also be used to allow for restoration of previously degraded habitat.

▶ **Redundancy**

The ability of a species to withstand catastrophic events, characterized by having multiple, resilient populations distributed within the species' ecological settings and across the species' range. It can be measured by population number, resiliency, spatial extent, and degree of connectivity. (USFWS, 2016)

▶ **Representation**

The ability of a species to adapt to changing environmental conditions over time. It is characterized by the breadth of genetic and environmental diversity within and among populations. (USFWS, 2016)

▶ **Resilience**

A general and generic property of systems (in this document, including ecosystems, habitats, human communities, species, etc) that describes the broad ability of a system to regain fundamental structures, processes, and functioning following stresses or disturbances.

   ▶ **Ecological Resilience**

   is a measure of the capacity of an ecosystem to regain its fundamental structure, processes, and function (or remain largely unchanged) despite stresses or disturbances (Chambers et al., 2019)

▶ **Species Resilience**

describes the ability of a species to withstand stochastic disturbance. Species resiliency is positively related to population size and growth rate and may be influenced by connectivity among populations. Generally speaking, populations need abundant individuals within habitat patches of adequate area and quality to maintain survival and reproduction in spite of disturbance (USFWS, 2016).

▶ **Fire Resilience**

refers to the capacity of ecosystems, habitat, species, and human communities to readily recover from wildland fire.

▶ **Resistance**

A general and generic property of systems (in this document, including ecosystems, habitats, human communities, species, etc.,) that describes the broad ability to retain fundamental structures, processes, and functioning despite stresses or disturbances.

▶ **Ecological Resistance**

is the ability of an ecosystem or habitat to retain its fundamental structure, processes and functioning (or remain largely unchanged) despite stresses and disturbances (Chambers et al., 2019).

▶ **Fire Resistance**

is used in this Strategy to refer to the capacity of ecosystems, habitat, species, and human communities to remain largely unchanged when impacted by wildland fire.

▶ **Restoration**

Returning shrubsteppe habitats to those dominated by native species (e.g., perennial grasses, shrubs, forbs). In this plan we use restoration synonymously with enhancement, rehabilitation, creation, or improvement to mean the manipulation of the physical or biological characteristics of a site with the goal of returning natural functions to the lost or degraded native habitat and improving ecosystem resilience.

▶ **Site-Specific Impacts**

Localized impacts that occur at a specific site within a larger landscape or biome. They might include localized pollution, specific construction projects, or targeted land management practices that directly affect a particular area.

▶ **Severity**

Fire severity, or burn severity, refers to the degree of consumption of combustible biomass and surface soil organic matter after a fire, reflecting the impact on ecosystems.

▶ **Shrubsteppe Ecosystems**

The communities of plants and animals in the shrubsteppe landscape and the nonliving things (e.g., soil, air, water) that they interact with. 'Shrusteppe ecosystems' is inclusive of the multiple ecological systems (vegetation communities) that include shrubsteppe, grasslands, mesic systems, and other vegetation communities (https://deptofnaturalresources.app.box.com/v/amp-nh-eco-sys-guide) that occur in the Columbia Plateau.

▶ **Shrubsteppe Habitats**

Used interchangeably with shrubsteppe ecosystems.

▶ **Shrubsteppe Landscape**

Used interchangeably with Columbia Plateau to describe the ecoregion. See Columbia Plateau for definition.

▶ **Species of Greatest Conservation Need (SGCN)**

Washington State list of species identified in State Wildlife Action Plan (SWAP). SGCN is a non-regulatory designation chosen to bring attention to the species before they become more rare or costly to conserve and inclusive of species with protected and classified statuses (e.g., listed species).

▶ **State Wildlife Action Plan (SWAP)**

The SWAP identifies Washington's wildlife and habitats needing conservation attention, the key problems they face, and outlines actions needed to conserve them over the long-term. SWAPs are updated every 10 years. Washington's next SWAP update will be published in 2025.

▶ **Stewardship**

Responsible use, management, and protection of the natural environment through conservation and sustainable practices.

▶ **Strategies**

Strategies serve as an actionable roadmap. They provide a high-level plan to achieve goals and objectives. Strategies describe HOW you plan to carry out your plan and are the highest level of organizing your actions in the conservation planning process.

▶ **Under-represented**

People who come from communities that have experienced exclusion from opportunity or have been disadvantaged because of discrimination or prejudice against a group to which they belong.

▶ **Vulnerable populations**

Population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to: (i) Adverse socioeconomic factors such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and (ii) sensitivity factors such as low birth weight and higher rates of hospitalization. "Vulnerable populations" includes, but is not limited to:

▶ Racial or ethnic minorities;

▶ Low-income populations;

▶ Populations disproportionately impacted by environmental harms; and

▶ Populations of workers experiencing environmental harms.

▶ **Working lands**

The lands used for farming or grazing to support livelihoods

▶ **Xeric**

An environment or habitat containing little moisture; very dry. In WSRRI's spatial priority setting, the xeric ecosystem includes drier environments where sagebrush and perennial grasslands predominate.

List of Acronyms

BAER	Burned Area Emergency Response		**GMA**	Growth Management Act
BAR	Burned Area Rehabilitation		**HVRA**	Highly Valued Resources and Assets
BAS	Best Available Science		**IDIQ**	Indefinite Delivery Indefinite Quantity
BLM	Bureau of Land Management		**IUCN**	International Union for the Conservation of Nature
BMP	Best Management Practices			
BOR	Bureau of Reclamation		**NIFC**	National Interagency Fire Center
CAO	Critical Area Ordinance		**NNL**	No Net Loss
CBO	Community Based Organization		**NRCS**	Natural Resources Conservation Service
CD	Conservation District		**PBA**	Prescribed Burn Associations
COAD	Community Organizations Acting in Disasters		**PBRS**	Public Benefit Rating System
COMM	Washington Department of Commerce		**PHS**	Priority Habitats and Species
			PODs	Potential Operational Delineations
CREP	Conservation Reserve Enhancement Program		**PCL**	Potential Control Lines
CRP	Conservation Reserve Program		**QWRA**	Quantitative Wildfire Risk Assessment
CWMA	Cooperative Weed Management Areas		**RIT**	Regional Implementation Teams
CWPP	Community Wildfire Protection Plan		**SAFE**	State Acres for Fish and Wildlife Program
DAHP	Department of Archaeology and Historic Preservation		**SCC**	Washington State Conservation Commission
DNR	Washington Department of Natural Resources		**SGCN**	Species of Greatest Conservation Need
			SHPO	State Historic Preservation Office
EGP	Enterprise Geospatial Portal		**SPP**	Sustainability in Prisons Program
EJ	Environmental Justice		**SWAP**	Washington State Wildlife Action Plan
ESD	NRCS Ecological Site Descriptions		**TREX**	Prescribed Fire Training Exchanges
ESL	English as a Second Language		**USFWS**	U.S. Fish and Wildlife Service
FSA	Farm Services Agency		**VSP**	Voluntary Stewardship Program
FWHCA	Fish and Wildlife Habitat Conservation Areas		**WDFW**	Washington Department of Fish and Wildlife
GOA	Growth Opportunity Area		**WSRRI**	Washington Shrubsteppe Restoration and Resiliency Initiative

Appendix A.   Proviso Language

(25) $1,175,000 of the general fund—state appropriation for fiscal year 2022 and $1,175,000 of the general fund—state appropriation for fiscal year 2023 are provided solely for the department to restore shrubsteppe habitat and associated wildlife impacted by wildfires.

(a) This funding is intended for the restoration of habitat on public lands as well as private lands by landowners who are willing to participate. The restoration effort must be coordinated with other natural resource agencies and interested stakeholders.

(b) Restoration actions may include - (i) Increasing the availability of native plant materials; (ii) increasing the number of certified and trained personnel for implementation at scale; (iii) support for wildlife-friendly fencing replacement; (iv) support for private landowners/ranchers to defer wildland grazing and allow natural habitat regeneration; and (v) species specific recovery actions.

(c) The department must submit a progress report to the appropriate committees of the legislature on the investments made under this subsection by December 1, 2022, with a final report submitted by September 1, 2023.

(d) Within the amounts provided in this subsection, $250,000 must be used by the department to form a collaborative group process representing diverse stakeholders and facilitated by a neutral third party to develop a long-term strategy for shrubsteppe conservation and fire preparedness, response, and restoration to meet the needs of the state's shrubsteppe wildlife and human communities. The collaborative may serve as providing expertise and advice to the wildland fire advisory committee administered by the department of natural resources and build from the wildland fire 10-year strategic plan. Components to be addressed by the collaborative include the restoration actions described in (b) of this subsection and on spatial priorities for shrubsteppe conservation, filling gaps in fire coverage, management tools to reduce fire-prone conditions on public and private lands and identifying and making recommendations on any other threats. Any reports and findings resulting from the collaborative may be included in the report specified in (c) of this subsection.

Appendix B.   WSRRI Long-Term Strategy Planning Process

WSRRI was formed under the leadership of a three-state agency coalition comprised of the WDFW SCC, and DNR. To develop the WSRRI Long-Term Strategy (Strategy), a planning approach was implemented to establish a repeatable, systematic, and well-documented method for developing goals and objectives, identifying threats, defining necessary actions, and constructing an implementation work plan. This process was guided by a key strategic direction to identify spatial priorities through an assessment of ecological integrity, primary threats to shrubsteppe in Washington and develop strategies to 'defend the core, grow the core, and connect the core' shrubsteppe habitats within the context of the Legislative Proviso and Mission and Goals of WSRRI. The Strategy has been developed through a stepwise process outlined below (Figure B1).

GOALS
"What we hope to achieve"

▶ Describe what the plan is intended to accomplish. The goals are derived from the vision and sets the foundational purpose of future actions.

THREATS
"What factors have led to current conditions"

▶ Identify and prioritize threats that need to be addressed to achieve objectives.

▶ Identify the sources and impacts of threats.

MONITORING AND ADAPTIVE MANAGEMENT
"How can we track if we are successful and adapt over time"

▶ Built on metrics tied to achieving objectives and addressing threats.

▶ Includes a plan for how to adapt over time.

STEP 1 — **SET GOALS**
STEP 2 — **DEFINE OBJECTIVES**
STEP 3 — **IDENTIFY CRITICAL THREATS**
STEP 4 — **IDENTIFY ACTIONS**
STEP 5 — **DEVELOP MONITORING PLAN**
STEP 6 — **DEVELOP FINAL PLAN**

OBJECTIVES
"How we define success"

▶ Develop based on planning targets and include information about the current and desired status of that target.

▶ Objectives include associated measurable indicators so they can be evaluated and tracked.

ACTIONS
"What actions are needed to meet our goals and address critical threats"

▶ Identify & prioritize actions to address threats and achieve goals and objectives.

▶ Develop the suite of actions that are needed to implement.

▶ Identify enabling conditions to support implementation across all actions.

▶ Conduct spatial prioritization.

Figure B1. Six Step Planning Process to develop the Strategy

The six-step process centered on establishing Goals and Objectives with a focus on the protection and restoration of wildlife habitats, the effective management of fire within the landscape, and the support of communities and compatible land uses. Within this framework, Critical Threats were identified and prioritized for targeted mitigation in pursuit of the defined Objectives. The plan identifies five Strategies and integrated specific and measurable Actions to accomplish these Goals, address identified Threats, and ensure the achievement of Objectives through implementation of a comprehensive Monitoring and Adaptive Management approach. At the heart of this Strategy is the mapping of ecological integrity across the Columbia Plateau, which enables identification of the Spatial Priorities of Core Areas, Growth Opportunity Areas, and Corridors. The relationship between Goals, Objectives, Strategies, and Actions is described in the table below (Table B1).

Table B1. Structure of the Strategy - goals, objectives, strategies, and actions.

	"WHAT?"	**"HOW?"**
Less Detail	GOALS	STRATEGIES
More Detail	OBJECTIVES	ACTIONS

SHAPING THE STRATEGY - A COLLECTIVE EFFORT

The WSRRI Strategy development process was informed by diverse perspectives and a broad range of stakeholders with vested interests in Washington's shrubsteppe landscape, as well as Tribes and various public and private partners. The initial stages of shaping the WSRRI Long-Term Strategy involved conducting assessment interviews with representatives from over 20 different organizations who provided invaluable feedback to form the Strategy's development process.

The operational structure included multiple groups, such as the Steering Committee, the Long-Term Strategy Advisory Group (LTSAG), the Wildlife Habitat Workgroup, the Wildland Fire Workgroup, the Spatial Workgroup, and several topic-specific discussions referred to as Focus Tables. Collaborative efforts among WSRRI advisors, work group participants, and Focus Table members were instrumental in constructing a comprehensive long-term strategy for shrubsteppe conservation. As directed by the Legislative proviso, this strategy addresses spatial priorities, establishes a wildlife habitat restoration program, enhances coordination and resource sharing at the landscape level, bolsters wildland fire preparedness, protection and response measures, supports working lands, and addresses other threats to the shrubsteppe landscape.

The Strategy development groups included -

▶ **Steering Committee**
The leadership of WSRRI consists of a state agency coalition, with active engagement from the WDFW, SCC, and DNR. Together, these agencies form the WSRRI Steering Committee, which convenes regularly to provide direction, make decisions, and prioritize funding within WSRRI. The collaboration among these agencies brings together diverse and complementary perspectives, expertise, and resources, strengthening the overall quality and impact of WSRRI's efforts. Operating under a consensus-based decision-making model, the Steering Committee works effectively to ensure that all decisions guiding WSRRI are reached collectively. In instances where consensus is challenging to achieve, the ultimate decision-making authority for WSRRI rests with the WDFW Director, safeguarding progress and forward momentum in a spirit of cooperation and shared goals. This leadership group plays a pivotal role in shaping the strategic direction, implementation, and impact of WSRRI's efforts, ensuring that they align with the overarching goals and values.

▶ **Long-term Strategy Advisory Group (LTSAG)**

The LTSAG, consisting of agencies, organizations, and individuals deeply invested in the shrubsteppe landscape, includes shrubsteppe landowners, land managers, and organizations that operate within the shrubsteppe landscape. Their active involvement in WSRRI is a testament to their dedication and their substantial capacity to contribute to the cause. Meeting from January 2022 to March 2024, LTSAG members played a pivotal role in offering insights into the proposed goals, objectives, actions, spatial priorities, and the governance and planning approaches. Their commitment and contributions have significantly shaped the strategic direction of this effort.

▶ **Tribal Engagement**

The development of the Strategy placed a strong emphasis on actively involving Tribes in Eastern Washington, recognizing their pivotal role in shaping WSRRI. Eastern Washington Tribes were invited to participate in the Long-term Strategy Advisory Group and additional effort was placed on specific tribal engagement. In the spring of 2023, the Steering Committee initiated a dialogue with the Confederated Tribes of the Colville Reservation, Yakama Nation, and Spokane Tribe, meeting with each Tribe in person individually to foster a deeper understanding. These one-on-one meetings were arranged to discuss the Strategy and identify alignment with tribal priorities, needs, and capacity. This engagement served as a conduit for the committee to gain invaluable insights into the Tribes' interests, priorities, and unique perspectives on WSRRI's efforts. Furthermore, it laid the foundation for building a cooperative and mutually beneficial relationship, ensuring that the Strategy would be fundamentally shaped by the valuable input and knowledge of the Tribes as it progressed.

▶ **Wildlife and Wildland Fire Workgroups**

The Wildlife Habitat Workgroup and Wildland Fire Workgroup initiated biweekly meetings in July 2022 to formulate objectives and actions for the Long-Term Strategy. In October of the same year, a workshop convened in Wenatchee, Washington, brought together the workgroups and Steering Committee to assess initial objectives, explore necessary cross-resource connections requiring further development, and collaboratively generate potential actions to accomplish the established objectives. This workshop led to the development of WSRRI Key Strategies.

▶ **Spatial Priorities Workgroup**

Additional funding from the Bipartisan Infrastructure Law funding focused on sagebrush-steppe was secured through U.S. Fish and Wildlife Service to supplement work for defining spatial priorities. WSRRI partnered with TerrAdapt, a non-profit organization with expertise in co-development of dynamic mapping tools to monitor habitat, project future conditions, and prioritize areas for conservation. This workgroup focused on identifying the important places within this landscape to guide the prioritization of conservation actions described in the plan. Spatial priorities were developed for three habitat targets - 1) xeric - dry; 2) mesic – wet; and 3) greater sage-grouse. Targets were selected with input from the Wildlife Habitat Workgroup, and their definition and focus were refined with the help of target-specific experts who worked with TerrAdapt to develop methods to map and monitor the spatial priorities. Xeric and mesic habitat experts and greater sage-grouse experts met for target-specific monthly meetings between January and December 2023, informing decisions on datasets to use, key methodological and modeling decisions, and how the resulting datasets and models informed where different actions should be taken.

Products from the Spatial Priorities Workgroup include spatially and temporally explicit maps of Core Areas, Growth Opportunity Areas, Corridors, and Other Habitat Areas for each of the three targets. Along with these categorized maps there are numerous data layers that were developed as inputs to these maps, including landcover, fractional rangeland vegetation cover, habitat quality, habitat connectivity, and ecological integrity. These datasets can be used to help monitor the landscape over time and inform spatial prioritization of actions and adaptive management.

► **Focus Tables**

In the spring and summer of 2023, a series of topic-specific Focus Table meetings were organized to gather input from subject matter experts regarding the formulation of Actions for the Long-Term Strategy. Details on these Focus Table meetings, including topics, can be found in Table B2.

Table B2. Focus Table Topics, Dates, and Participants

WF	Meeting Dates	Participants
Grazing	2/3/23 2/22/23 3/10/23	Shana Joy (Steering Committee), SCC Allisa Carlson (Steering Committee), SCC Janet Gorrell (Steering Committee), WDFW Richard Fleenor, NRCS Scott Scroggie, NRCS Jeff Burnham, WDFW Wade Troutman, Foster Creek CD, and Douglas County Producer Tip Hudson, WSU Extension Elayne Hovde-Knudson, Lincoln Co. CD Kari Fagerness, DNR
Habitat Restoration	2/14/23 2/23/23 3/7/23 3/23/23 3/30/23 4/14/23	Keyna Bugner, DNR Jason Lowe, BLM Ryan Lefler, FCCD Kim Veverka, USFWS Nick George, USFWS Michael Brown, Pheasants Forever Kurt Merg, WDFW Hannah Anderson, WDFW Kat Kelly, WDFW Elizabeth Torrey, WDFW David Wilderman, DNR Colin Leingang, YTC Jay Kehne, Conservation Northwest Jesse Ingels, Washington Cattlemen's Association
Habitat Protection – Incentives	5/31/23 7/25/23	Allisa Carlson (Steering Committee), SCC Janet Gorrell (Steering Committee), WDFW Angie Reseland, WDFW Tom O'Brien, WDFW Sean Williams, WDFW Austin Shero, NRCS Kara Whittaker, WDFW Dani Madrone, American Farmland Trust Paul D'Agnolo, SCC Braeden Van Deynze, WDFW Mark Teske, WDFW Kim Sellers, WA Recreation and Conservation Office Carlee Elliot, NRCS Kate Delavan, SCC Vanessa Kritzer, WA Association of Land Trusts Shana Joy (Steering Committee), SCC Sarah Brooks, Methow Conservancy Mickey Fleming, Chelan-Douglas Land Trust Megan Whiteside, Cowiche Canyon Conservancy

WF	Meeting Dates	Participants
Habitat Protection – Land Use Policy	7/10/23 9/21/23	Hannah Anderson (Steering Committee), WDFW Thomas O'Brien, WDFW Kara Whittaker, WDFW Margen Carlson, WDFW Chuck Stambaugh-Bowey, WDFW Sean Williams, WDFW Misty Blair, ECY Dave Andersen, COM Trina Bayard, Audubon of Washington Braeden Van Deynze, WDFW Sharica Jenkins-Hill, WDFW Carmen Andonaegui, WDFW Steve Davenport, COM Janet Gorrell (Steering Committee), WDFW Keith Folkerts, WDFW Julia Michalak, WDFW
Community Fire Protection	7/11/23 8/9/23	Allen Lebovitz (Steering Committee), DNR David Way, DNR Hilary Lundgren, WA Fire Adapted Communities Shana Joy (Steering Committee), SCC Guy Gifford, DNR Laura Rivera, CAFÉ Wenatchee Rose Beaton, DNR Hannah Anderson (Steering Committee), WDFW Janet Gorrell (Steering Committee), WDFW Reese Lolley, WA Resource Conservation and Development Council Alex Smith, CAFÉ Wenatchee
Fire Planning and Response #1	7/12/23 8/8/23	Allen Lebovitz (Steering Committee), DNR Shana Joy (Steering Committee), SCC Bob Gear Steven Harris, DNR Vincent Jansen, WDFW Collin Haffey, DNR Angie Lane, DNR Janet Gorrell (Steering Committee), WDFW Curtis Bryan, BLM Danny Stone, Grant County Commissioner
Community Engagement	8/10/23 9/26/23	Allisa Carlson (Steering Committee), SCC Shana Joy (Steering Committee), SCC Allen Lebovitz (Steering Committee), DNR Rachel Blomker, WDFW Eryn Couch, WDFW David Trimbach, WDFW Elayne Hovde-Knudson, Lincoln Co. CD Sarah Wilcox, SCC Elsa Bown, Lincoln Co. CD Lilliane Ballesteros, Latino Community Fund Hilary Lundgren, WA RCD Kari Fagerness, DNR Benjamin Anderson, WDFW

WF	Meeting Dates	Participants
Invasive Plants	8/15/23	Janet Gorrell (Steering Committee), WDFW Shana Joy (Steering Committee), SCC David Heimer, WDFW Joe Smith, University of Montana Maria Marlin, WA RCO Keyna Bugner, DNR Tim Walls, WDFW Mary Fee, WA State Dept. of Agriculture Vincent Jansen, WDFW
Species Management	8/29/23 9/14/23	Hannah Anderson (Steering Committee), WDFW Jason Fidorra, WDFW Michael Atamian, WDFW Carrie Lowe, WDFW Mike Schroeder, WDFW Gerald Hayes, WDFW Kyrsten Wolterstorff, Yakama Nation of Indians Stefanie Bergh, WDFW Sam Rushing, Confederated Tribes of the Colville Reservation Trina Bayard, Audubon of Washington Kimberly Veverka, USFWS Kyle Garrison, WDFW Jon Gallie, WDFW Emily Jeffreys, WDFW Scott Fitkin, WDFW Lisa Hallock, WDFW Kurt Merg, WDFW

Focus Table Questions

Information & Planning

▶ *"What information is needed to implement this action/measures successfully?*
▶ *"Is there planning needed to support implementation? What planning?"*

Organization & Governance

▶ *"Is there currently an organization structure and governance in place to implement these action/measures successfully?"*
▶ *If Yes - "Is, it working? If not working what improvements are needed?"*
▶ *If No- "Do you need to establish and organization structure and governance to implement?"*

Policy

▶ *"What new policies are needed to support implementation? What existing policies need to be changed"*

Resources, Capacity & Funding

▶ *"Are current resources and funding adequate to support implementation?"*
▶ *"If not what additional resources are needed?" "What additional funding and where might that come from?"*
▶ *"Is there current capacity to support full implementation of this action?" "If not, what capacity is needed?"*

Community Support and Engagement- Education, Outreach & Landowner Incentives

▶ *"What community engagement and education is needed to implement this action?" "Are there existing programs to achieve this and do they need to be expanded or supported in some way?"*

Appendix C.   Supplemental Information on WSRRI's Spatial Priorities

In the last few decades, several projects have mapped habitats and places of value across the Columbia Plateau (Table C1). Each project and associated datasets have provided valuable information for specific end users' needs. Many of these efforts created ideas, methods, and information that TerrAdapt and WSRRI partners used to co-develop the spatial priorities. This appendix summarizes WSRRI's evaluation of these projects and datasets for WSRRI's use, then describes the methods used by TerrAdapt to define WSRRI's spatial priorities. WSRRI's Spatial Priority maps can be accessed at https://wdfw.wa.gov/species-habitats/habitat-recovery/shrubsteppe#wsrri.

Spatial Datasets Guiding Wildlife Habitat Conservation and Protection across the Columbia Plateau

In the development of the Long-term Strategy, WSRRI reviewed the 2022 Western Association of Fish and Wildlife Agencies (WAFWA) Western USA Sagebrush Conservation Design (SCD; https://pubs.usgs.gov/of/2022/1081/ofr20221081.pdf). to determine if and how it could inform where actions were needed across the Columbia Plateau. Collectively, local experts and WSRRI's Advisory Group concluded that while the general approach was good, the SCD product did not fully meet WSRRI's needs, as it lacked information on connectivity between high quality habitat; this is especially important in Washington where shrubsteppe is highly fragmented. Further, the SCD did not include lands enrolled in the Conservation Reserve Program (CRP), though the importance of CRP and previously tilled locations for greater sage-grouse conservation in Washington has been well-documented for several species, including greater sage-grouse. Finally, the SCD lacked information on wetter or mesic areas within Washington's shrubsteppe landscape, which are critical to inform other aspects of SGCN species conservation and fire planning. These factors resulted in the SCD maps identifying no core habitat in Washington, thereby providing very little guidance on where to implement WSRRI's strategies and actions.

Other major projects that have guided conservation planning in the Columbia Plateau have come from the Washington Connected Landscapes Project and the Arid Lands Initiative. Both of these projects created collaborative groups to develop map products that identified priorities. But like all landscapes, this region is dynamic and has changed over time due to a variety of drivers, such as human development, annual grass invasion, wildfire, altered growing conditions and restoration actions, and the products created through those projects were static and could not reflect changes subsequent to their creation. WSRRI desired a tool and data to match the dynamic nature of the world we live in. The work WSRRI has done with TerrAdapt aims to provide tools that are dynamic and that add to the available datasets in our toolbox that can be used for decision making and conservation at landscape scales.

Table C1. Projects guiding conservation and protection of habitat of multiple species across the Columbia Plateau.

Project name (year created)	Project Lead	Project Focus	Spatial Data Layers Produced	Major Use Case for Spatial Data	Automatic Updates	Vegetation Condition Included in Models	WA State Centric	Source Info
Washington Connected Landscapes Project – Columbia Plateau (2012)	WSDOT, WDFW (Many collaborator)	Find areas to maintain and enhance wildlife habitat connectivity	Connectivity maps for 11 focal species / Landscape integrity	Mapping connectivity, habitat concentration areas for focal species or core areas for landscape integrity	No	No	Yes	https://waconnected.org/cp_focalspecies_landscapeintegrity/
Arid Lands Initiative (2014)	USFWS, WDFW, Audubon, NRCS, TNC, BLM, WA State Parks, and more	Find common set of priority lands to guide conservation action	Via a spatial prioritization model (Marxan) Spatial Prioritization of Ecological systems and Species	Prioritization and ranks of core areas important for conservation, restoration and connectivity	No	No	Yes	https://aridlandsinitiative.org/our-projects/the-science/; https://www.sciencebase.gov/catalog/
Sagebrush Conservation Design (SCD) (2023)	WAFWA, USFWS, USGS	Explicit spatial prioritization and conservation strategy for the Sagebrush biome	SEI	Prioritization of the shrubsteppe biome based on the ecological integrity of the landscape. This effort is based on a threats-based conservation approach .	Yes	Yes	No	https://www.usgs.gov/publications/a-sagebrush-conservation-design-proactively-restore-americas-sagebrush-biome
Least Conflict Solar Siting (2023)	WSU	Collaborative, non-regulatory project to minimize conflict and negative impacts to the Columbia Plateau while increasing solar energy production	Solar Development Suitability map, Farm Land Value map, Ranchland Value Map, Environmental Conservation Map	Use of various maps to understand where solar citing conflict might occur; Understand how collaborative group of people map places of high value across the Columbia Plateau	No	Yes for the Ranchland Value map	Yes	https://www.energy.wsu.edu/documents/Least-Conflict_Solar_Siting_Report-WSUEP23-04--6-29.pdf
PHS Shrubsteppe Eastside Steppe (2021)	WDFW	Mapping priority habitat and species for WDFW	Landcover/ habitat	A flagging tool to identify areas where site-scale information should be gathered on shrubsteppe or eastside steppe habitat in order to inform land use decisions and/ or changes in land use	Not currently	No	Yes	https://wdfw.wa.gov/sites/default/files/2021-10/shrubsteppe_eastside_steppe_info.pdf
WSRRI (2024)	WDFW, DNR SCC	Prioritize areas across the Columbia Plateau for habitat conservation, restoration and fire management	Both	Prioritizing the landscape based on relative values of ecological integrity or high habitat suitability (Core, Growth Opportunity Areas and Other habitat) as well as important areas for connectivity .	Yes	Yes	Yes	https://terradapt.org/

Defining WSRRI's Spatial Priorities - Advancing Landscape Scale Mapping and Monitoring across the Columbia Plateau

Recently, there has been an advance in our ability to analyze and produce remotely sensed data products and maps that update over time. This advance is critical to providing an up-to-date picture of the challenges we currently face and more timely data to map and monitor dryland habitats at landscape scales (Jones et al., 2021, Jansen et al., 2018, Allred et al., 2020). In recent years, advances have been made in our ability to estimate the fractional amount of dominant plant functional groups annually across the landscape (Allred et al., 2021, Riggie et al., 2020). These data improve our ability to differentiate areas of higher quality habitat compared to areas that are degraded by invasive annual grasses, human development, or recent fire- or, conversely, areas that are improving with restoration action or land use change, such as lands enrolled in CRP. The datasets co-developed with TerrAdapt for WSRRI products rely on such dynamic data inputs which help to fill gaps in existing datasets or datasets that are becoming outdated. Important aspects of the WSRRI spatial priority mapping include -

▶ Two of the three spatial priorities (wet-mesic and dry-xeric) are focused on ecosystems rather than any one or a group of specific animals.

▶ The mapping of spatial priorities of our ecosystems is based largely on the estimated ecological quality (i.e., Ecological Integrity Score) using data on vegetation condition (i.e., the fractional cover products) and a human footprint model.

▶ The input datasets, models, and collaborators are all specific to the Columbia Plateau, as compared to the Western US-wide Sagebrush Conservation Design. Our local models and stakeholder groups improved our ability to model important features of this landscape.

▶ Maps provides current connectivity data on the three targets.

▶ The tools and datasets are dynamic, allowing us to monitor the landscape over time and make changes to priorities if on the ground conditions change.

▶ Data Inputs

The WSRRI spatial priorities were produced using several data inputs developed by TerrAdapt and described below.

▶ ### Landcover
TerrAdapt's dynamic 30m resolution landcover model classifies our region into 19 landcover types representing a variety of native vegetation communities and human land uses. The model is trained on landcover observations gathered from across Washington for each landcover class. It uses a random forest machine learning algorithm to predict the class based on a suite of environmental variables, including Landsat multispectral imagery, indices derived from Landsat imagery that reflect the seasonality of vegetation conditions, and other ancillary data related to topography, climate, hydrology, and soils. The model was projected for all years from 1984 to 2022 at the time of this study.

▶ ### Fractional Rangeland Vegetation Cover
TerrAdapt's 30m resolution fractional rangeland vegetation cover model predicts the percent cover of different vegetation types (perennial grasses, invasive annual grasses, sagebrush, and shrubs). The model is trained using the US Bureau of Land Management's Assessment, Inventory, and Monitoring (AIM) field data. The AIM program quantifies the fractional cover of various vegetation types in locations across the western US, including Washington. The model uses a random forest machine learning algorithm to predict the fractional cover of each vegetation type based on a suite of environmental variables, including Landsat multispectral imagery, indices derived from Landsat imagery that reflect the seasonality of vegetation conditions, and other ancillary data related to topography, climate, hydrology, and soils. The fractional rangeland cover models were projected for all years from 1984 to 2022 at the time of this study.

▶ Human Footprint

TerrAdapt's 30m resolution human footprint model quantifies the degree to which anthropogenic impacts to native environments diminish or degrade habitat suitability. Areas of high human footprint (e.g., dense urban areas, intensive agricultural areas, or surface mines) are assumed to provide poor habitat for native species. This model follows methods similar to Theobald et al. (2020), which quantifies the magnitude of several anthropogenic impacts such as various classes of roads (interstate highways, primary roads, secondary roads, local roads), various classes of agriculture (irrigated row crops, dryland row crops, fallow, orchard, and pasture), population density, and infrastructure (energy transmission lines, solar installations, wind turbines, canals, dams, quarries, and electrical power stations). Each impact also has a distance over which the impacts extend from their source, reflecting processes such as the spread of noise, light, invasive species, domestic animals, pollution, and other impacts that radiate outward from impacted areas. Fuzzy sum is used to combine impacts into a single human footprint model scaled from 0 to 1 (higher values indicate greater magnitude of human impacts). The locations of these impacts are derived from several sources, including OpenStreetMap, BC Integrated Roads data, the TerrAdapt landcover model (described above), and the US Homeland Infrastructure Foundation-Level Data catalog. The human footprint model was projected for all years from 1984 to 2022 at the time of this study.

▶ Height Above Nearest Drainage

TerrAdapt's 30m height above nearest drainage (HAND) model normalizes topography (based on a 30m digital elevation model) according to the local relative heights found along the drainage network, revealing the local draining potentials (Nobre et al., 2011). The HAND model has been shown to be highly correlated with the depth of the water table, providing an accurate spatial representation of soil water environments.

METHODS

▶ **Workflow Overview**

Figure C1 below illustrates the general modeling workflow we used to map spatial priorities for each conservation target. The workflow began by linking to the input datasets stored in TerrAdapt's cloud data repository and updated dynamically each year; key input datasets for this project were described in the Data Inputs section above. We then developed models of habitat suitability (the degree to which a pixel can provide a suitable environment for the conservation target) and resistance (the degree to which a pixel resists movement during dispersal). Next, we mapped Core Areas (local concentrations of high-quality habitat) and Growth Opportunity Areas (local concentrations of present but somewhat degraded or sparse habitat). Then we modeled Corridors linking all adjacent Core Areas together if within dispersal limits. Finally, we mapped the full suite of spatial priorities as Core Areas (Core), Growth Opportunity Areas (GOAs), Corridors, and Other Habitat.
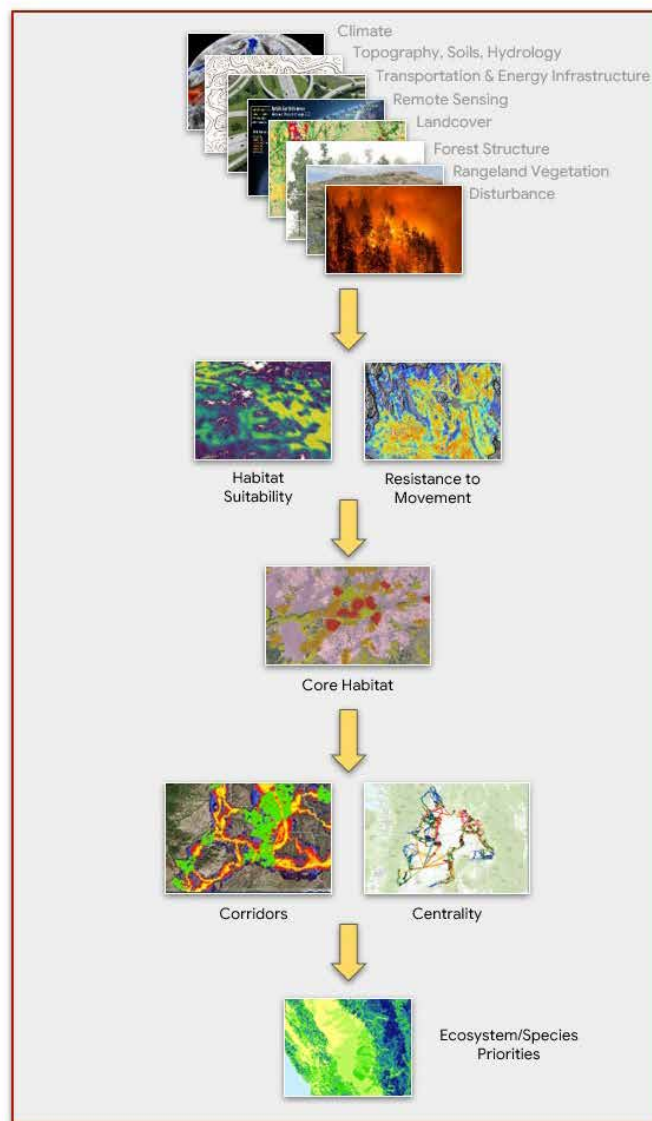
Figure C1. Modeling workflow used to map spatial priorities.

HABITAT

We modeled habitat for each of the three targets in different ways, based on expert input from each target co-production team.

▶ ### Dry-Xeric Ecosystem

To map habitat for the Xeric Ecosystem, we first computed an ecological integrity score largely following the sagebrush conservation design (Doherty et al, 2022). Specifically, we fit curves to fractional cover datasets produced by Terradapt on invasive annual grass cover, perennial grass cover as well as the human footprint to calculate q score which is a measure of habitat quality (Figure C2). All data were computed on an annual basis for each 100m grid cell across the study area that was classified as either shrubland or grassland by TerrAdapt's Landcover model.
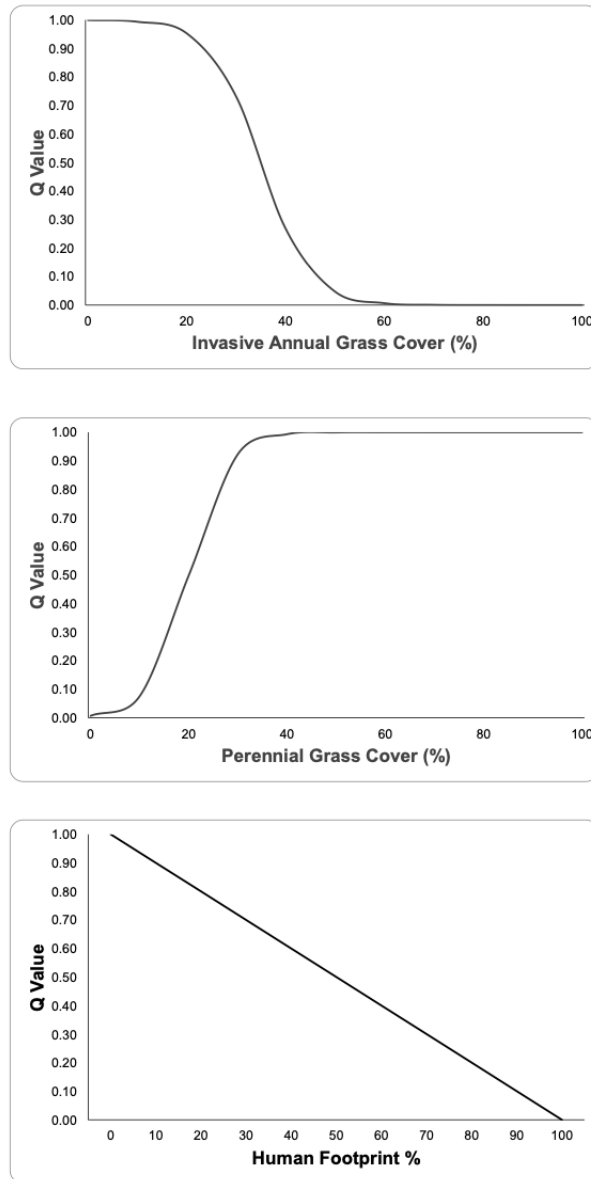
Figure C2. Q curves for invasive annual grass cover, perennial grass cover and human footprint

► **Wet-Mesic Ecosystem**

To map Wet-Mesic habitat, we first created a layer of habitat quality and a layer of 'wetland potential'. Habitat quality was driven by the human footprint and constrained to an area defined by either 1) the wetlands landcover (emergent or woody wetland) defined by TerrAdapt's landcover model OR 2) low lying areas (defined by a height above nearest drainage less than 15m) that also were classified as mesic vegetation (mesic grass/shrub or forest). Wetland potential was defined as a linear function of the normalized difference wetness index (NDWI) calculated from Landsat imagery. NDWI is a measure of vegetation moisture, with values ranging from –1 to 1. Values above 0 are extremely moist environments likely to be inundated by water. Values in the range of –0.3 to 0 represent vegetation with ample moisture, indicating high water availability at or near the surface. We created a wetland potential index ranging linearly from 0 for NDWI values < -0.3 to 1 for NDWI values >= 0. Only pixels with a landcover class that could become a wetland if restored (irrigated or non-irrigated row crops, pasture, fallow, forest, or mesic grass/shrub) that were also in low-lying places (HAND < 15m) were allowed to have wetland potential > 0. In this way, the wetland potential index reflects low lying areas of potentially restorable landcover that has access to surface moisture.

► **Greater Sage-Grouse**

To map the spatial priorities of the greater sage-grouse, we trained a habitat suitability using the MAXENT algorithm (Phillips et al., 2010) empirically in a use-availability study design using habitat predictors and 93,474 observations of grouse in this landscape going back to the 1980s. The habitat predictors included climate variables (mean annual temperature, mean annual precipitation, climatic moisture deficit, growing degree days, etc.), fractional vegetation cover data (perennial grass, sagebrush cover, annual grass cover), landcover data (xeric/mesic grass/shrub, developed, agricultural classes, etc.), topography data (slope, topographic wetness index, heat load index, etc.) and the human footprint (powerlines, roads, railroads, wind turbines, urbanization, etc.). The model exhibited a strong relationship to greater sage-grouse occurrence (area under the receiver-operator curve = 0.90), with high accuracy (0.83), sensitivity (0.83), and specificity (0.82).

RESISTANCE

► **Xeric and Mesic Ecosystem**

We modeled resistance for both ecosystems using an expert-based approach. In both cases, the human footprint data layer was the primary driver of resistance, with resistance (higher costs to movement) a linear increasing function of the human footprint. For the xeric ecosystem, additional resistance was added for movement over water, forested areas, and cliffs (but these areas were not considered total barriers). Areas with low human footprint in a natural vegetation type (except forest, and not water or cliff) were considered optimal for movement.

► **Mesic Ecosystem**

Resistance for the mesic ecosystem was also driven largely by the human footprint, but additional resistance was also added as 1) an increasing function of the height above nearest drainage, 2) a decreasing function of the normalized difference wetness index (NDWI), and cliffs. Areas with low human footprint in low-lying areas with moist vegetation and no cliffs were considered optimal for movement.

► **Greater Sage-Grouse**

We modeled greater sage-grouse resistance following the methods described in an empirical model that used landscape genetics approaches to determine resistance weights (Shirk et al., 2015). This model predicts high resistance to movement arising from barriers like interstate highways, cities, and large transmission lines, and forests, with more moderate resistance coming from primary and secondary roads, agricultural lands, and areas of warmer or cooler climate relative to the mid to higher elevations of the Columbia Basin.

CORE AREAS

We modeled Core Areas for each target the same way, using an approach developed for the Washington Connected Landscapes project and implemented in the Gnarly Landscape Utilities ArcGIS toolbox (Shirk et al., 2010). First, a moving window average was applied to the habitat model and thresholded to identify local areas that have high average local habitat quality. The radius of the moving window and the thresholds varied by target and are listed in the table below. For each target, two different moving window thresholds were used to create a set of higher quality areas (the Core class in our spatial priorities hierarchy) and lower quality areas (Growth Opportunity Areas). In this way, Core Areas are nested within GOAs. Within each Core Area or GOA, all pixels with a resistance greater than 5 and all pixels with a habitat quality less than the threshold were removed.

Next, we used the target's resistance model to calculate the cost-weighted distance to the nearest valid pixel in the Core Areas and GOAs, and then applied a threshold to that cost-distance at a distance approximating a home-range type movement (see table below for the distance threshold, which varied by target). This links nearby patches together unless they're sufficiently far apart in cost-distance. Finally, all Cores and GOAs that were below the minimum size threshold (see table below) were removed.

Because we used moving windows and local movement neighborhoods to define Cores and GOAs, it is possible they contain pixels that are not currently classified as habitat for the target. This is intentional, as animals within Cores and GOAs are likely to move through these areas within their home ranges. These non-native habitats within Cores and GOAS are critical locations to restore or manage in a way that promotes or increases habitat quality within that area. The parameters used to map Cores and GOAs for each target are shown in the table below.

Table C2. Core and GOA Parameters.

Parameter	Dry (Xeric) Ecosystem	Wet (Mesic) Ecosystem	Greater Sage-grouse
Core habitat threshold	0.5	0.15	0.8
GOA habitat threshold	0.33	0.15	0.33
Moving window radius (km)	1	1	0.5
Home range movement distance (km)	2.5	1	2.5
Minimum size requirement (km²)	10	1	10

CORRIDORS

To map corridors for each target, we followed methods developed by the Washington Connected Landscapes project and implemented in the Linkage Mapper ArcGIS toolbox. We first calculated the adjacency of all pairs of Core/GOA patches within the network. Patches were not considered adjacent if they were beyond the maximum dispersal distance (see table below) or if another patch was closer in cost-distance relative to the other patch in the pair. For all adjacent patches, we calculated the least-cost corridor, thresholded at a maximum corridor width. The parameters used to map corridors for each target are shown in the table below.

Table C3. Corridor Parameters.

Parameter	Dry (Xeric) Ecosystem	Wet (Mesic) Ecosystem	Greater Sage-grouse
Maximum dispersal distance (km)	100	100	100
Corridor width (km)	10	10	10

SPATIAL PRIORITIES

The above processes to map habitat, resistance, Cores, GOAs, and corridors were conducted for each year from 2018-2022 (5 years) for the xeric ecosystem and greater sage-grouse, and from 2013-2022 (10 years) for the mesic ecosystem, using input data matched to the year of mapping. For each year and for each target, these maps with potentially overlapping classes of Core, GOA, and CORRIDOR were combined into a single prioritization, using a hierarchy where pixels labeled as Core were included first, then GOA, then corridor, and finally 'other habitat'. A final spatial priorities map was then calculated per target as the most common class (Core, GOA, corridor, or 'other habitat' across the range of years). This was done to reduce year-to-year variability in spatial priorities due to data inaccuracies and other sources of variation.

ADDITIONAL REFERENCES CITED IN APPENDIX C

▶ Jansen, V., Kolden, C., & Schmalz, H. (2018). The development of near realtime biomass and cover estimates for adaptive rangeland management using Landsat 7 and Landsat 8 surface reflectance products. *Remote Sensing* 10, 1057.

▶ Allred, B.W., Bestelmeyer, B. T., Boyd, C.S., Brown, C., Davies, K. W., Duniway, M. C., Ellsworth, L. M., Erickson, T. A., Fuhlendorf, S. D., & Griffiths, T. V. (2020). Improving Landsat predictions of rangeland fractional cover with multitask learning and uncertainty. *Methods in Ecology and Evolution*, 12, 841-849.

▶ Jones, M. O., Robinson, N. P., Naugle, D. E., Maestas, J. D., Reeves, M. C., Lankston, R. W., & Allred, B. W. (2021) Annual and 16-day rangeland production estimates for the Western United States. *Rangeland Ecology & Management*, 77, 112-117.

▶ Rigge, M., Homer, C., Cleeves, L., Meyer, D.K., Bunde, B, Shi, Hua, Xian, G., Shell, S., & Bobo, M. (2020) Quantifying western US rangelands as fractional components with multi-resolution remote sensing and in situ data. *Remote Sensing*, 12(3), 412

Shrubsteppe conservation and wildfire preparedness and response across Washington's Columbia Plateau have been of great interest to federal and state agencies, Tribes, nonprofit partners, and communities for years, given the region's ecological, cultural and economic values.

▶ **Indigenous Peoples**
have inhabited the shrubsteppe since time immemorial and have maintained connection to culturally and spiritually significant sites, as well as cultural and subsistence practices that honor ancestral traditions. Across the West, land managers are increasingly recognizing the importance of incorporating Traditional Ecological Knowledge, sometimes referred to as Indigenous Knowledge, into land management and natural resource decisions, from wildlife population monitoring to fighting climate change (U.S. Fish and Wildlife Service, 2011). In Washington, Tribes are leading independent efforts to conserve and restore native ecosystems through initiatives such as long-term water quality monitoring programs (Colville Tribe, 2023), eradication of invasive plant species (Spokane Tribe, 2023), partnerships with ranchers to implement sustainable grazing practices (Spokane Tribe, 2023), and many more. Each Tribe in the region maintains distinct lifeways and unique cultural practices rooted in relationship to the land, and all are vital to the effort to conserve and restore native ecosystems.

▶ **Ranchers, farmers, and residents**
are deeply connected to the land, drawing upon the landscape's natural resources for livelihoods and the preservation of cultural legacies. Agricultural producers and communities play an important role in the socioeconomic stability of rural Washington, highlighting the connection between shrubsteppe health and the enduring success of these practices. Ranchers play a vital role in maintaining habitat connectivity for wildlife, oftentimes safeguarding the lands they manage from development that would further threaten already diminished connectivity. Farmers and ranchers also often serve as early notifiers of wildland fire due to their remote locations and presence in the landscapes on which they live and work. In these ways and many more, private landowners, often in collaboration with others, implement conservation strategies and strengthen long-term ecosystem health.

▶ **Scientific researchers, environmental education, hunters, anglers, and outdoor enthusiasts**
have both individual and shared interests in the shrubsteppe. The landscape serves as a hub for scientific research and environmental education, which furthers our shared understanding of shrubsteppe ecology and cultural significance. Outdoorsmen and women value the shrubsteppe for its cultural significance, natural beauty and recreational opportunities and, through their activities, contribute to local economies and conservation efforts.

▶ **Agencies, NGOs, and Land Trusts**
A comprehensive network of local, state, and federal agencies along with non-governmental organizations underpins conservation across the shrubsteppe landscape. State and federal agencies with land management, natural resource management, and regulatory roles are complemented by Conservation Districts, local jurisdictions, and others in achieving conservation. Non-governmental organizations, such as land trusts, Audubon Washington, The Nature Conservancy, Conservation Northwest, and others, further reinforce these efforts, focusing on wildlife protection, habitat restoration, and wildfire prevention to maintain the shrubsteppe's rich biological diversity and ecological function.

COLUMBIA PLATEAU PLANS AND EFFORTS

Collaborative efforts around shared interests of those described above have resulted in many regional (specific to the Columbia Plateau) planning efforts and products, several described below, that were considered foundational to the context and development of WSRRI's Long-term Strategy. Further, we describe several statewide and rangewide plans that were highly informative to our work. Finally, though not included below, WSRRI's efforts have been and will continue to be further informed by current and future strategic plans developed by agencies and organizations working around the nexus of wildlife and wildland fire.

▶ **Arid Lands Initiative (2009-present)**

To address the challenges posed by landscape conservation in eastern Washington, a group of interested entities came together to form the Arid Lands Initiative in 2009. The team identified key biological, strategic, and spatial priorities for a strategic plan that works towards the conservation and restoration of arid lands in Eastern Washington. The Arid Lands Initiative has worked with experts and stakeholders to develop key science products to assess the health of systems and species in the arid landscape and to serve as a tool for collaborative conservation work, including Shared Priorities for Conservation at a Landscape Scale and Spatial Conservation Priorities in the Columbia Plateau Ecoregion. https://aridlandsinitiative.org/

▶ **Washington Wildlife Habitat Connectivity Working Group (2007-present)**

The Washington Wildlife Habitat Connectivity Working Group was formed in 2007 under the co-leadership of WDFW and the Washington Department of Transportation. The Working Group is a science-based partnership composed of participants representing land and natural resource management agencies, organizations, Tribes, and universities. Statewide connectivity analyses conducted by the group highlighted the Columbia Plateau as an ecoregion where native vegetation communities are severely fragmented, limiting movement potential for wildlife. In response, the team developed a series of more detailed connectivity analyses within the Columbia Plateau; the products allow partners and stakeholders to visualize connectivity patterns at regional and local scales to inform conservation efforts intent on allowing for continued and future wildlife movement. https://waconnected.org/columbia-plateau-ecoregion/

▶ **Multiple Species General Conservation Plan for Douglas County (2015-present)**

The Multiple Species General Conservation Plan was created by the Foster Creek Conservation District in cooperation with the USFWS to protect habitat in Douglas County, while also protecting the agricultural producers who own land in these areas. The plan focuses on four endangered species found throughout the county (Columbia Basin pygmy rabbit, greater sage-grouse, Columbian sharp-tailed grouse, and Washington ground squirrel). It describes a process for private agriculture landowners or lessees to voluntarily develop site-specific Farm Plans/Site Plans with Best Management Practices that will result in improved habitat for one or more of the covered species. https://www.fostercreekcd.org/copy-of-vsp

▶ **Okanogan Working for Wildlife Initiative (2013-present)**

Coordinated by Conservation Northwest and funded by the National Fish and Wildlife Foundation, the Working for Wildlife Initiative began in 2013 and is a coalition of federal, state, tribal and nongovernmental interests working together to protect wildlife habitat, working lands and natural heritage in the Okanogan Valley and Kettle River Mountain Range. Sharp-tailed grouse and Mule deer are two priority species for the Working for Wildlife Initiative that depend upon a healthy shrubsteppe landscape. https://conservationnw.org/our-work/habitat/okanogan-working-for-wildlife/#:~:text=Funded%20by%20the%20National%20Fish,in%20the%20diverse%20landscape%20of

STATEWIDE PLANS AND EFFORTS

▶ **Washington's State Wildlife Action Plan (2015)**

Washington's State Wildlife Action Plan is a comprehensive plan for conserving the state's fish and wildlife and the natural habitats on which they depend. It objectively assesses the status wildlife and habitats, identifies key problems they face, and outlines the actions needed to conserve them over time; a guiding principle of the SWAP is to identify actions needed to conserve wildlife and their habitats before they become too rare and restoration efforts too costly. The SWAP is structured to allow any partner that has an interest in wildlife and habitat conservation to identify and implement important conservation actions that align with their own conservation mission and goals. To that end, it provides tools and informational resources to support collaborative conservation initiatives across a range of organizations and entities.
https://wdfw.wa.gov/species-habitats/at-risk/swap

▶ **State of Washington Natural Heritage Plan (2022)**

The State of Washington Natural Heritage Plan establishes a list of priority species and ecosystems and describes the criteria and process by which sites are selected for addition to the statewide system of natural areas. The statewide system includes various natural area designations employed by state and federal agencies and private, non-profit organizations. Priorities assigned to species and ecosystems are used by numerous local, state, and federal agencies to guide conservation actions and land-use decision-making.
https://www.dnr.wa.gov/NHPconservation

▶ **Washington State Wildland Fire Protection 10-year Strategic Plan (2019)**

Developed in response to the 2014 and 2015 fire seasons, the Wildland Fire Protection Strategic Plan provides a blueprint for effective wildland fire protection in Washington and informs associated policy and resource decisions. The plan is one part of a larger comprehensive approach to fundamentally change the future trajectory of wildland fire in Washington; it focuses on resilient landscapes, fire-adapted communities, and safe, effective wildfire response. Additionally, the plan addresses wildfire prevention, reducing human-caused ignitions, and post-fire recovery.
https://www.dnr.wa.gov/publications/rp_wildfire_strategic_plan.pdf

SHRUBSTEPPE RANGEWIDE PLANS AND EFFORTS

▶ **Western Association of Fish and Wildlife Agencies Sagebrush Conservation Strategy (2021-present)**

The Sagebrush Conservation Strategy is intended to provide guidance so that the unparalleled collaborative efforts to conserve the iconic greater sage-grouse (Centrocercus urophasianus) by state and federal agencies, academia, Tribes, nongovernmental organizations, and stakeholders can be expanded to the entire sagebrush biome to benefit the people and wildlife that depend on this ecosystem. This Strategy provides the latest science pertaining to the myriad challenges confronting managers of the sagebrush ecosystem that covers portions of 14 Western states and two Canadian provinces. It was produced by a team of 94 scientists and specialists from 34 federal and state agencies, universities, and non-governmental organizations. https://wafwa.org/sagebrush-conservation-strategy/

▶ **Invasive Plant Management and Greater Sage-Grouse Conservation - A Review and Status Report with Strategic Recommendation for Improvement (2015)**

In 2013, the U.S. Fish and Wildlife Service's Conservation Objectives Team identified wildfire and the associated conversion of low- to mid-elevation sagebrush habitats to invasive annual grass-dominated vegetation communities as the two primary threats to the sustainability of greater sage-grouse in the western portion of the species range. This finding led to development of a collaborative assessment of the greater sage-grouse conservation challenges associated with fire and invasives across the species' geographic range, including parts of 11 states and two Canadian provinces. https://wafwa.org/wpdm-package/invasive-plant-management-and-greater-sage-grouse-conservation/

▶ **An Assessment of Native Seed Needs and the Capacity for Their Supply (2023)**

This report examines the needs for native plant restoration and other activities, provides recommendations for improving the reliability, predictability, and performance of the native seed supply, and presents an ambitious agenda for action. This document addresses the various challenges facing our natural landscapes and calls for a coordinated public-private effort to scale-up and secure a cost-effective national native seed supply. https://nap.nationalacademies.org/catalog/26618/an-assessment-of-native-seed-needs-and-the-capacity-for-their-supply

Appendix E. Implementation Work Plan (March 2024 – June 2027)

Note: This is an interim work plan that includes near-term priorities currently identified. Refinement of this work plan will occur through a collaborative process in 2024.

Work Plan Duration: July 1, 2024 – June 30, 2027. Next work plan July 1, 2026 – June 30, 2029.

Purpose: Identify short term tasks (within 3 years) toward fulfilling Strategy actions and identify lead implementers.

Table E1: WSRRI 3-year implementation work plan

#	Action	Year	Lead agencies/ partners
Organization and Governance			
OG1	Develop a tri-agency agreement including roles, responsibilities, and a commitment to shared work.	Year 1	WDFW, DNR, SCC
OG2	Develop a master Interagency Agreement between SCC and WDFW for WSRRI work to easily move money between agencies. *Note: this already exists for DNR and SCC.*	Year 1	WDFW, DNR, SCC
OG3	Develop and implement a plan for tribal engagement and coordination with all interested tribal nations. Establish process for regular information sharing on updates, successes, and challenges with all interested tribal nations.	Year 1	WDFW, DNR, SCC, all interested tribal nations
OG4	Develop protocols for effective collaboration between the Steering Committee, Advisory Group, Regional Teams, and other staff members. Define roles and responsibilities for each.	Year 1	WDFW, DNR, SCC, and all partners
OG5	Identify and stand-up an Advisory Group – develop a charter to include protocols for effective collaboration between the Steering Committee, Advisory Group, Regional Teams, and other staff members.	Year 1	WDFW, DNR, SCC
OG6	Determine the process and criteria for identifying Regional Implementation Team Leads.	Year 1	WDFW, DNR, SCC, Program Manager
OG7	Operationalize the WSRRI Program Manager Role, including liaison roles, programmatic oversight, and communication management.	Year 1	WDFW, DNR, SCC
OG8	Summarize WSRRI capacity needs – prioritize ways to address capacity needs.	Year 1	Program Manager
OG9	Develop a process for the development of work plans, incorporating thorough discussions of the value and viability of actions. Develop procedures for developing work plans at the Regional Implementation Team level and their workflow integration.	Year 1	WDFW, DNR, SCC, Program Manager
OG10	Reconvene all parties to prioritize actions in the Long-Term Strategy and identify initial tasks to achieve highest priority actions.	Year 1	WDFW, DNR, SCC, Program Manager, Partners

#	Action	Year	Lead agencies/ partners
OG11	Create an efficient mechanism for regular reporting and feedback to the Program Manager from Regional Implementation Team Lead Representatives.	Year 1	Program Manager
OG12	Initiate a pilot Regional Implementation Team by identifying and establishing one.	Year 1	Program Manager
OG13	Pinpoint topics that necessitate specialized focus and organize Topical Forums as needed.	Year 1	Program Manager
OG14	Refine the project/needs solicitation, generation, and selection process for soliciting, generating, reviewing, and allocating funds and resources	Year 1	Program Manager
OG15	Provide training and finalize guidance for best use of the WSRRI Spatial Priority maps and dashboard and integration of these tools into regional implementation work plans. Raise awareness of spatial priorities and give partners the means to apply them.	Year 2	Spatial Priority Team, WDFW, DNR, SCC, Program Manager
OG16	Refine the monitoring and adaptive management plan through metric selection and implementation of a tracking system for monitoring both strategy and project implementation and success.	Year 1	Spatial Priority Team, WDFW DNR, SCC, Program Manager
OG17	Establish a multi-agency community engagement plan for WSRRI implementation. Create platforms for sharing information, updates, and successes of WSRRI.	Year 1	WDFW, DNR, SCC
OG18	Identify existing efforts that align with actions identified in the Strategy and coordinate implementation.	Year 1	Program Manager
OG19	Refine objectives for wet (mesic) habitats and greater sage-grouse, to better define the amount and configuration of core areas needed for the conservation and recovery of SGCN.	Year 3	Program Manager, Partners
OG20	Refine the species objectives to be more specific, measurable, and time bound.	Year 3	Program Manager, Partners

#	Action	Strategy	Year	Lead agencies/ partners
Implementation				
I1	Analyze DNR's role in safeguarding unprotected lands: Identify critical paths, pinpoint key activities, and recognize straightforward opportunities. Establish strategies for securing unprotected lands in core areas.	Habitat Restoration	Year 1	DNR
I2	Tailor criteria for projects supported by WSRRI, including practice standards for fuel breaks, planning documents, and fence specifications; enhance these by building upon existing standards such as NRCS BMPs and conservation plans. ▶ Incorporate wildlife benefits and rangeland management specialty into the SCC Center for Technical Development.		Year 1	SCC, Program Manager
I3	Seek further state and federal funding for WSRRI programs, such as through State Legislature, Regional Conservation Partnership Program, Community Wildfire Defense Grants, and Hazard Mitigation programs.		Year 1	WDFW, DNR, SCC, Program Manager
I4	Seek additional funding for Wildlife Friendly Fence initiatives	Habitat Protection	Year 1	SCC
I5	Pursue options for state supported virtual fence infrastructure on public lands and supporting private landowners that have towers to leverage benefit to multiple landowners ▶ Identify efficient opportunities for where on the landscape towers could be placed.	Habitat Protection	Year 2	WDFW, DNR, SCC, Program Manager
I6	Develop a targeted shrubsteppe conservation easement program, focusing on initiatives such as carbon storage in shrubsteppe habitats and projects to prevent habitat conversion.	Habitat Protection	Year 1	WDFW, DNR, SCC, Program Manager, Partners
I7	Maintain active participation in the federal Farm Bill formulation processes	Habitat Protection, Habitat Restoration	Year 1	WDFW, DNR, SCC, Program Manager
I8	Continue identifying and implementing priority habitat restoration projects with existing funding and resources	Habitat Restoration	Year 1-3	WDFW, DNR, SCC, Partners
I9	Develop a native seed strategy	Habitat Restoration	Year 1	WDFW, Partners

Shrubsteppe habitat at the Chester Butte Wildlife Area Unit. J. Haug

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