



2023



# BIGHORN HABITAT

A cooperative effort to conserve and improve habitat of the Spanish Peak bighorn sheep herd.

*Noxious weeds like spotted knapweed are known as "habitat transformers" because they change the physical structure and forage availability in habitats, eventually pushing out resident wildlife.*

In 2010, we identified the winter range of the Spanish Peaks bighorn sheep herd as critical wildlife habitat compromised by invasive species. Montana Fish, Wildlife and Parks lists bighorn sheep as a "species of conservation concern," meaning those species for which population viability is threatened as evidenced by a significant downward trend in population or in habitat capacity.

The combination of compromised habitat and a species at risk prompted our team to take action to improve the winter range of our local and beloved herd of bighorn sheep.

## PROJECT PARTNERS



## PROJECT FUNDERS





## BIG SKY'S BIGHORN

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Bighorn sheep are high-country ungulates that thrive on steep mountainsides and require a combination of four habitat elements:

- Ample wild grasses and forbs
- Reliable water sources
- Wide visibility so they can see predators
- Steep, bare slopes nearby for escaping danger

According to wildlife biologist Julie Cunningham, the Spanish Peaks herd is comprised of roughly 140-150 individuals, and is capable of producing trophy quality rams.

Bighorn sheep face a multitude of threats to their winter range:

- Habitat loss due to human development and sprawl
- Spread of invasive species (noxious weeds)
- Conifer encroachment
- Overgrazing
- Climate change
- Competition with other grazing animals (both domestic and wild)

## WINTER RANGE

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In 2010, we set out to identify wildlife habitat areas compromised by noxious weeds. The area northwest of Lone Mountain Trail and Highway 191 is well-known bighorn sheep winter range, and is considered critical habitat by Montana Fish, Wildlife and Parks.

The team found high densities of noxious weeds (houndstongue, musk thistle, hoary alyssum, spotted knapweed, and others) that initially established on private property and quickly spread to adjacent public lands.

Abundant native forage is the critical factor in bighorn sheep survival during winter months, and the presence of noxious weeds results in fewer resources and space for critical native grass and forb production.





## NOXIOUS WEED MANAGEMENT

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Since 2010, the Grow Wild team has led an annual effort to manage invasive species on the steep, rocky bighorn sheep winter range with the following partners:

Gallatin County Weed District (GCWD)  
Custer Gallatin National Forest (CGNF)  
Montana Conservation Corps (MCC)  
Montana Department of Transportation (MDOT)  
Montana Fish, Wildlife, and Parks (FWP)  
Montana State University (MSU)  
Natural Resources Conservation Service (NRCS)

2010–2023

13	Years
8	# Partners
\$14,644	Our Investment
\$156,507	Matching Funds

## FIELD STUDY #1

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In 2015, we established vegetation test plots to determine what native plants (grass and forbs) could compete on the shallow soils and steep hillside and provide winter forage for bighorn sheep.



In the fall of 2015, the site was prepared and seeded with native grasses and forbs. Starting in 2016, test plots were evaluated annually for stand density (plants/ft<sup>2</sup>) to determine what species established best (# plants/ft<sup>2</sup>), and if grazing exclosures were effective.



In 2018, results were analyzed, and native species had low establishment.



- All species increased over time except for slender white prairie clover.
- Prairie coneflower, Lewis flax, and thickspike wheatgrass were the seeded species with the highest densities. They established well on the weedy, southern aspect.
- Protecting seeded species from grazing improved the density of all species.
- Cheatgrass, common mullein, musk thistle, and other weeds species re-established on the sites at approximately 70% canopy cover.
- Prairie coneflower was the only seeded species being grazed by wildlife.
- Additional weed management for cheatgrass prior to seeding, or using a herbicide with residual to control cheatgrass and other weeds for a longer period of time, may improve seeded species establishment.



## FIELD STUDY #2

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As reported in the previous 2018 evaluation results, the 2015 treated sites are dominated by cheatgrass (*Bromus tectorum*), a winter annual, and biennials common mullein (*Verbascum thapsus*) and musk thistle (*Carduus nutans*) at an estimated 70% canopy cover.

This study will test a new pre-emergent herbicide Indaziflam (Esplanade 200 SC) to help deplete the winter annual and biennial seed bank of these invasive plants.

Indaziflam's mode of action inhibits cellulose biosynthesis in seedlings, making it an effective pre-emergent herbicide for annuals such as cheatgrass (*Bromus tectorum*), a non-native winter annual grass.



Cheatgrass is the most widespread invasive plant in the western U.S., and it is problematic for many range managers throughout Montana (MSU Extension Invasive Plants Monthly Weed Post, September 2021).

As cheatgrass spreads, it replaces the native perennial grasses that sustain wildlife.

Cheatgrass disrupts the fire cycle, leading to more frequent and more intense burns.

The suppression strategy may serve to release any existing native species to recruit, regenerate and eventually out-compete invasive species. Residual seed germination control is expected to last 8 months following treatment. A determination of plant occupancy and site condition will be evaluated as the study progresses.

The desired outcome would be to find a method to facilitate the improvement of the forest understory native plant frequency through a favorable soil condition that encourages natural plant recruitment and regeneration, increases productivity and enhances wildlife habitat while minimizing environmental impacts such as soil erosion, water contamination and noxious weed invasion.





## Materials and Methods

As with the 2015 test sites, treatment sites will be located on the southwest exposure north of the Big Sky Spur road of the Lone Mountain Trail.

Plots with a different percent canopy cover (1 – 5%, 6 – 25%, 26 – 50% , and 51 – 100%) of cheatgrass will be selected to be treated with Indaziflam with the goal of understanding the maximum percent canopy cover of cheatgrass that can regenerate a desirable native population to meet our land use objectives.

Fall 2022: Residual biomass was raked from the plot and Indaziflam applied according to label in early fall to mineral soil for activation by soil moisture. Three herbicide rate treatments were applied to each cover class, and replicated, to determine an economic and effective rate of Indaziflam. Paired controls without treatment were located adjacent to the treated plots.



## Evaluation

Treatment plots and controls will be inventoried prior to treatment and paired with sites with the various weedy compositions for baseline species comparisons. The treatment plots will be monitored for species composition within treatments vs. non-treated paired controls for 2-3 years using permanent line point intersects.

## Monitoring.

Sites will be evaluated for three years (2022-2024), assessing desired species response to the control of cheatgrass with Indaziflam.



Will the desired species fill in after the cheatgrass is controlled, or are there no desired species remaining to fill the gaps that cheatgrass occupied?  
In the latter situation, revegetation by artificially seeding adapted native species may required.