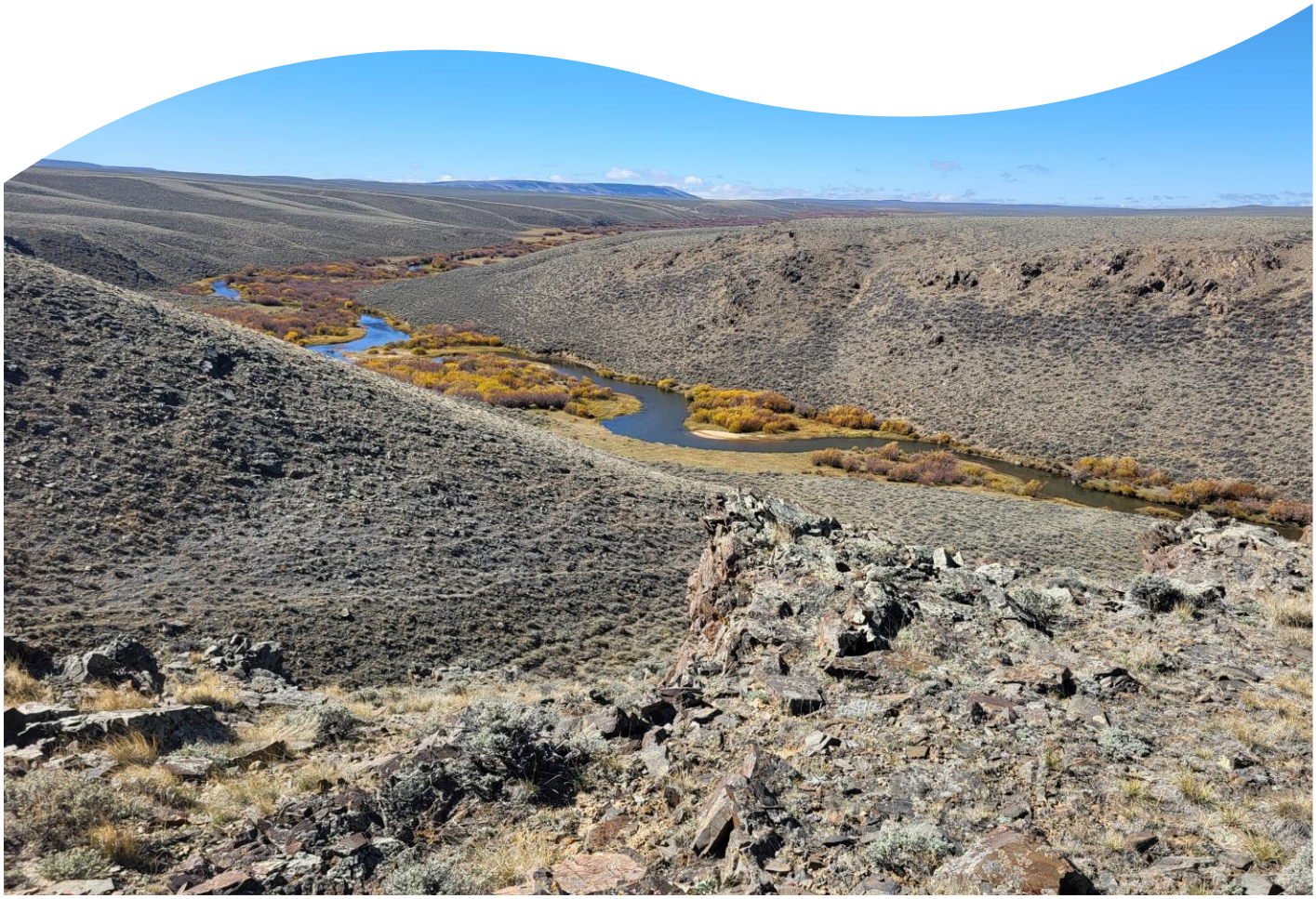
The Nature Conservancy

Defending Wyoming's Core Sagebrush Rangelands Against Cheatgrass

Opportunities and Actions



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About

This report captures the key opportunities for action to better defend Wyoming's sagebrush rangelands against the spread of invasive cheatgrass (*Bromus tectorum*) and other invasive annual grasses. These opportunities came out of a series of in-depth interviews with managers in western and central Wyoming, the results of which are detailed in the companion Current Practices, Challenges, and Knowledge Gaps report. Both reports share learnings and selected, anonymous quotes from interviewees. We encourage readers to consult the Current Practices, Challenges, and Knowledge Gaps report for a more complete picture of the interview responses. Throughout this document, you will find references to the most relevant sections of that longer report.

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Current Practices, Challenges, and Knowledge Gaps

This report PDF



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Introduction

Cheatgrass (*Bromus tectorum*) and other invasive annual grasses (IAGs) collectively represent one of the most significant and rapidly-expanding threats to rangelands in Wyoming and across the Western US. These species are transforming native plant communities into highly flammable systems with reduced diversity and forage value, fundamentally altering the ecological processes and services that support our wildlife habitat and livestock production and moderate the risk of rangeland wildfires. Wyoming is home to the largest remaining extent of "core sagebrush area" – the highest-condition sagebrush where IAGs remain relatively limited. Our state has an important opportunity to get ahead of the IAG problem in core sagebrush areas before it is too late.

There is general agreement that we need to prioritize a Defend the Core strategy against cheatgrass and other IAGs – to keep core sagebrush areas in their high condition state and prevent these areas from becoming dominated by cheatgrass – and therefore extremely difficult to recover. However, how exactly to

> *"Prevention is worth a pound of cure, and we are in the position to do a lot of prevention if we can stay on top of it."*

implement Defend-the-Core can be unclear, and there are many practical challenges that stand in the way. To better understand current management approaches, challenges, and the actionable steps that can be taken to defend Wyoming's sagebrush rangelands against IAGs, we assembled this situation assessment based on in-depth interviews with 22 land managers who work across western Wyoming, spanning a variety of jurisdictions and roles. Here, we present a brief summary of the challenges that managers identified and the key opportunities and potential actions that emerged from participants' responses; the full report provides additional context and detail.

The focus of this report is on opportunities to take proactive management towards maintaining high-condition sagebrush rangelands. In some situations, that includes improving the condition of more-invaded, high-value areas contained within or adjacent to less-invaded areas. It also includes management to prevent the expansion and intensification of cheatgrass invasion. A primary management tool is the herbicide indaziflam (Rejuvra), which prevents seedling emergence and depletes the seed bank of annual plants like cheatgrass; however, other management actions are part of the overall management toolbox, and herbicide treatments may have adverse effects that need to be weighed against their benefits.

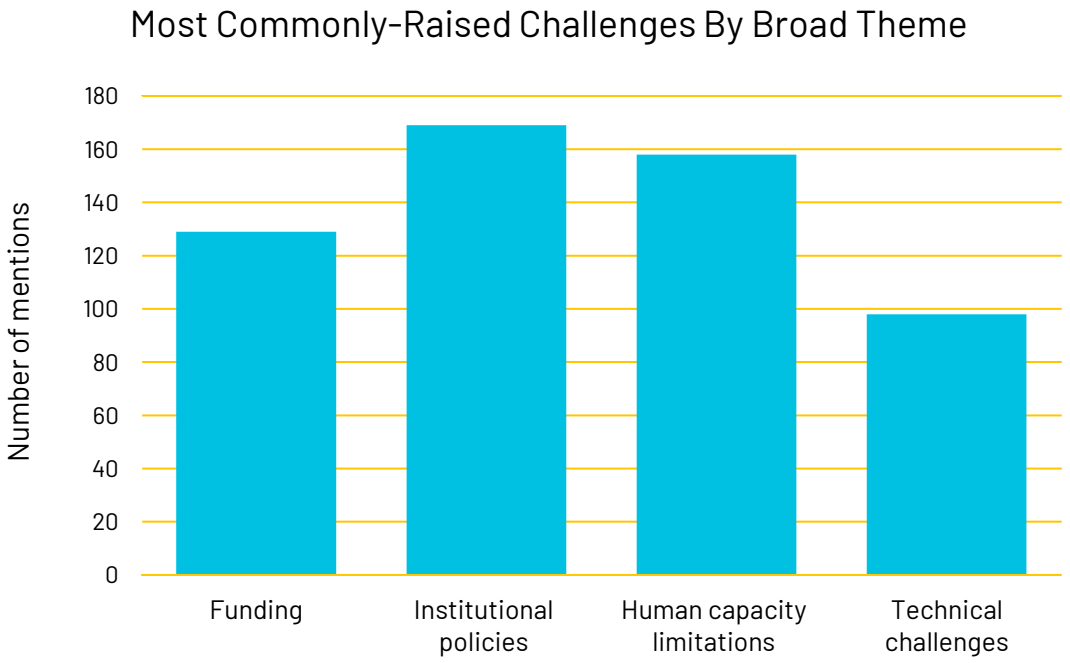
By elevating practitioner experience and identifying constraints to proactive cheatgrass management, this assessment aims to provide a foundation for improving coordination, resource allocation, and strategic action to address one of the most pressing ecological threats facing the state.



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Challenges to Operationalizing Defend the Core

Interview participants identified a variety of challenges they face in defending the core sagebrush habitat in Wyoming against invasive annual grasses. These fell into distinct themes, summarized in these graphs and charts, which represent the number of times the challenge was raised in interviews.



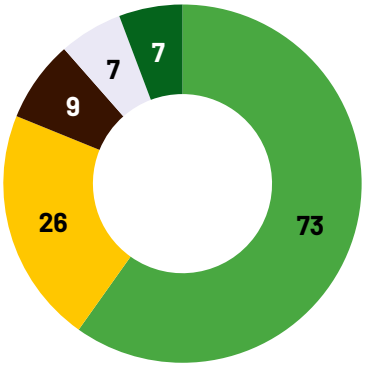


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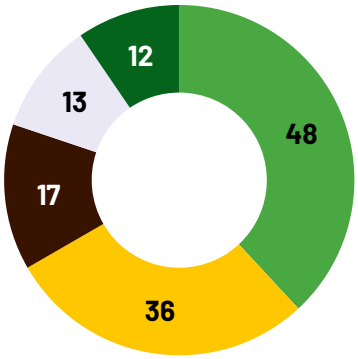
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Funding-Related Challenges



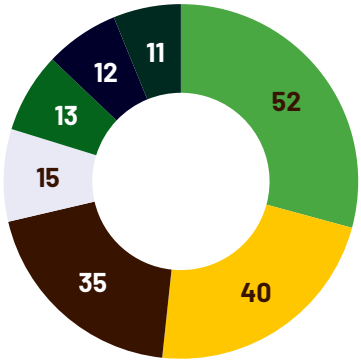
- Funding insufficient to meet the need
- Lack of durable funding
- No dedicated funding for retreatments
- Ongoing budget cuts
- Funding not aligned with timing of need

Challenges Tied to Policies



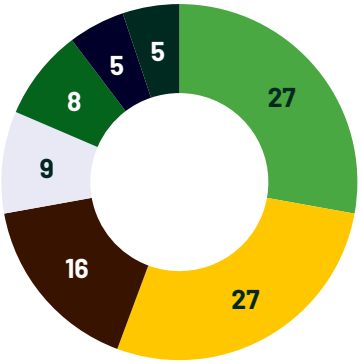
- Piecemeal approach to NEPA process
- Lack of coordinated strategy across jurisdictions
- Other Federal and State review requirements
- Insufficient regulation of seed contamination
- NRCS deferred grazing requirement

Insufficient Human Capacity



- Limited capacity for outreach and education
- Competing priorities
- Capacity for coordinating treatments
- Staffing shortages
- Anticipated shortage of applicators
- Staff and position turnover
- Limited resources for collaboration across boundaries

Technical Challenges



- Inadequate spatial data to plan treatments
- Landscape and climate obstacles to treatment application
- Unpredictable precipitation timing
- Insufficient local data to plan
- Insufficiencies of non-aerial herbicide application
- Limitations of herbicide application by drone
- Minimizing human disturbance post-treatment

Opportunities to Operationalize Defend the Core

The central opportunity that managers reported is to shift from reactive, fragmented treatment to proactive, coordinated prevention and proactive management. Western Wyoming remains in a position to "hold the line" and maintain intact sagebrush systems, rather than attempt large-scale, costly restoration after allowing cheatgrass to increase in these areas. This approach aligns with the Defend the Core strategy, which has been put forward by natural resource experts across the West. Proactive, coordinated, preventative management is consistently viewed as more cost-effective and more likely to sustain ecological function over time than a more fragmented or reactive approach.

Realizing this opportunity will require coordinated advances through multiple pathways. We outline the key pathways for strengthening IAG management across western Wyoming that managers highlighted in their interviews and that directly address many of the existing challenges that inhibit proactive management.

1. Funding Systems to Match the Scale of the Problem

A foundational opportunity lies in establishing or restructuring funding systems to better reflect the long-term nature of cheatgrass and other IAG management. Current funding is widely described as insufficient, episodic, and poorly aligned with the ecological timelines required for effective herbicide treatment (see Section II-A, page 16 in full report), collectively creating the single greatest barrier to management. Specifically, managers are concerned that funding does not meet the scale of the problem and that funding will dwindle and will not be sufficient for retreatments, jeopardizing the value of treatments made to date.



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"My biggest concern is operating at a scale that at least matches the rate of infestation and ideally exceeds it. There are more acres being infested every year than we are able to treat....And so at some point, we're going to have to operate at a scale that's commensurate with the need."

Potential action steps include:

- Establish sustained, multi-year funding mechanisms that both increase total government funding for cheatgrass and other IAG treatments and explicitly account for the retreatment needs; most areas treated with indaziflam are expected to need at least one re-treatment in 3-5 years to deplete the seedbank

- Increase state-level funding, which may help leverage greater federal funding
- Create dedicated early-detection rapid-response (EDRR) funding pools for early-stage detection and action to prevent spread in uninvaded and minimally-invaded area

2. Coordinate Actions Across Boundaries

Decision-making structures are not always aligned with ecological dynamics, management needs, and scientific understanding, and these misalignments can hinder proactive cheatgrass management (see Section II-B, page 18 in full report). Current management is often fragmented along land jurisdiction lines (Section II-C-iv, page 25), limiting the ability to implement landscape-scale strategies and resulting in discontinuities that reduce the efficacy of management actions. Addressing these constraints represents a significant opportunity for improving management effectiveness. Interview participants highlighted that current practices allow for locally-sensitive management but can also result in fragmented, patchwork approaches rather than being tiered under a unified statewide framework. Many felt that a statewide strategy is needed to achieve the ideal goal of maintaining or improving conditions in core sagebrush areas. Participants also described how aligning treatment timing, tools, and objectives across land ownership and management boundaries would improve efficiency and ecological outcomes.

Potential action steps include:

- Develop a statewide IAG strategy
- Organize management around watershed- or landscape-scale planning units
- Use shared planning processes to prioritize and align management actions and treatment timing
- Create or expand IAG coordinator roles to bridge across agency, land ownership, and county lines

"How can we do better to collaborate between all these different agencies who are trying to do the same thing? We've been needing to do that for a while."



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"We need to think statewide. I think people realize that you need to look beyond your little walls at times, and make great decisions for the bigger cause and the bigger picture."



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3. Align Policies

A statewide strategy and structures to support cross-boundary action would have more traction and be more implementation-ready with alignment in policies and procedures. Permitting and approvals, especially the NEPA process, was one of the greatest challenges that managers consistently identified (see Section II-B-iii-b, page 21 in full report)

Potential action steps include:

- Create policies that incentivize cross-boundary and multi-partner projects that align with a statewide strategy
- Improving consistency and efficiency of NEPA processes and approvals to accelerate NEPA approval for aerial herbicide treatment

Participants highlighted several other, specific opportunities to adjust policies in order to enable more proactive cheatgrass management. Many of these have nuanced considerations behind them and are not uniformly supported; these considerations are summarized in the full report.

- Modify the NRCS post-treatment grazing deferment requirement to be more flexible and/or incorporate incentives for virtual fencing to enable temporarily subdividing large pastures
- Adjust downward the NRCS threshold of 15% cheatgrass cover needed to access EQIP funds for treatments, to support intervention and treatment at earlier stages of invasion
- Designate cheatgrass as a state-level noxious weed to support funding access and unified prioritization
- Reduce the rate of permissible IAG seed contamination in restoration seed mixes, under Wyoming's Seed Law, to reduce unintended IAG spread in restoration projects.

"I think that cross-boundary partnership is a pretty big deal. If we all have the same tools available to us without restriction, and I'm thinking specifically of the NEPA piece... Having the ability to treat state and BLM and Forest Service all in the same flight would really help, and we know that, and we're trying, but we just haven't quite hit our stride there."



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"I think one of the things for the NRCS programs is that they require a growing season rest after treatment, so that can be kind of hard for people. We have really large pastures for the most part, and so to rest the whole pasture, it sometimes isn't feasible. So that would be the number one reason why NRCS programs don't work sometimes for landowners."

4. Increase Workforce Capacity and Implementation Support

Interview participants cited human capacity limitations as a consistent constraint hindering planning, implementation, monitoring, and coordination (see Section II-C, page 22 in full report). Addressing these limitations represents a critical opportunity to scale management efforts. Sustained investment in personnel, rather than project-based funding alone, will be necessary to match the scale and complexity of the problem over time.

Potential action steps include:

- Increase and/or create dedicated IAG implementation staff capacity within agencies
- Establish more coordination positions that can work across county, agency, and other and jurisdiction lines to support partnerships and projects
- Increasing funding for and capacity of inventory and monitoring field crews and associated data management, analysis, and report-back systems
- Expand technical transfer programs to share current best-practices and knowledge as it evolves
- Increase incentives, training opportunities, and contracting stability for aerial (helicopter and drone) applicators to expand treatment capacity

"It often feels like our fingers are in 10 places in the dam, trying to hold stuff together and [we need] having other people that are also looking and helping us understand the state of things in a systematic way."

"Monitoring is probably the most neglected thing that we do, not because we don't want to, but we have limited capacity to do so."



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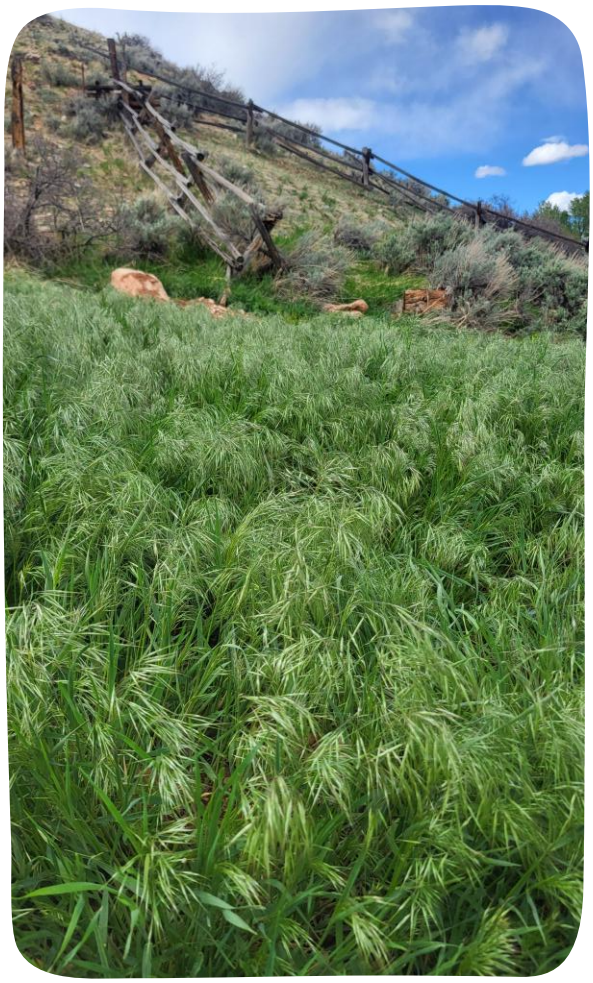
5. Expand Education and Outreach

Participants felt strongly that broadening awareness and understanding of invasive annual grass impacts is essential for sustaining long-term management efforts (see Section II-C-iv-b, page 26 in full report). Many landowners and residents have gaps in their understanding of the connections between cheatgrass and wildfire risk, economic losses, and ecosystem degradation.

Potential action steps include:

- Expand outreach to landowners, communities, and decision-makers through messengers that speak to their interests in locally-relevant terms
- Message better the economic impacts of inaction (such as to agricultural systems and fire-related costs), versus the opportunity to take less costly proactive management actions now
- Frame cheatgrass as a wildfire risk, economic issue, and wildlife habitat threat
- Share visible success stories and demonstration projects

"The number two barrier is [the need to create] buy in and making sure that everyone understands the importance and wants to be part of the solution... and I'm not talking just about landowners, I want people who don't know anything about cheatgrass today to know that it's a problem, and even if they don't have land, they want to figure out a solution."



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6. Support Planning With Data

Assessing the conditions on the ground, over large areas of land, can be challenging. Although many different maps of IAG cover and other spatial planning tools exist, limitations in accuracy and accessibility make it challenging to use them for making management decisions (see Section II-D-i, page 27 in full report). A key opportunity is to better-support managers to navigate and understand different sources of information, integrating region-wide spatial data, local information, and boots-on-the-ground monitoring data. Data collection – both remotely and on the ground – is needed to detect low-level and emerging invasions and to evaluate the outcomes of treatments. Technically-trained staff can help navigate and understand available local information and region-wide science to ensure it is accessible to managers making local decisions.

"Keeping up with what technology and spatial data is available is really challenging"

"Right now, remote sensing is focusing on looking at these big, solid, very thick stands of cheatgrass. I don't need that. We might have like a 10th of an acre. That's what I need to detect. I don't need to detect a hillside... I want to detect it when it's like, the size of my truck, and that's hard."

Potential action steps include:

- Advance a shared, cross-agency data platform for storing and accessing geospatial data, field data, and pre/post treatment data
- Expand capacity and tools for early-detection monitoring and pre/post treatment monitoring
- Improve accessibility and usability of planning support products for managers
- Integrate field data with these geospatial data to guide prioritization and adaptive management
- Evaluate accuracy of geospatial data, including new tools as they become available; develop and test technologies for detecting smaller patches and lower-cover areas.



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7. Address Knowledge Gaps

The knowledge gaps identified through interviews highlight both critical research needs and opportunities to better translate existing science into management (see Section III, page 31 in full report). While some uncertainties require new research, some reflect challenges in accessing, synthesizing, or applying available knowledge. Addressing these gaps is essential for improving decision-making, evaluating risk, and increasing the effectiveness of invasive annual grass (IAG) management in Wyoming.

Potential action steps include:

- Conduct applied and local research on treatment longevity, reinvasion, and treatment impacts on native species
- Increase evidence-base for thresholds that should trigger treatments or other management actions
- Improve understanding of cheatgrass spread rate and dynamics in less-invaded areas
- Expand technical transfer capacity to translate science into actionable guidance
- Develop practical restoration guidance, including seed mixes and treatment sequencing, for more-invaded and post-fire areas
- Invest in making quality native seed available
- Generate ways to robustly compare the risks of herbicide impacts with risks of cheatgrass-driven ecosystem degradation and fire and communicate these relative risks

"At what point do we need to treat in general? ...we think we really need to catch it early, and I agree with that philosophy. But...what is early, right? Or what percentage is ideal? Is that 5% canopy cover? Is that 10? Is it 15? Are you too far gone at 20?"



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"We don't really know how long the positive effect is going to last... How fast can it reinvade? Is it going to reinvade from that one seed that could last 10 years, or is it going to reinvade from a seed that falls off of a bike or a bird or a deer or something, and then what's that going to look like, is the system healthy enough to resist it?"

8. Manage Spread

Managing the pathways through which invasive annual grasses spread represents one of the most immediate and cost-effective opportunities for slowing expansion. Cheatgrass is being found at progressively higher elevations as hotter, drier conditions combine with vectors of spread such as roadsides, energy corridors, recreation areas, and wild and domestic animals. Yet, resources are not always available to control and prevent spread (see Section II-D-ii, page 28 in full report). By focusing on vectors of spread, managers can more effectively prevent new infestations and protect intact areas within Defend the Core frameworks.

Potential action steps include:

- Promote greater treatment along highway corridors, other roads, energy corridors, and infrastructure, especially in otherwise uninvaded or very low invasion areas
- Coordinate roadside IAG treatment timing with mowing and regrading on state and county roads
- Implement EDRR to target new outbreaks due to livestock and wildlife-related seed transport and human recreation activities
- Anticipate spread into higher-elevation areas and plan EDRR accordingly
- Expand the use of drones for treating small or inaccessible infestations



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"I definitely think [cheatgrass] is getting worse. It's going up in elevation. I think our climate is causing or creating a condition for it to get a leg up, by just the fact that now we're seeing it pushing 10,000 feet elevation."



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"In the higher elevations, you see [cheatgrass] marching up the roadsides. And in the Beartooths, we've got it up to almost 9,000 feet. That's pretty high. I'm a little worried about the alpine."

9. Anticipate Fire

While a Defend the Core approach is aimed primarily at avoiding risk of cheatgrass-fueled fire, it is important to expect that fires will happen, even in core sagebrush areas. Rangeland fires may become more frequent and extensive with hotter, drier conditions. Therefore, a critical opportunity is to be more ready to respond to fires in a timely, coordinated fashion to prevent high-condition sagebrush from becoming dominated by cheatgrass post-fire. Funding for post-fire management is sometimes only available on a quick turnaround time, putting pressure on managers to make rapid decisions.

Potential action steps include:

- Develop and share guidance for planning post-fire response that can be turned to quickly in the wake of a fire
- Assess post-fire recovery outcomes, to inform future planning that takes into account Wyoming's ecology, which is different from the Great Basin's
- Invest in making quality native seed available for post-fire use
- Recognize that realistic post-fire outcomes and goals will differ depending on pre-fire condition



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10. Operationalize True Defense

Through this interview process, it became clear that while Defend the Core is widely recognized as an essential strategy, it is a broad umbrella term that can translate to multiple different actions and approaches. There is a key opportunity in Wyoming to implement true defense, since large areas remain cheatgrass-free. While much attention goes to areas with some level of invasion, a critical opportunity is to keep some resources, coordination, planning and treatment efforts dedicated to keeping uninvaded areas uninvaded. Many of the strategies to do so are covered in the preceding nine action opportunities; however, some actions would especially enable more rapid, coordinated, and effective responses.

Potential action steps include:

- Align Wyoming practitioners around a Defend the Core implementation framework
- Commit durable funding and resources specifically towards maintaining high condition uninvaded and very-low invasion rangelands
- Establish clear EDRR protocols, including: defined detection responsibilities (who is monitoring), standard reporting and tracking systems, thresholds that trigger treatment
- Expand early detection capacity through field crews, drone and high-resolution satellite imagery, and community reporting networks
- Advance science and tech transfer to develop "how-to" guidance for stopping and/or slowing early spread
- Public outreach and communication to support the need and understand the risks of inaction



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Concluding Words

The 10 opportunities and specific actions identified in this report are not necessarily new; many of these same needs were identified in the 2020 Governor's Invasive Species Initiative final report, as well as the 2021 Wyoming Game and Fish Department's Invasive Annual Grass Implementation Plan. What this report does is to elevate the voices of managers working on the ground. It focuses on the needs and opportunities particularly for defending the less-invaded parts of Wyoming against spread of cheatgrass and other IAGs. In doing both of these things, we hope that it re-elevates attention and motivation, leading to sustained action.

Addressing this challenge will require collective effort among federal, state, and tribal governments, NGOs, scientists, and members of the public. However, as noted by Governor Gordon in 2019, "while our neighbors are contemplating restoration, we still have the opportunity in many areas to contemplate prevention, retention of habitats, and improvement." Together, addressing these 10 opportunities would support a transition from reactive management toward a system built on maintaining Wyoming's expansive and intact core sagebrush that makes it unique in the American West.



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