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Tackling Idaho's Cheatgrass Challenge

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WHAT'S INSIDE

This booklet serves as a call-to-action to reduce cheatgrass and other invasive annual grasses in sagebrush country by providing information on the invasive annual grass issue, laying out a proactive strategy for tackling the problem, and describing some actions land managers can take to fight back.

The Problem (pgs. 2 – 4)

Cheatgrass and other invasive annual grasses, such as, medusahead and ventenata, are taking over America's sagebrush rangelands, increasing wildfire size and frequency, reducing forage productivity, and threatening wildlife habitat and rural economies.

Efforts to control invasive annual grasses are too often done reactively where invasive infestations are already bad, at relatively small scales, and without sufficient regional context for long-term success.

A Proactive Strategy (pgs. 5 – 8)

Science shows that invasive species control is more effective and cost-efficient when done early, before infestations become widespread, and when management responses are informed by what's going on in the surrounding landscape. With this in mind, Idaho partners have come together to devise a new statewide strategy that provides all-hands, all-lands vision for implementing the right actions, in the right places, at the right time.

Three coarse region types have been identified across rangelands in the state: 1) Core areas consisting of relatively low cover of annual grasses, 2) the Annual Grass Region dominated by moderate-to-high cover of annual grasses, and 3) Transition Zones representing areas between cores and the annual grass region.

Identification of these broad regions allows for implementation of a proactive and strategic approach to tackling annual grasses: Defend the core. Grow the core. Mitigate impacts.

Defending relatively uninvaded cores from annual grass conversion is a top priority to maintain resilient and healthy rangelands. A secondary priority is to grow the core by restoring the transitioning zone. Finally, perpetual management will be required in the annual grass region to mitigate the most severe impacts of the cheatgrass-fire cycle on life and property.

On the Ground (pgs. 9 – 14)

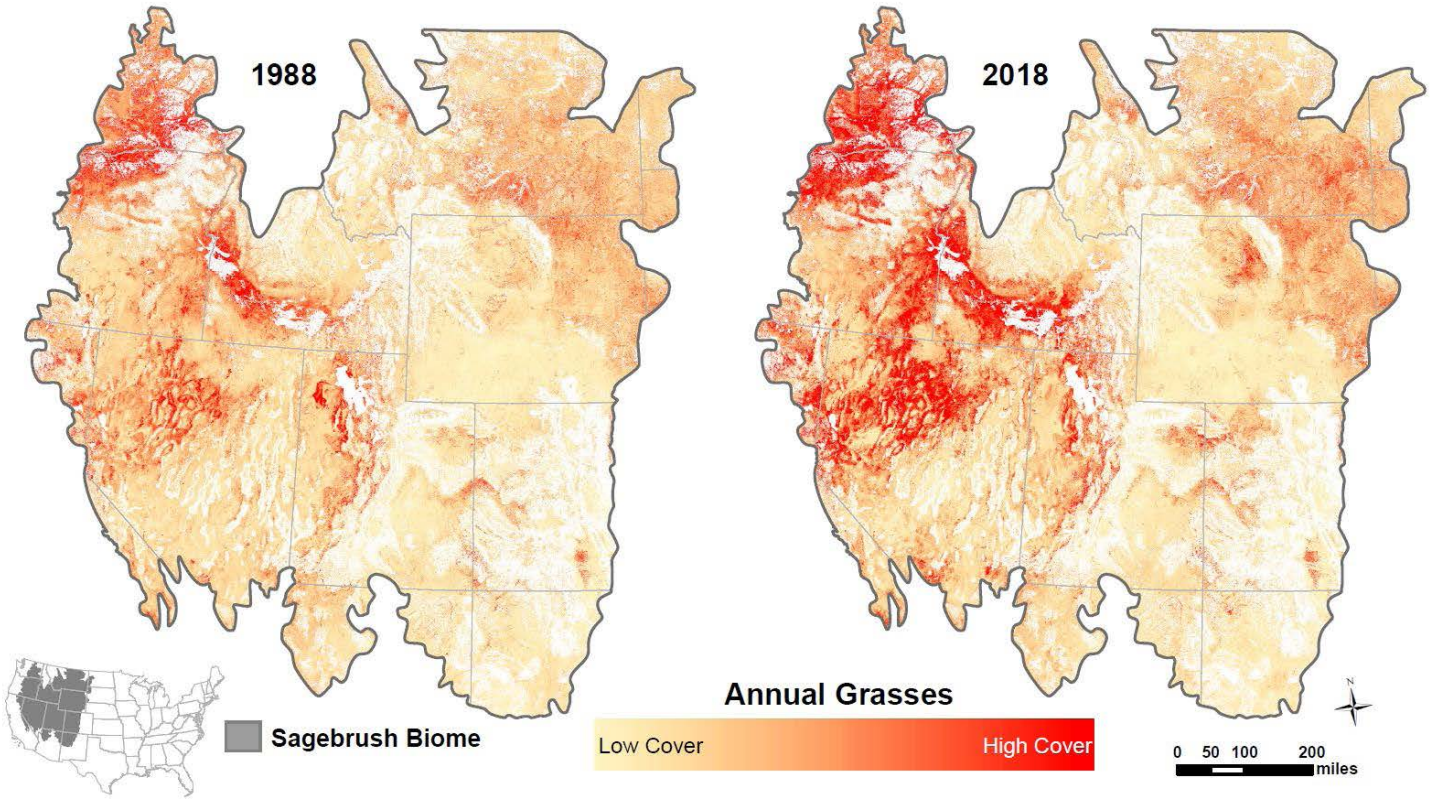
Healthy perennial plants, especially perennial grasses, provide the best defense in the long run against annual grass invasion. Long-term solutions lie in integrated, ecologically based approaches that manage both for perennials and against invasive annuals.

A variety of actions can be taken to reduce invasive annual grasses. These include measures to prevent invasions, manage invasions once they occur, and maintain/restore perennial-dominated rangelands. Which specific actions managers take should be informed by what kind of landscape they're in (core, transition zone, or annual grass region) and community-based plans for achieving desired goals for the region.

References (pgs. 15 – 16)

Tackling Idaho's Cheatgrass Challenge

A Call-to-Action to Reduce Cheatgrass and Other Invasive Annual Grasses in Sagebrush Country



Source: Rangeland Analysis Platform (Matthew Jones and Brady Allred | University of Montana)

Invasive annual grasses have been increasing across sagebrush rangelands in the western U.S. fueling larger and more frequent fires.

The challenge

Cheatgrass (*Bromus tectorum,* or downy brome) and other invasive annual grasses are taking over America's sagebrush rangelands, increasing wildfire size and frequency, reducing forage productivity, and threatening wildlife habitat and rural economies. Cheatgrass invasion represents one of the single largest challenges to the health and resilience of western working lands. Accidentally introduced to the U.S. in the 1800s, cheatgrass has spread rapidly replacing native vegetation along the way. Some 52 million acres are already invaded with more than fifteen percent cheatgrass cover[1]. Although not as pervasive or well-known, other annual grasses that may be even more problematic if left unchecked are increasing too, such as, medusahead (*Taeniatherum caput-medusae*) and ventenata (*Ventenata dubia*).

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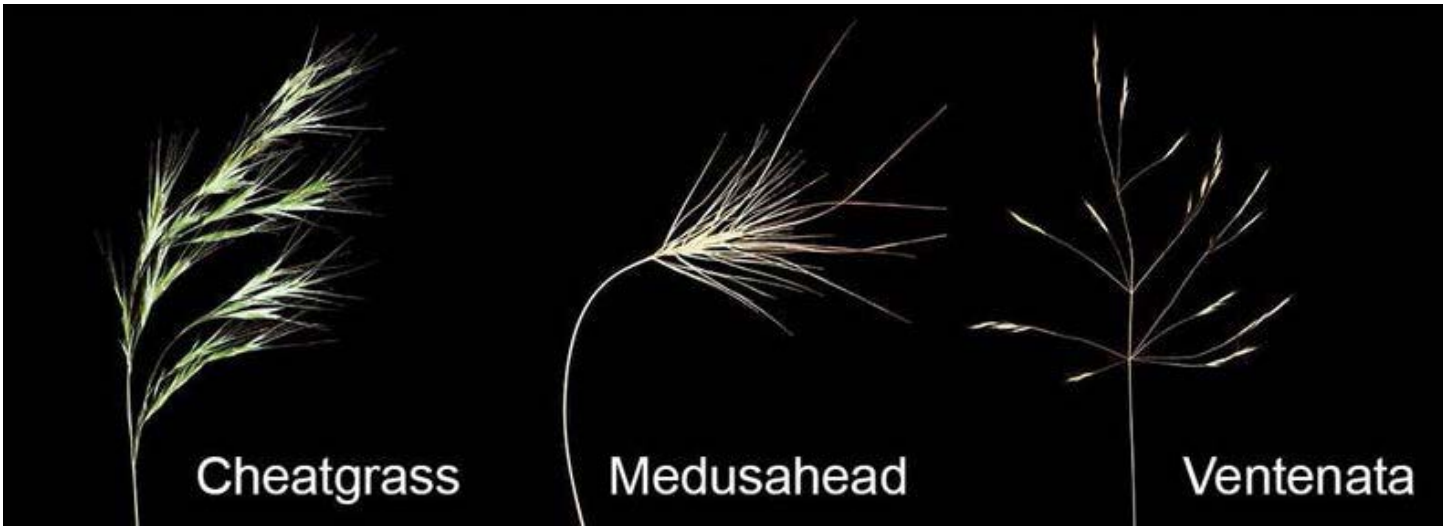
Cheatgrass fuels fires

Cheatgrass invasion doubles the risk of wildfire on a piece of land[1]. As its name implies, cheatgrass 'cheats' native vegetation by greening up earlier in the growing season, using up the limited soil moisture and nutrients available on arid rangelands. It dries out early in the summer and remains highly flammable throughout the fire season. Dead cheatgrass plants (litter and thatch) build-up fine fuels that feed fire. Cheatgrass grows densely, creating more continuous fine fuels that helps fire spread faster than it normally would in native vegetation that is patchier with bare ground spaces. Cheatgrass creates a vicious cycle: more cheatgrass promotes more wildfire, more wildfire promotes more cheatgrass. Allowing cheatgrass to become dominant means lands are 4 times more likely to burn than lands dominated by native vegetation[2]. The result over time is larger and more frequent fires. In the worst cases, fires occur every 3 to 5 years as opposed to every 50 to 100+ years as historically occurred[3]. While fire is a natural part of sagebrush rangelands, fires that are too frequent make it difficult for native plants to re-establish, leaving the door open to invasive annuals to take over.

Why are invasive annual grasses so competitive?
Cheatgrass, medusahead, and ventenata are annual grasses, meaning they sprout, grow, produce seed, and die within one growing season. They are considered winter annuals because seeds usually germinate in the early- or late- winter months—giving them a head start on native plants—then they grow in the spring, mature and die by early summer. Unfortunately, these plants are well-adapted to the climate of the Intermountain West.

They are prolific seed producers, sometimes capable of growing more than 1,000 plants per square foot, and surviving in the soil for 3 to 5 years. Seeds readily stick to clothes and animal fur which helps them easily spread to new areas. Invasive annuals grow under a wide range of conditions and have high survival through winter. By completing their life cycle early in the season, invasive annual grasses are able to gain a competitive advantage over newly-germinated native plant seedlings that take longer to grow. Invasive annual grasses thrive in disturbed areas, so maintaining healthy native plants is key to reducing invasion.



Beth Fowers

Seedheads of three primary invasive annual grasses. For more identification information, refer to: [Wyoming Weed and Pest Council's Invasive Grass Quick Guide](#).

Are your rangelands cheating you?

Healthy sagebrush rangelands are working lands that support livestock production, wildlife habitat, and recreation that sustain western communities. Annual grass invasion undermines ranch viability and recreational opportunities with economic impacts most apparent in the aftermath of wildfire that results in the loss of forage, habitat, and infrastructure. However, less obvious economic impacts are also occurring before fire as invasive annual grasses cheat the land of its productivity and diversity.

As annual grasses invade, perennial species that provide a reliable source of nutritious, year-round forage on native rangelands are replaced by invasive annuals that are used only sparingly by livestock and wildlife. Cheatgrass can provide adequate forage for livestock in the spring before it produces seed, and some land managers find it acceptable for that purpose. Medusahead and ventenata are much less palatable to grazing animals than cheatgrass due to their high silica content.

> *"That's why they call it cheatgrass. Just when you think you can count on it, it loses that green and dies. Your forage is gone."*
>
> *Jon Griggs,*
> *Maggie Creek Ranch, Nevada*

Leaving invasive annuals unchecked allows them to increase and spread, reducing overall forage quantity and quality. Invasive annual grasses effectively shorten the 'green window' – limiting the period when palatable forage is available and making feed less dependable from year-to-year as production varies wildly with precipitation. Dense infestations of medusahead can reduce livestock carrying capacities by up to 70%[4].

Treating areas heavily invaded with annual grasses is expensive and challenging, so it's crucial to act early while infestations are small and before desirable perennial plants are gone. In fact, land managers can save money in the long-run by first working to prevent invasion altogether, and second, treating invasive annuals while infestations levels are still relatively low.

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Shared Vision: Productive, working rangelands that are resilient to fire and resistant to invasive annual grass conversion

Taking a proactive and strategic statewide approach

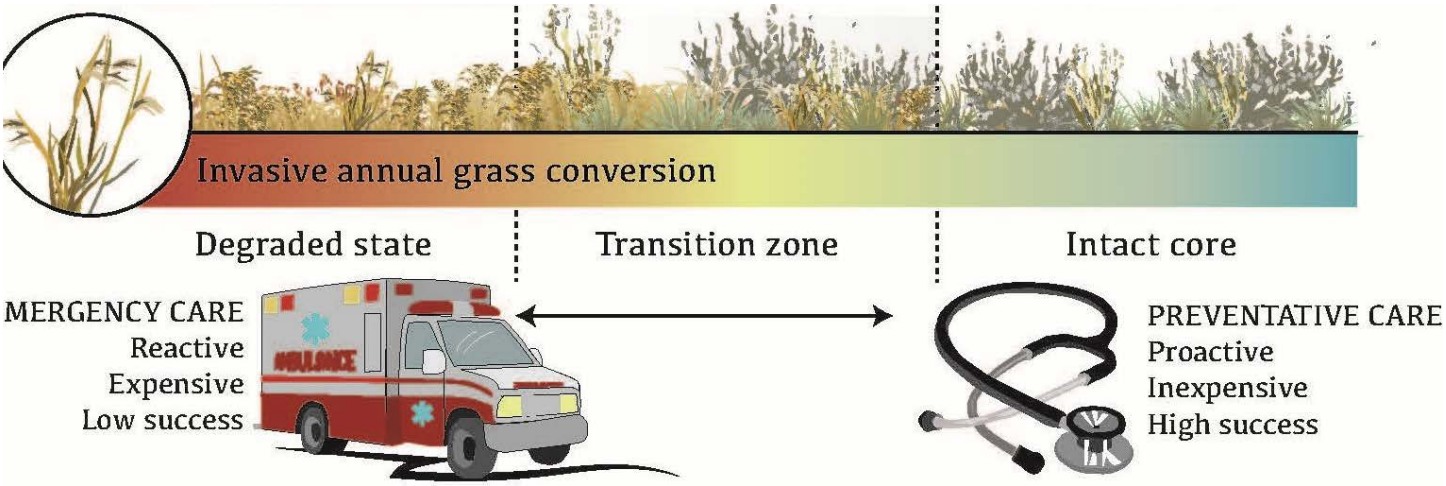
Efforts to control cheatgrass and other invasive annual grasses are too often done reactively where invasive infestations are already bad, at relatively small scales, and without sufficient regional context for long-term success. Unfortunately, the result has been the continued loss of productive rangelands to invasive annuals. Stopping the wholesale conversion of sagebrush rangelands to annual grasslands requires us to think differently about how to tackle the problem. Science shows that invasive species control is more effective and cost-efficient when done early, before infestations become widespread, and when management is informed by what's going on in the surrounding landscape.

With this in mind, Idaho partners have devised an overarching statewide approach to tackling invasive annuals. The approach starts by taking a big picture view to assess the current condition of rangelands relative to the annual grass problem in order to provide landscape context for local stakeholder discussions of management goals, priorities, tradeoffs, and expectations[5]. Three coarse region types were identified using newly-available vegetation data and analyses[6,7]:

Core. These areas represent regionally intact landscapes as characterized by relatively low cover of annual grasses. The regions are still largely in a stable sagebrush rangeland state. Local areas of higher annual grass cover may be present within the regions, but the overall landscape is still relatively uninvaded.

Annual Grass Region. This region, primarily along the Snake River Plain, is characterized by a landscape dominated by moderate-to-high cover of annual grasses. Some rangelands have already converted to a new stable annual grassland state. Local areas of lower annual grass cover are present within the region, but their long-term integrity is compromised by occurring in a setting of higher invasive annuals. Frequent fires and re-invasion from neighboring areas make management of invasive annuals difficult and costly.

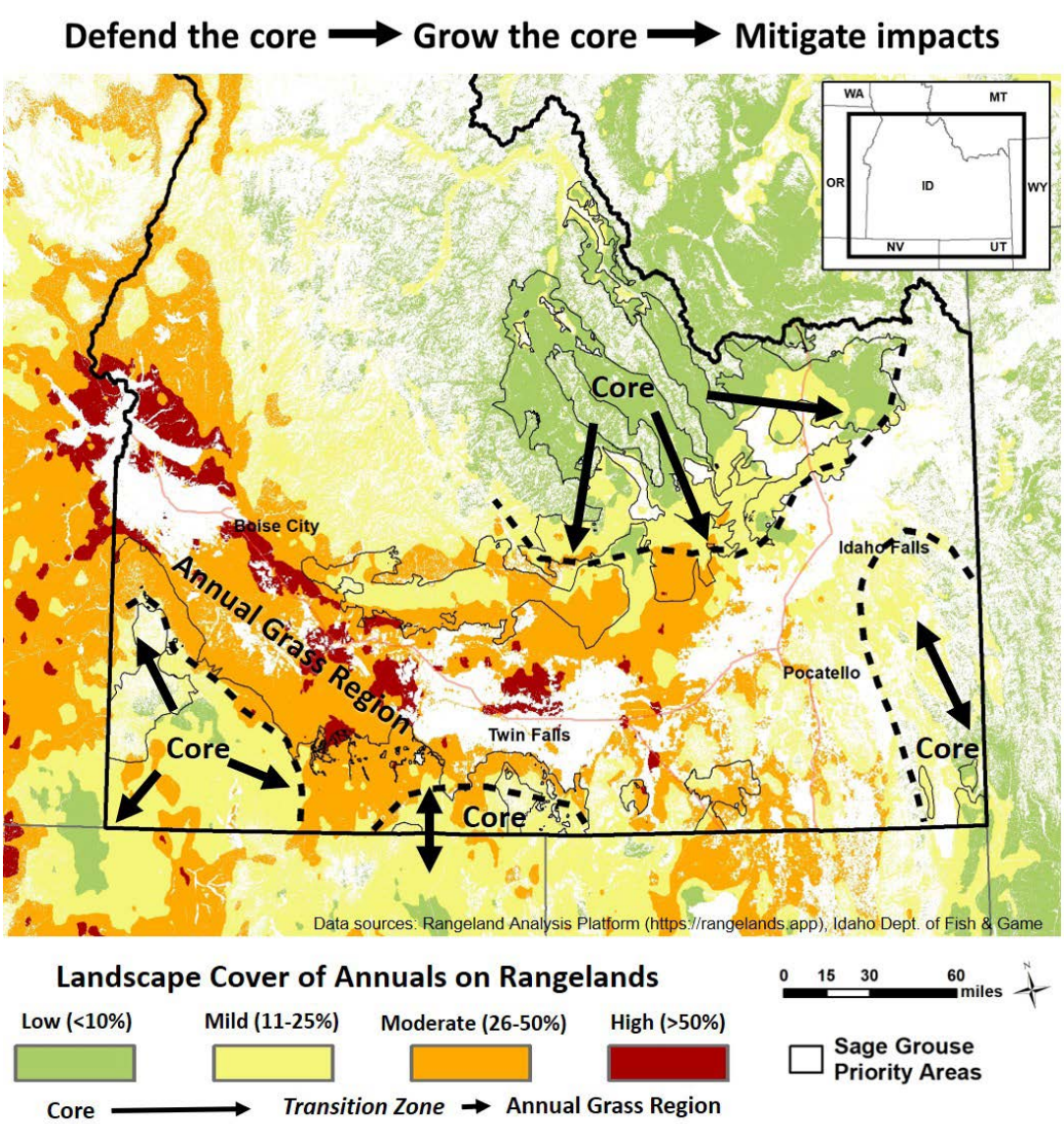
Transition Zone. Regional transition zones occur between relatively intact cores and the annual grass region. These regions are undergoing change at landscape scales as areas of higher annual grass cover spread into relatively intact sagebrush rangelands. These are areas of high unpredictability for management as ecosystems undergo impacts from invasive annuals and reorganize.



With this statewide perspective, goals for a new proactive, rather than reactive, strategy for managing the invasive annual grass threat can be laid out: 1) defend the core, 2) grow the core, 3) mitigate impacts. Locating relatively intact core regions of low annual grass cover is critical as it provides regional anchor points for future conservation and restoration efforts. Defending intact cores from annual grass conversion is a top priority for management. Management emphasis within intact cores is early and aggressive control of annual grass invasions (e.g., Prevention and Early Detection Rapid Response) to maintain healthy sagebrush rangelands. With successful management, these areas are expected to remain as intact rangelands over the long term.

While intact cores are being defended, a secondary priority is to grow the core by pushing back the transitioning zone. Management emphasis within transitioning zones is on containing spread of the annual grass region into cores and restoration of invaded lands to recover sagebrush rangelands. Since these areas are undergoing large-scale ecosystem change, higher uncertainty about management effectiveness is anticipated. With sustained management, it may still be possible to restore intact rangelands in these areas but continual monitoring and adaptive management is expected over time.

Finally, in order to mitigate the most severe impacts of the cheatgrass-fire cycle on life and property, the strategy recognizes the need for investing in perpetual management in the annual grass region. Management emphasis in this region includes asset protection, fine fuels reduction, and rehabilitation to perennial grasslands. Localized restoration of sagebrush may still be possible and desired in high-value habitats, but a sustained effort will be needed to maintain these habitats through time. Even with successful management, this region is expected to continue to be heavily impacted by annual grasses into the foreseeable future.



The map at left depicts the landscape cover of annual forbs and grasses on rangelands. Dashed lines represent the approximate transition zones between relatively intact cores and the annual grass region. Arrows depict the strategic direction of management:
1) defend the core,
2) grow the core,
3) mitigate impacts.

Prioritizing where to work within regions

While the broader statewide strategy lays out a vision for the preferred direction of management, it is likely that annual grass management will occur within all three region types. Given the vast area and limited resources, additional information should be used to prioritize project-level treatments within each region. A variety of decision-support tools and data[5], used alongside local knowledge, can be helpful in prioritizing where to work, such as:

- Vegetation data: Field and remotely-sensed vegetation composition and productivity data
- Resource values: Sage grouse priority habitats (e.g., core areas, lek locations), big game corridors, critical infrastructure, etc.
- Risk maps: Invasive annual grass suitability models, resilience and resistance (R&R)
- Soil survey information: Soil properties (e.g., texture, depth, temperature and moisture regime)
- Topographic maps: Elevation, aspect, roads
- Other information: Availability of existing NEPA, human capacity, proximity to other projects, cultural will and readiness to act, etc.

Local stakeholders are best positioned to decide which specific management actions need to be taken and where they should be focused first. Convening community-based partnerships to discuss how best to achieve the regional goals (e.g., defend the core, grow the core, or mitigate impacts) can help create a shared vision across ownerships and leverage resources. Concentrating management efforts in specific geographies also makes measurable outcomes more likely, as opposed to postage-stamp projects scattered across a region. Large-scale demonstration projects showing that we can move the needle on invasive annual grasses are a great way to build momentum for future success.

Getting to the ‘roots’ of the problem

With a regional strategy and prioritization process in place to help local management maximize opportunities for success, partners can step down to the scale of individual sites to think about how to fix the problem. Successful weed management requires an understanding of the underlying causes of invasion and the processes driving plant community change[8]. Science shows us that healthy perennial plants, especially perennial grasses, provide the best defense in the long run against annual grass invasion[9,10].

Healthy and diverse rangelands support multiple plant functional groups that help fill places (niches) that might otherwise be available for invasive annuals. To reduce invasive annual grass impacts, perennial plants need to win the battle over invasive annuals.

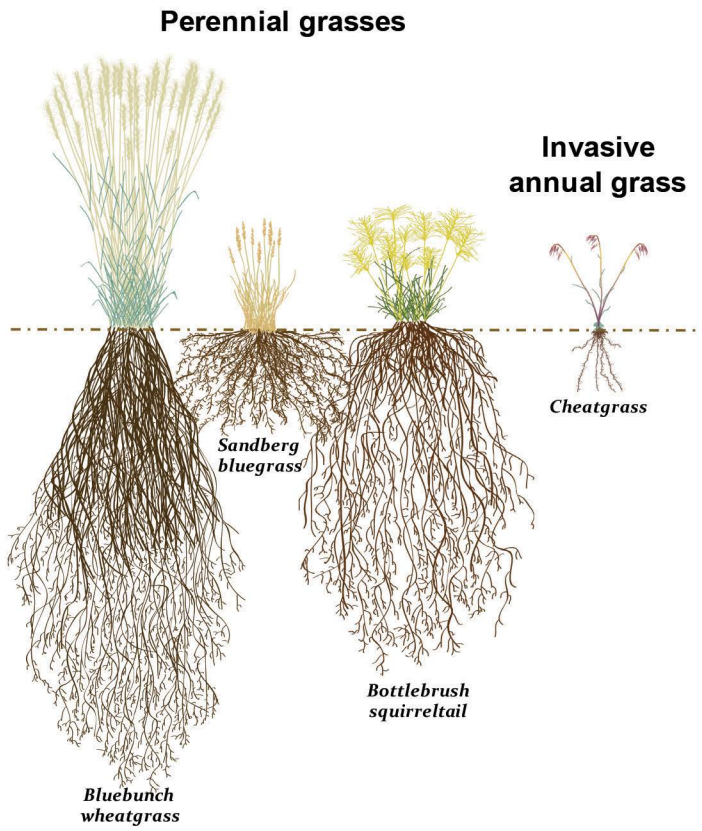
USDA-Agricultural Research Service, Burns

Maintaining a sufficient density of healthy perennial grasses (left) is a key factor in preventing conversion to invasive annual grasslands (right).

Management that only focuses on killing the weed, without considering what allowed its initial invasion, and what will take its place when it's removed, are ineffective. Long-term solutions lie in integrated, ecologically based approaches that manage both for perennials and against invasive annuals. This approach helps build rangelands that are more resilient to disturbance (i.e., come back to perennials after fire) and resistant to annual grass pressure (i.e., lands remain largely unchanged despite weed presence), which is the overarching goal of rangeland management[11,12].

Managers must think about causes of plant succession that might be favoring invasive annuals over desired perennials, or vice versa[8]:

1. are there niches for the native or invasive plants to grow on the site,
2. are there seed sources available for native or invasive plants to occupy the site, and
3. how is management affecting the native or invasive plant's ability to grow and reproduce?



Healthy perennial grasses produce abundant roots that help take up belowground niches and build weed-resistant rangelands.

On rangelands, plants compete for limited water and nutrients but what we see above ground is only part of the story. Healthy rangelands support diverse plant types with abundant roots that help keep potential invaders out. Space between plants may look like bare ground, but that space may be 'occupied' below ground where competition is occurring for resources[13].

When bunchgrasses and other native plants are stressed, limited, or lacking, opportunities arise for invasive species to take over. Healthy perennial bunchgrasses can live for many years, but seed production occurs episodically. Plants must remain vigorous enough to reproduce during favorable conditions, and have weed-free areas to establish, or plant replacement will not occur leaving even more room for weeds through time.

Considering potential sources of invasive annual grass seed is also crucial. The life cycle of annual grasses requires them to produce seeds most years to survive. If invasive annuals are already present on a site, then management must seek to reduce or eliminate seed production. One-time treatments that just kill existing plants are often ineffective because seeds can persist in the soil for 3 to 5 years. Once annual grasses mature and die, they also produce dead plant material (thatch or litter) that facilitates seed germination and growth. Therefore, reducing annual grass thatch may also be important in seed source management in areas with a lot of annuals. Seeds are also readily moved by livestock, wildlife, and humans, so considering vectors for how invasive annuals are arriving on the site in the first place is crucial, especially in areas of no, or low, infestation.

Rising to the challenge of invasive annual grasses will require managers to consider how their daily management decisions in sagebrush country are affecting plant succession processes that favor either perennials or invasive annuals.

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Primary tools in the toolbox

While a variety of tools are available to address invasive annual grasses, the three primary options include:
1. herbicides,
2. seeding, and
3. prescribed grazing.

These tools are often combined to reduce invasive annuals and re-establish or promote desired perennial plants. Other tools are available for small-scale treatments (e.g., mowing), and still more are undergoing research and development (e.g., biological controls). However, we focus here on the three main tools currently in the toolbox for large-scale application on rangelands. Given the arid nature of rangelands and challenges with weed control, it is important to recognize that results from using these tools can be unpredictable. Monitoring and adaptive management are crucial elements of implementing any integrated weed-control plan. Below is a brief description of the main tools used for managing invasive annuals (for more detailed technical "how-to" information, see references [4,14]).

Herbicides. Chemical control is the most widely used weed control method on rangelands. There are several herbicides currently labeled for control of cheatgrass, medusahead, and ventenata. Herbicides can be used to treat invasive annuals before (pre-emergence) or after (post-emergence) plants grow, and they can be applied by ground crews to treat small areas or aerially for larger areas. Using the appropriate rate and timing of herbicide application for local site conditions is critical to achieving desired results. Chemical control alone is often not adequate as a long-term solution. Other weeds may move into treated areas so promotion of desired perennial plants along with treatments is needed. Receiving proper guidance and training on the selection, handling, and application of herbicides is essential. Always read and adhere to herbicide labels. Consult with your local county extension office, state department of agriculture, or weed and pest control district for more information on herbicides for annual grasses.

Seeding. Nature doesn't like voids. Removing weeds without thinking about what will take their place can result in further land degradation. When the existing amount of desired species is insufficient to recover and resist weeds after treatment, seeding is required. Perennial grasses are vitally important in keeping invasive annuals at bay, so revegetation with native or introduced perennial grasses is typically recommended. Land managers often seed perennial grasses after a fire, soil disturbance, or herbicide treatment. Rangeland seedings can be costly and difficult to establish, so it is often preferable to prioritize annual grass control in areas where desired perennials remain and soil disturbance can be minimized. Where seeding is needed, proper post-treatment grazing management is essential to long-term success in maintaining the planting.

Derek Tilley | NRCS

Bare ground between perennial plants breaks up continuity of fine fuels (foreground). Cheatgrass invasion fills these gaps (purple in background) creating more continuous fuels and facilitating fire spread.

Grazing. Livestock grazing is a critical tool in managing invasive annual grasses[15]. Designing grazing strategies that promote the health and vigor of desired perennial grasses is the primary method managers use to maintain weed-resistant rangelands. Adjusting the timing and duration of grazing to minimize the amount of vegetation eaten during critical growth periods for perennial grasses helps ensure plants remain healthy and competitive against annuals[16]. It is often advantageous to rest lands from grazing for an adequate period immediately following herbicide treatments or wildfires to give perennial plants an opportunity to win the competitive battle for dominance over invasive annuals. Resuming appropriate grazing strategies after

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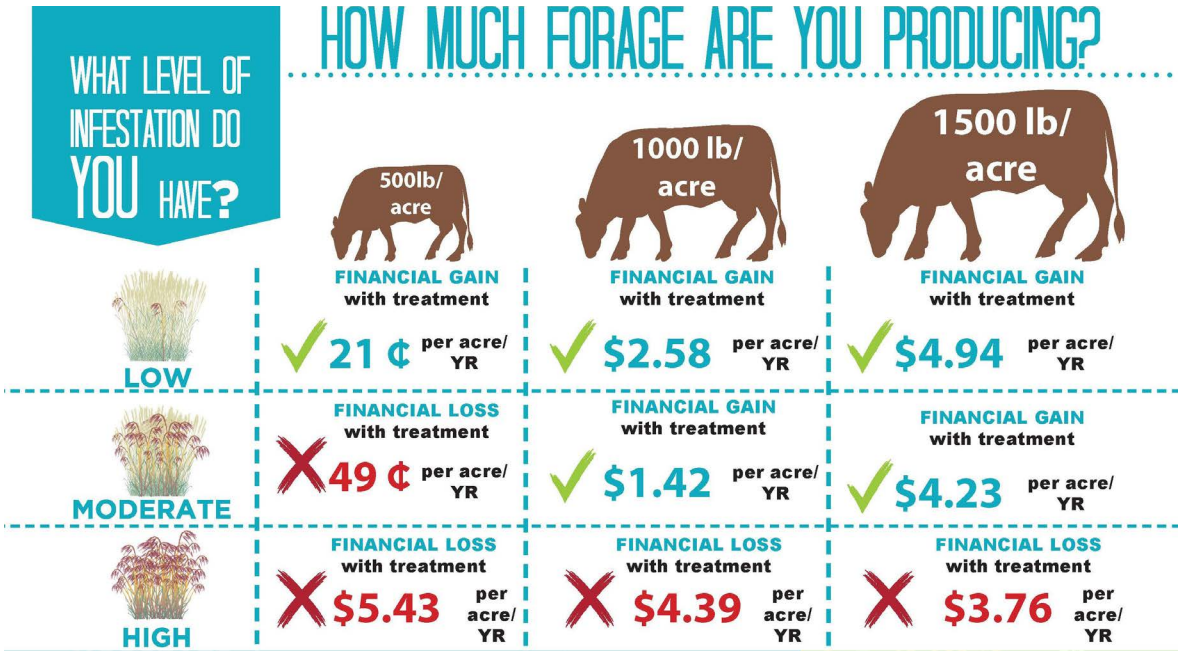
desired plants establish is important to maintain health and vigor of perennial plants as well. In areas with a lot of annual grass production, livestock grazing is one of the best tools available for managing the annual grass standing crop and litter at large scales. Targeted grazing can be applied in strategic areas that are heavily invaded to reduce continuous fine fuels and create a fuel break[17]. Dormant-season grazing can be incorporated into grazing systems to reduce the aboveground biomass, seed production, and litter of invasive annuals[18]. Grazing may limit seed production of annual grasses but will not prevent it entirely, so grazing must be combined with additional tools like herbicides for full control of the seed source. Again, since perennial plants are the key to long-term invasive annual grass control, grazing strategies must be carefully and consistently applied in a manner that promotes the health and vigor of perennials.



Source: NRCS Oregon

Invasive annual grasses impact forage production and a rancher's bottom line. Treating invasive annuals early saves money in the long run for livestock producers.

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What actions can land managers take?

There are a variety of actions land managers and partners can take to help reduce the invasive annual grass problem[19]. These include measures to prevent invasions, manage invasions once they occur, and maintain/restore perennial-dominated rangelands. Which specific actions managers take should be informed by what kind of landscape they're in (intact core, transition zone, or annual grass region) and the local community-based strategies for achieving desired goals for the region.

Prevention. Keep weed seeds out

- This primarily applies to intact core regions for cheatgrass, but could apply locally elsewhere for less well-established species like medusahead and ventenata.
- When invasive annual grasses are not already present, avoid introducing new weed seeds. Some ways to do that include:
    - o Be conscientious about moving livestock that have been grazing in a pasture infested with seed-bearing annuals. Avoid moving stock to uninvaded areas or allow adequate time for seeds to pass through the animals.
    - o Clean clothes, vehicles, and equipment that have been in areas with invasive annuals during seed production.
    - o Buy weed-free hay, straw, and seed. Ask if products are tested specifically for cheatgrass, medusahead, and ventenata.
    - o Work closely with neighbors and community partners to raise awareness of invasive annual grasses and prevent new introductions. Consider forming a Weed Prevention Area[20] to keep invasive annuals out.
    - o Avoid disturbing the soil and maintain desirable vegetation cover.

Early Detection Rapid Response. Monitor for and eradicate early infestations

- This primarily applies to intact core regions for cheatgrass, but could apply locally elsewhere for less well-established species like medusahead and ventenata.
- When invasive annual grasses are just starting to come in to otherwise intact rangelands, it may still be possible to completely eliminate the weeds from the site and prevent further spread with aggressive management and monitoring.
- Pay close attention to disturbed areas (e.g., roads, watering areas), south-facing slopes (cheatgrass), soils with high clay content (medusahead and ventenata), or other high-risk sites where invasion is likely to occur first. This Early Detection Rapid Response (EDRR) approach requires surveying and monitoring of invasion-prone areas but is one of the most effective and efficient invasive plant management techniques besides prevention.
- As soon as invasions are noticed, implement management (e.g., chemical control, seeding if needed) to eradicate invasive annuals and promote healthy perennial plants. Since annual grasses produce a large amount of seed each year, eradication will likely require multi-year treatment to deplete the seedbank.

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Roadside management. Manage invasive annuals along roadsides and other travel corridors

- Roads, trails, and other regularly disturbed and traveled corridors are one of the primary ways that weeds are spread across the landscape, so land managers and road maintenance agencies should have a plan to manage invasive annual grasses in these areas to reduce spread into adjacent or uninvaded lands.
- Treatment may need to be an annual activity in areas where soil disturbance occurs each year.
- In areas of heavy infestations, consider limiting seasonal travel during the annual grass seed production period to avoid spreading annuals to new areas.

Perennial plant release. Apply herbicide to control annual grasses and release desired perennials

- When infestations exist, but desired perennial plant communities are still mostly intact, consider applying selective herbicides to reduce annual grasses and release desired perennials before they are lost. The goal is not necessarily eradication, but to reduce annuals to a very low level so perennials can continue to dominate the site.
- Careful planning will be needed to ensure herbicides are applied properly and desired perennials are not injured. Multiple applications may be required over time.
- This practice must be combined with proper grazing management that promotes perennial grass health and vigor.

Post-fire/disturbance rehabilitation. Act quickly to address weeds after wildfire and ground disturbance

- When invasive annuals are known to be present and a wildfire or ground disturbance occurs, act quickly to limit annual grass increase and spread. The period immediately following a fire or other soil disturbance offers a leverage point to eliminate or reduce invasive annuals and provide perennials a chance to thrive due to the lack of competition and thatch. However, the window is short, so action must typically be taken promptly after the disturbance.
- In known infestations or high-risk invasion areas, consider applying pre-emergent herbicide to treat annual grasses before the first germination event (typically fall) following disturbance.
- Seeding of perennial grasses at a later date may also be needed following chemical control in areas where the existing plant community is insufficient to recover and resist annuals. Consult herbicide labels and resource specialists on proper handling, timing, and application of chemicals and seeding.
- Monitor burned or disturbed areas closely in the years following disturbance and treatment. Conduct follow-up treatment and seeding as needed.
- Treated areas may need to be rested from grazing for a brief period to allow perennials to become well-established and grazing ready.

Fine fuels reduction. Use grazing and strategic fuel breaks to reduce annual grass fuels and fire risk

- This primarily applies to the annual grass region and heavily-invaded transition zones.
- When invasive annual grasses comprise a significant component of the plant community, incorporate grazing strategies and fuels management techniques to suppress impacts of invasive annuals on the existing plant community, minimize fire risks, and contain the problem from affecting surrounding lands.
- In areas where perennials are still abundant, consider incorporating dormant-season (fall/winter) grazing strategies designed to reduce invasive annual grass biomass and seed production. This will not eliminate invasive annuals, but it can help reduce standing dead material and litter and release perennials from some competitive pressure. Consistent application over several years will likely be needed[21].
- In heavily invaded landscapes, establish strategic fuel breaks and/or targeted grazing areas to reduce fine fuels and contain fire spread. Breaking the annual grass-fire cycle is paramount to preserving perennial plant communities. Strategically placing fuel breaks and targeting grazing areas, typically along roads, can help provide anchor points for firefighting and limit fire size and frequency. Fuel breaks and targeted grazing must be carefully planned to be effective and to minimize adverse impacts[22] (for more information, see: Great Basin Fire Science Exchange). A long-term commitment to fuel break maintenance (e.g., weed control) is critical. Avoid installing fuel breaks in uninvaded areas to reduce risk of creating a new weed source.

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Restoration. Revegetate degraded lands to desired perennial plants

- When the desired plant community is depleted or lacking, consider revegetating the site with perennial grasses, forbs, and shrubs.
- Due to the high cost, restoration in areas of moderate-to-heavy infestations should strategically focus restoration in high-priority areas. Areas adjacent to uninvaded lands are often a top priority.
- Commitment to a multi-year treatment plan will be required. Significant site preparation (e.g., disking, weed control) is often needed for successful restoration. Seeding success can be low on rangelands so multiple seeding attempts may be needed, especially on priority lands.

Perennial grass maintenance. Use grazing strategies that promote perennial grass health and minimize ground-disturbing activities that remove perennials

- When desired perennial grasses remain in the understory, design grazing strategies that promote the health and vigor of desired perennial grasses. Perennial grasses are the primary, long-term defense mechanism against conversion to annual grasslands. Adjust the timing and duration of grazing to minimize defoliation during critical growth periods for perennial grasses to allow for healthy root growth and seed production.
- Avoid or minimize heavy ground-disturbing activities that might result in loss of perennial grasses. If disturbance is unavoidable, reseed areas with desired perennials.

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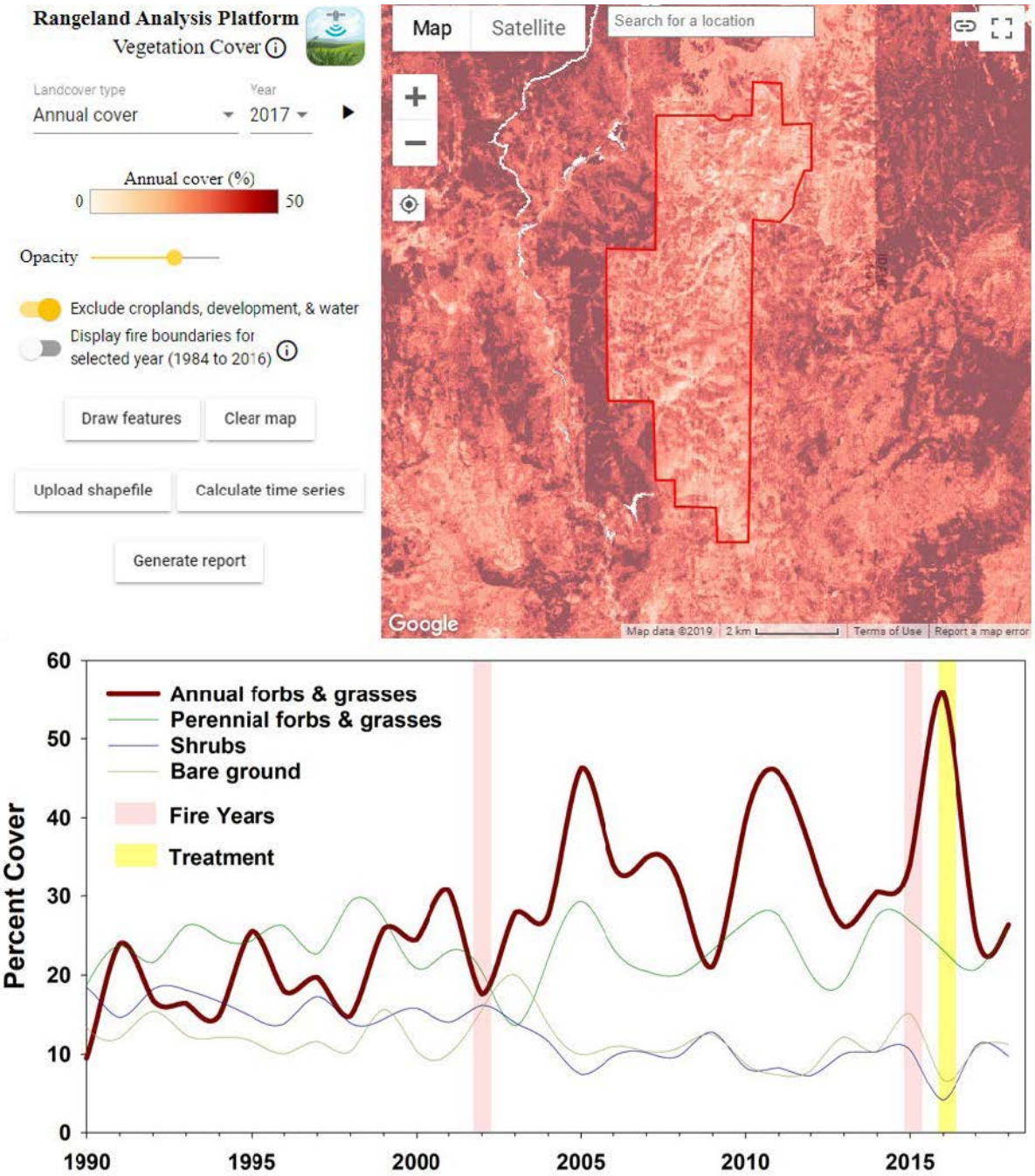
What does success look like?

Setting realistic expectations and timeframes for recovery of desired conditions are essential since tackling invasive annuals is a long-term commitment, not a “one-and-done” land treatment. Metrics of success in the near term might include:

- Increased stakeholder awareness of the problem and how they can strategically tackle it
- Improved stakeholder coordination and prioritization on annual grass management
- Changed behavior that considers invasive annuals in every land management decision
- Large-scale demonstration projects showing that we can move the needle on invasive annual grasses
- Local vegetation data trending in the right direction (e.g., more perennials and fewer invasive annuals)
- Statewide monitoring data showing intact cores are being maintained, improved, and/or are expanding

While many early metrics of success may be qualitative, we also have tools that can help track outcomes as management hits the ground. Remote-sensing based products, like the Rangeland Analysis Platform, provide one method for tracking vegetation change through time. Combining this technology with traditional field-based monitoring data allows managers to assess efficacy of projects, adaptively manage, and share lessons learned with others.

Invasive annual grasses pose perhaps the greatest threat to the continued function of sagebrush rangelands of the Intermountain West. Addressing this challenge requires first acknowledging that invasive grasses are here and they are changing rangelands as we know them today. Taking a strategic and proactive approach to tackling the problem offers an opportunity to change our current trajectory. This brochure seeks to inspire local stakeholders to band together to address cheatgrass and other invasive grasses in order to maintain productive, diverse, and resilient rangelands for current and future generations.



The Rangeland Analysis Platform (https://rangelands.app/) is a free web application that can assist land managers with monitoring of management effectiveness. In this example, herbicides were applied in the red polygon to reduce invasive annuals following a wildfire in 2015. A time series graph (bottom) shows vegetation cover in the treated area through time.

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Notes

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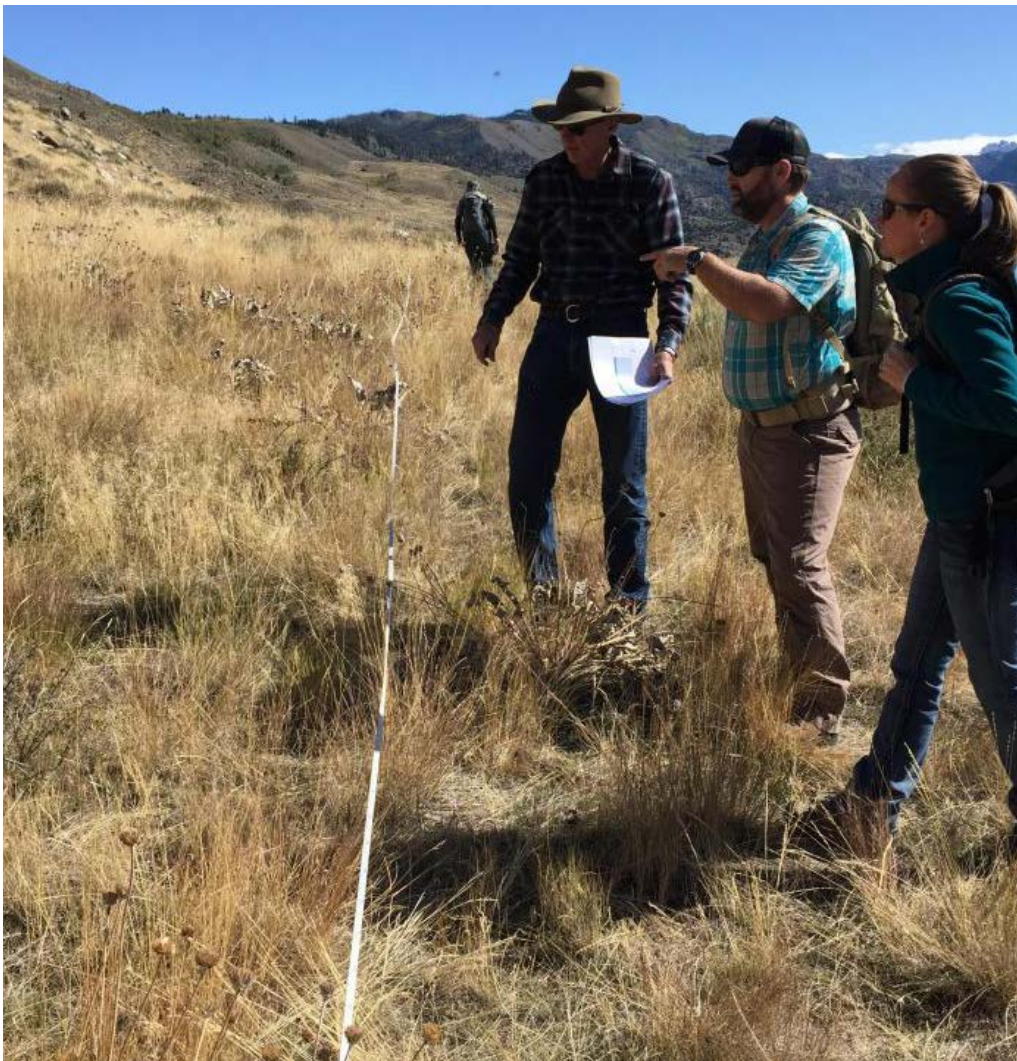
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