

LANDOWNER AND ECONOMIC BENEFITS FROM MIGRATION CORRIDOR DESIGNATION IN WYOMING

Summary

Since the Wyoming Game and Fish Commission designated wildlife migration corridors in 2016, the state has emerged as a leader in migration-focused science, policies, and funding. These migration corridor areas are prioritized for conservation funding based on science-led analysis. Designation status opens up an array of programs with direct benefits for landowners.

Direct benefits to landowners from migration-focused conservation include improvements to ranch infrastructure and assets such as fencing and forage, as well as property value adjustments that reflect both conservation and landowner values. We quantify landowner benefits specifically related to the Sublette Mule Deer Migration Corridor, commonly known as the Red Desert to Hoback Basin (RD2H), since it was designated in 2016.

Landowner experiences with conservation projects related to the RD2H migration corridor are diverse in the scale and scope of projects as well as the impacts on individual ranch

operations. However, landowners share an appreciation for co-benefits to both livestock and wildlife for their ranch from migration conservation projects.

Conservation funding connected to migration corridor designation also has numerous benefits that extend broadly to the people of Wyoming, including strong agricultural communities, economic benefits from hunting and tourism, safe roadways, and benefits from healthy ecosystems.

RD2H: The Sublette Mule Deer Migration Corridor

Commonly known as RD2H for “Red Desert to Hoback Basin,” the Sublette Mule Deer Migration Corridor is the longest of its kind in the world. It stretches 160 miles, from the Leucite Hills in the Red Desert just north of I-80, north through the Jack Morrow Hills, following the west flank of the Wind River Range then northwest into the Hoback Basin (Figure 1). The corridor consists of migratory paths, stopover sites, and bottlenecks, all defined by observed deer movements. Forage

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Contents

Summary	1
RD2H: The Sublette Mule Deer Migration	
Corridor	1
Designation.....	2
Recognition	4
Landowner Benefits Related to RD2H	
Migration Corridor Designation	6
Landowner benefits that enhance ranch	
infrastructure and assets	6
Wildlife-friendly fencing	6
Habitat and forage	7
Agricultural legacies: adjusting property value	
to match landowner values	8
Conservation easements.....	8
Habitat leasing	9
Habitat markets.....	10
Landowner experiences	10
Landowner experience case study: Brad	
Bousman, Bousman Livestock Inc.	11
Landowner experience case study: Albert	
Sommers, Sommers Ranch.....	11
Land manager experience case study:	
Walter Wehtje, Jackson Fork Ranch....	12
Migration Corridor Benefits for All of	
Wyoming	13
Wildlife and wildlands	13
Economic benefits from hunting and fishing,	
tourism and recreation	13
Strong agricultural communities	14
Safe roadways	14
Economic benefits from ecosystem services	15
Linking Benefits across the Migration	
Landscape	15
References	16
Sources	19
Searchable key words.....	20
Acknowledgment	20

on stopover rest spots is critical for migration, as are bottlenecks, where many animals pass through a narrow band of habitat. The mule deer herd associated with the RD2H corridor numbers around 24,200 animals. Pronghorn, moose, and elk also use winter and summer ranges linked by these ancient pathways (WWF 2021).

Designation

The paths followed by Wyoming's mule deer, pronghorn, elk, moose, and bighorn sheep to travel from summer to winter ranges have long been observed locally by ranchers and hunters who spend time on the landscape. Over the past two decades, however, wildlife biologists, using increasingly sophisticated GPS collars, have documented and mapped these seasonal animal movements. Defining migration corridors through observations and GPS data has proven to be valuable for prioritizing conservation dollars. The state of Wyoming is a leader in migration-focused policies and funding.

In addition to designated corridors, there are many other scientifically identified corridors that are not state-designated. Funding for easements and fence conversions are often still available for those non-designated, but known corridors. While there is no hard line between funding tied to a specific designation versus wider migration conservation efforts in the state, this analysis focuses on economic benefits to landowners related to the 2016 RD2H designation.

The Wyoming Game and Fish Commission adopted the Ungulate Migration Corridor Strategy that designated migration corridors in 2016, adding stopovers and bottlenecks as vital areas in 2019 (WGFD 2016, revised 2019). The RD2H corridor was among the first to receive designation status. In 2020, the RD2H corridor received additional recognition through a state executive order, the first of its kind in the US (SWED 2020). State designation of wildlife

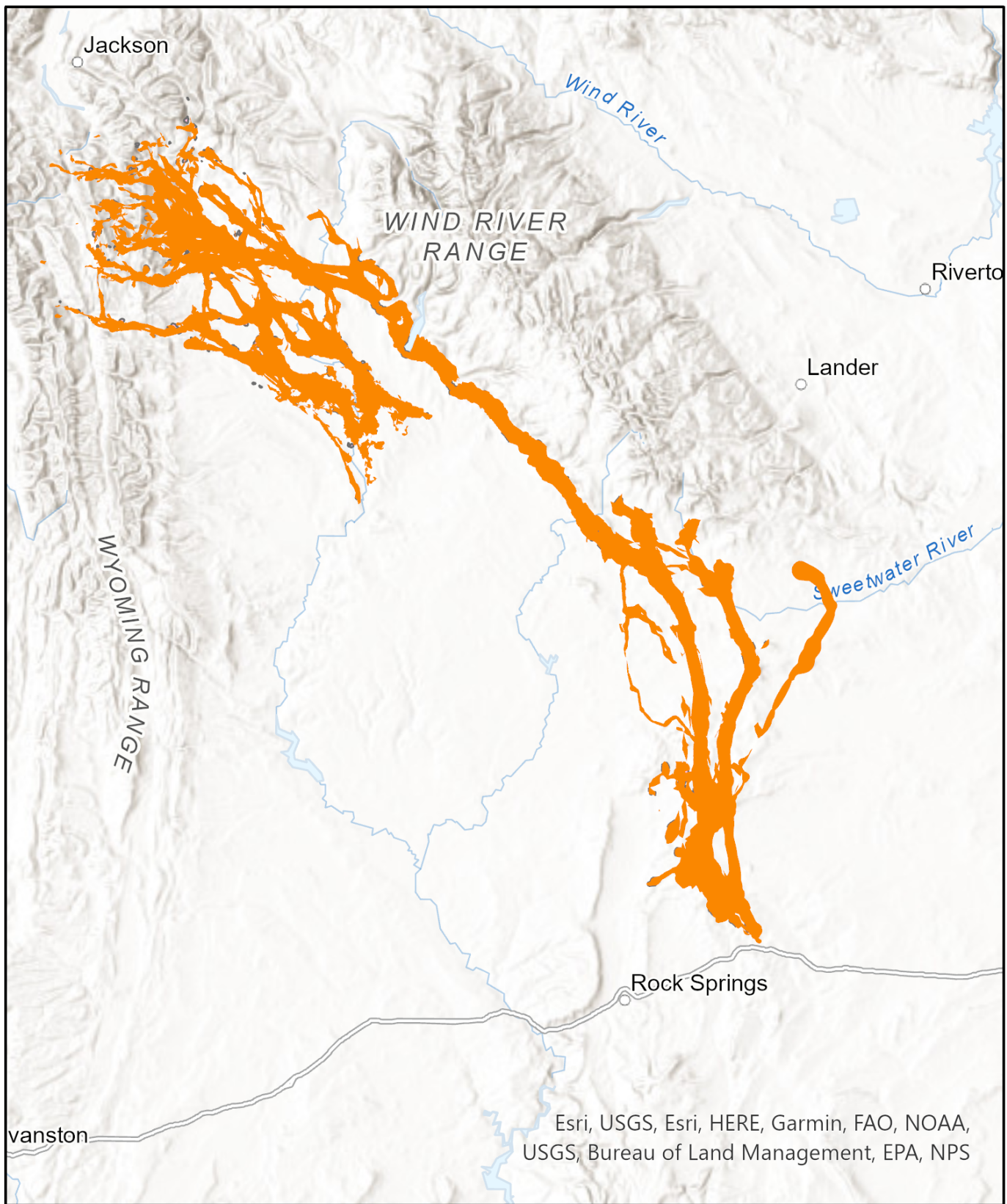


Figure 1. Sublette Mule Deer Migration Corridor, commonly known as RD2H (WGFD 2021)

corridors in Wyoming prioritizes these areas for conservation funding.

According to Casey Stemler, Senior Advisor for Western States at US Fish and Wildlife Service (USFWS), among eleven western states that his agency asked to provide scientifically defined focus areas for big game conservation funding (NFWF 2020), “Wyoming was and remains to this day the exception. From the outset Wyoming has been the leader.” As a direct consequence, he stated, Wyoming has benefited more than any other state, receiving the most grant funding (PVMCWG 2021).

WYOMING’S MIGRATION CORRIDOR DESIGNATIONS PRIORITIZE US FISH AND WILDLIFE SERVICE PROJECTS ON PRIVATE LANDS

The US Fish and Wildlife Service (USFWS) Partners for Fish and Wildlife Program provides technical and financial assistance to landowners to voluntarily enhance or restore wildlife habitat on their land. The program has three full-time staff in Wyoming.

In 2018, the US Department of Interior issued Secretarial Order 3362, “Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors” (US DOI 2018). The order directs agencies to focus on state priority migration corridors, like RD2H. As a leader in migration corridor science and designation, this order has particularly benefited Wyoming.

All USFWS-sponsored projects related to migration corridor designations in Wyoming follow state-defined, state-driven policy. Of course, all projects on private lands are voluntary.

Designation status opens an array of programs with direct benefits for landowners. Funding for migration conservation projects originates from a variety of public and private non-profits, trusts, agencies, project offices, initiatives, and partnerships—working at local, state, regional, and national levels. Thirty-nine partners were identified participating in conservation projects related to the 2016 RD2H designation with direct benefits for area landowners as of spring 2021 (Table 1, page 5).

The majority of RD2H-related conservation projects include multiple cooperating partners. As an example, for reported wildlife-friendly fencing projects, an average of four cooperating agencies in addition to the landowner contributed to organize, fund, and implement each project. These collaborations between the landowner and multiple other partners are key to on-the-ground conservation project success in Wyoming.

Recognition

Big game migration corridors exist today due to a legacy of landowners’ care for habitats and wildlife. Continued conservation on private lands is integral to protecting wildlife migration, and recognizes this legacy. Migration-focused policies and programs can help defray the costs of multi-purpose land management.

Funding for wildlife friendly fencing and improving habitat and forage often benefit both wildlife and livestock operations. Likewise, conservation easements can help protect the viability and intactness of working agricultural lands alongside wildlife and habitat conservation. Further, landowners benefit from hunting opportunities, untrodden views, habitat, and all of the other benefits that come from healthy wild places and working lands.

Table 1. Project partners, funding sources, and cooperating agencies participating in conservation projects related to RD2H designation with direct landowner benefits as of spring 2021

LANDOWNERS AND LAND MANAGERS

Private landowners, ranches, trusts, grazing associations, housing development associations, etc.

COUNTY AGENCIES

Popo Agie Conservation District
Sublette County
Sublette County Conservation District
Sublette County Weed and Pest
Star Valley Conservation District
Teton County Scenic Preserve Trust
Teton Regional Land Trust

WYOMING STATE AGENCIES AND INITIATIVES

Wyoming Governor's Office

Wyoming Governor's Big Game License Coalition
Wyoming Wildlife and Natural Resource Trust

Wyoming Game and Fish Department

Wyoming Game and Fish Commission
Wyoming Game and Fish Department Trust
Wyoming Mule Deer Initiative

FEDERAL AGENCIES AND OFFICES

US Fish and Wildlife Service

National Fish and Wildlife Foundation
Wyoming Partners for Fish and Wildlife

US Forest Service

Bridger-Teton National Forest

Bureau of Land Management

Jonah Interagency Mitigation and Reclamation Office
Pinedale Anticline Project Office
Pinedale Field Office
Rock Springs Field Office

USDA Natural Resource Conservation Service

Environmental Quality Incentives Program
Joint Chiefs' Landscape Restoration Partnership
Wyoming Regional Conservation Partnership Program

INTER-AGENCY GOVERNMENTAL COMMITTEE

Wyoming Landscape Conservation Initiative

UNIVERSITY OF WYOMING

Wyoming Migration Initiative

NON-PROFIT ORGANIZATIONS

Regional Non-profit

Greater Yellowstone Coalition
Jackson Hole Land Trust (JHLT)
Green River Valley Program of the JHLT
Jackson Hole Wildlife Foundation
Upper Green River Alliance
Upper Green River Regional Partnership (TNC)

Wyoming-focused Non-profit

Muley Fanatic Foundation
Wyoming Stock Growers Land Trust
Wyoming Wildlife Federation

National Non-profit

Land Trust Alliance
Knobloch Family Foundation
Mule Deer Foundation
Rocky Mountain Elk Foundation
The Conservation Fund
The Nature Conservancy (TNC)

Landowner Benefits Related to RD2H Migration Corridor Designation

We can quantify landowner benefits related to the RD2H corridor since its designation by the Wyoming Game and Fish Department in 2016. Direct benefits to landowners include improvements to ranch infrastructure and assets, such as fencing projects and forage improvements, as well as property value adjustments that reflect both conservation and landowner values (Table 2, page 6).

Landowner benefits that enhance ranch infrastructure and assets

Wildlife-friendly fencing can have shared benefits for livestock management infrastructure. Likewise, projects aimed at improving wildlife habitat on rangelands can improve forage

for livestock grazing assets on Wyoming ranch lands.

Wildlife-friendly fencing

While fences are integral to livestock management, they can create barriers that block or hinder wildlife movement. GPS collaring has been used to observe the movements of mule deer and pronghorn in the RD2H area as they encounter fencing (Xu et al. 2021). As they move across the landscape to access seasonal forage, both species alter their movements, bouncing away or moving back and forth or along fences. On average, pronghorn were observed to be twice as likely to encounter fences as mule deer and were more likely to bounce away, whereas deer more often engaged in back-and-forth or traced fences.

Just as different fence designs are specific to cattle or sheep, fence design affects wild species differently. Antelope in particular benefit from fence modifications that allow them to safely pass underneath a smooth bottom wire. Removing old woven-wire sheep fence allows deer fawns, elk calves, and antelope to pass (Hanophy 2009; Paige 2015). Where fencing is installed to protect springs or creeks, seasonal fence lay-down sections allow wildlife to safely access these important areas for forage, water, and shelter. Seasonal configuration and maintenance on lay-down sections in the RD2H area is done by both volunteer organizations and land management agencies, for example, by volunteers from the Jackson Hole Wildlife Foundation, as well as by area BLM field office employees.

Across state organizations, wildlife-friendly fencing typically includes a smooth bottom wire, 18 inches above the ground, a top wire no higher than 42 inches, and a minimum 12-inch gap between the top wire and the second highest wire (Paige 2015).

Table 2. RD2H Migration Corridor Landowner Benefits Tally since 2016 Designation

Wildlife-friendly Fencing

- 482 miles of fencing modified or removed
- 22+ lay-down sections installed
- \$7.6 million in project funding
- 86+ landowners participating with 17+ cooperating agencies

Habitat and Forage Improvements

- \$718,000 in project funding

Conservation Easements

- 6,607+ acres conserved inside or adjacent to the RD2H corridor
- 22,218+ acres conserved in a 20-mile buffer around the RD2H corridor
- 45,622+ acres conserved in RD2H counties
- 74,447+ total acres conserved in and around the RD2H corridor since 2016
- 50 landowners conserved land with 12 funding and land trust partners

Fence placement and design can benefit both wildlife movement and livestock grazing management. As one land manager pointed out, an added benefit from fences designed for wildlife to safely cross pasture and rangeland is reduced cost from repairing fencing damaged by wildlife.

Assistance for fencing projects associated with migration corridors include replacing or rehabilitating existing fencing to be more compatible with wildlife, adding seasonal lay-down sections, as well as removing unused or derelict fences.

Since its designation by the Wyoming Game and Fish Department in 2016, landowners have benefited from at least 482 miles of wildlife friendly fencing projects on private lands related to the RD2H migration corridor. Funding for these projects came from federal, state, and county agencies as well as non-profit organizations. Funding for wildlife friendly fencing projects on private land in the RD2H area since 2016 is estimated at over \$7.6 million.¹

Fifteen cooperating agencies contributed to the Upper Green River Basin Migration Corridor Fencing Initiative, of which the Wyoming Wildlife Federation was an active contributor. Additional projects with thirteen cooperating agencies have been managed through the Sublette County Conservation District, Wyoming Game and Fish Department, and USDA Natural Resources Conservation Service.²

1 Upper Green River Basin Migration Corridor Fencing Initiative funding totals are estimated using total fence miles (322) multiplied by average per-mile cost for projects where funding is reported (\$15,173). Wyoming Game and Fish Department fencing project-funding totals are estimated based on \$3.25 per foot.

2 RD2H-related fencing initiative lists compiled and provided by Troy Fieseler and Jill Randall, Wyoming Game and Fish Department.

Overall, 86 landowners and 17 funding partners participated in wildlife friendly fencing projects in and around the RD2H corridor since its 2016 designation. Ninety-seven percent of fence miles involved rebuilding or modifying existing fences; three percent were removed. Costs per mile ranged from \$4,100 to \$22,000 with an average per-mile cost just over \$15,000. This is typical for the region, according to Joe Parsons, District Manager of the Saratoga-Encampment-Rawlins Conservation District. In his experience fence replacement costs can be quite variable across the landscape, with typical replacement costs in southwest Wyoming of around \$12,000 per mile, about half of those dollars going to materials and the other half going to labor (PVMCWG 2021). Labor costs and materials pricing can also vary significantly over time.

Fencing is integral to ranch livestock management, and can represent a significant expense on annual budgets (Dyer 2017). Wildlife-friendly fencing is subject to less damage from wildlife, reducing long run maintenance costs. Wildlife-friendly fencing also provides opportunities for assistance with replacement or removal, reducing long-run maintenance costs.

Habitat and forage

Migration corridor designation has prioritized funding to ensure big game animals have quality forage as they move between summer and winter range. Habitat and forage improvements benefit livestock grazing as well. Moreover, these projects provide landowners with additional tools to manage the landscape, enabling agricultural operations to be more adaptive.

The majority of forage enhancement projects related to the RD2H corridor and implemented since its designation in 2016 were led by the Bureau of Land Management's Pinedale Anticline Project Office (PAPO) and Jonah Interagency Mitigation and Reclamation Office

(JIO) coordinating with landowners and a number of cooperating agencies. PAPO funding for oil and gas mitigation was leveraged to coordinate regional, state, and federal resources. Cooperating agencies included Sublette County Conservation District, Sublette County Weed and Pest, Wyoming Governor's Big Game License Coalition, Bridger-Teton National Forest, and USDA Natural Resource Conservation Service. Total project funding for these PAPO- and JIO-led habitat and forage enhancements on private or leased lands related to RD2H is \$718,000 (PAPO 2020; JIO 2020).

Forage enhancement and habitat projects include invasive species control, fire adaptations, and landscape-scale efforts to improve wildlife habitats. Treatment of invasive perennial pepperweed and cheatgrass in projects related to RD2H benefit landowners and leaseholders through fire adaptation from breaking cheatgrass-wildfire cycles resulting in productive range and pastureland for livestock grazing. The same is true for projects aimed at fire mitigation and rehabilitation, such as prescribed burns and mechanical conifer slashing. Landowners and leaseholders grazing livestock in treated areas benefit from wildfire adaptation and more productive rangeland.

Landscape-scale projects to enhance forage and habitat for mule deer herds in the RD2H migration corridor involved removing large sagebrush with both mechanical implements and herbicide treatment; stimulating new sagebrush, forbs, and grasses through large-scale fertilizer and herbicide application; as well as planting 5,000 nursery-grown shrub seedlings for mule deer forage. While intended to benefit mule deer herds and other wildlife, landowners and leaseholders grazing livestock benefit from increased grass height and general improvements to pasture and range, as well as increased hunting opportunities.

Agricultural legacies: adjusting property value to match landowner values

Wyoming's private working agricultural lands conserve undeveloped wild spaces that are valued by the public. Market-based conservation tools recognize this value by providing payments, property value adjustments, and tax benefits for landowners who chose to preserve agricultural legacies.

Conservation easements are the primary market-based conservation tool used to protect agricultural lands from development. In addition to conservation easements, a number of contractual and credit trading system options have been explored in the context of the Upper Green River (Duke, Pocewicz, and Jester 2011), notably habitat leasing and habitat exchanges. Through each of these, landowners receive financial compensation for providing ecosystem services, such as wildlife habitat. While habitat leasing has not been implemented in Wyoming as of spring of 2021, the state is working to codify the practice for the benefit of landowners within designated migration corridors (PVMCWG 2021).

Beyond financial benefits, Wyoming landowners who have enrolled their lands in one of these programs may gain peace of mind from their land being preserved into perpetuity.

Conservation easements

When voluntarily entering into a conservation easement, landowners work with a land trust to permanently protect their land from future development while preserving their agricultural legacy for future generations. Through this type of agreement, landowners exchange future development rights for payments and tax benefits (LTA 2021; IRS 2021).

Funding sources for conservation easements in Wyoming represent a range of interests. The Wyoming Stock Growers Land Trust, for

example, focuses on conserving agricultural lands. The Wyoming Wildlife and Natural Resource Trust and the Rocky Mountain Elk Foundation aim to enhance and conserve wildlife habitat throughout the state, while organizations like The Nature Conservancy and the Upper Green River Alliance focus on specific geographic regions. All of these organizations agree that working to protect big game migration corridors, such as RD2H, is a priority. As more landowners discover their benefits, conservation easements are becoming an increasingly viable way to link habitat across landscapes.

Since designation in 2016, at least 6,607 acres in or adjacent to the RD2H migration corridor have been preserved through conservation easements. Easements within a 20-mile buffer of the designated corridor have been established since 2016 on at least 22,218 acres. An additional 45,622 acres have been conserved through easements in RD2H counties, for a total of over 74,447 acres or 116 square miles of wildlife habitat and agricultural land protected in the RD2H area since designation.³ Of course, there is no way to verify that all easements in or proximate to the RD2H corridor can be wholly or partially attributed to designation, however, there has been significant concerted targeting of resources to designated migration routes in this timeframe.

These new easement parcels in and around RD2H are held by the Wyoming Stock Growers Land Trust, The Nature Conservancy, The Conservation Fund, Jackson Hole Land Trust's Green River Valley Program, Jackson Hole Land Trust, Wyoming Game and Fish Commission, and the Rocky Mountain Elk Foundation.

3 Not all information regarding conservation easements is public, so easement totals are a conservative estimate. Valuation information is also not generally public, so funding totals are also not available.

In Wyoming, over 703,300 acres are protected by conservation easements in 22 counties, with the first recorded in 1976 (NCED 2021). Sublette County leads Wyoming in terms of acres enrolled; Wyoming Stock Growers Land Trust and The Nature Conservancy are the two biggest easement holders in the state.

Habitat leasing

A habitat lease is simply a contract that provides annual payments to landowners for ecological services, like wildlife habitat, on their lands that they provide to the public (WLA 2019). Also known as "term easements," a habitat lease works much like a conservation easement structured as a multi-year contract with annual payments. Habitat leasing is an emerging market-based conservation tool.

USDA Conservation Reserve Program (CRP) cost-share assistance on rangelands that also support grazing is a government-sponsored program similar to habitat leasing. In Wyoming, habitat leasing was brought up during Platte Valley Migration Corridor Working Group discussions (PVMCWG 2021). Bob Budd, Executive Director of the Wyoming Wildlife and Natural Resource Trust, promoted habitat leasing in the context of migration corridor designations: "The nice thing about doing habitat leasing with migration is that it is scientifically based, it's quantifiable, it's defined." Moreover, as he pointed out, the funding model can be upfront and not dependent on future funding allocations, with total funds placed in an account and payments drawn over the term of the contract.

While the concept of habitat leasing is not new, there is currently no working model for it in the state. However, according to Mr. Budd, the concept has been significantly elevated recently in the context of migration corridors. Platte Valley Migration Corridor Working Group draft recommendations support both conservation

easements and habitat leasing while recognizing landowner choice.

Funded federal programs include habitat leasing pilot programs associated with migration corridors in Wyoming. The Nature Conservancy and partners has been awarded \$6.5 million through the NRCS Regional Conservation Partnership Program for “Securing Grass Highways for Wyoming Migrations II,” (NRCS 2021b), which will pilot habitat leases protecting intact and connected migration corridors and crucial winter ranges in the Greater Yellowstone Ecosystem. As part of the 2018 Farm Bill, Working Lands for Wildlife includes funding for the Agricultural Conservation Easement Program (NRCS 2021a) provides an additional avenue for migration corridor funding for both permanent and term easements focused on migration.

Habitat markets

Market-based conservation programs such as conservation banks and habitat exchanges link landowners who have generated conservation benefits from land management practices to energy developers who are required to offset unavoidable impacts (Hansen, Jakle, and Hogarty 2013). Through a habitat exchange, the value of habitat credits tied to these practices is determined through a market between willing sellers (landowners) and willing buyers (developers). The Upper Green River Conservation Exchange is in development, facilitating pilot projects focused on mule deer habitat in and around the RD2H corridor (WCE 2021). Wildlife migration corridor designated areas could provide focus for specific conservation goals valued through habitat exchanges in Wyoming.

Landowner experiences

Landowner experiences with conservation projects related to the RD2H migration corridor

are diverse in the scale and scope of projects, as well as their influence on individual ranch operations. Projects vary from modifying a single fenceline to landscape-scale preservation. Ranch operation benefits may focus on the annual budget bottom line or long-term ranch succession and climate adaptation. Landowner perspectives, however, have a common thread in seeing co-benefits to both ranching and conservation—livestock and wildlife—from conservation projects that relate to migration on their lands. A project-level summary of wildlife friendly fencing initiatives and conservation easements provides a snapshot of what a typical migration conservation project looks like to an individual landowner.

Typical project sizes for wildlife friendly fencing related to RD2H migration range from a short section of lay-down fence to over thirty miles of fencing modified, removed, or replaced. For 70 landowners participating in the Upper Green River Basin Migration Corridor Fencing Initiative the average landowner received 6.6 miles of new or modified fence and 2.3 miles of unused or derelict fence removal.

Land parcels recorded in conservation easements by landowners in the RD2H corridor area since designation range in size from 1.3 to 15,122 acres. The average size over all RD2H-related conservation easement parcels is 1,489 acres.

Landowners also benefit from habitat and forage projects on leased public grazing lands. Many of these projects are landscape scale and involve long-term, multi-year planning and multiple landowners, making typical benefits for individual landowners difficult to quantify. However, these projects can have long-term landscape management and adaptation benefits for landowners and leaseholders.

Dave Kimble, Private Lands Biologist for the US Fish and Wildlife Service Partners for Fish and Wildlife Program working in Wyoming, views migration-related projects on private lands as providing “tools to better manage the landscape, insulate from drought extremes or pasture loss, for example. These sometimes fit into bigger land management, being adaptive to a changing environment.” Some Wyoming landowners and land managers see having management plans for wildlife and habitat in place as an advantage when negotiating with the federal land managers on adjacent leased lands.

The following case studies of landowner experiences highlight how particular motivations driving participation in migration-focused programs overlap ranch business and conservation values and goals.

Landowner experience case study: Brad Bousman, Bousman Livestock Inc.

The Bousman ranch is located in the Upper Green River Valley, east of Boulder, Wyoming, near the midpoint of the RD2H corridor. The ranch has been in the Bousman family since the 1940s (Sublette Examiner 2020). The Bousman family has worked with the Wyoming Game and Fish to protect migration routes that they have witnessed for decades: “Before mule deer numbers dropped, they would trail down ranch lanes like cows.” In 2020, the Bousman ranch entered into a conservation easement with the Wyoming Stock Growers Land Trust, conserving 1,295 acres. The ranch has also benefited from wildlife-friendly fencing.

Mr. Bousman sees wildlife-friendly fencing as a win-win for wildlife and livestock: “There is nothing special about wildlife-friendly fencing. These are good cow fences too. Sometimes the bottom wire is too low and animals can’t get through. But good spacing doesn’t hurt the cows.”

The area in Sublette County where the Bousman ranch is located is under pressure from residential development. Brad Bousman sees protecting agricultural lands from subdivision as a primary goal for enrolling ranch lands in a conservation easement. Further, payments from the easement allowed the ranch to pay off some debts, making it easier to hand the land down. In this way, Mr. Bousman hopes enrolling his lands in a conservation easement will allow future generations to find purpose working on the Bousman Ranch while protecting migration paths that crossed the land long before it was homesteaded. As Mr. Bousman wryly points out, “The state can’t designate where the deer will go.” However, he recognizes additional funding and conservation work has come into the area because of Wyoming’s migration corridor designations.

Landowner experience case study: Albert Sommers, Sommers Ranch

Conservation achievements listed on the Sommers Ranch website are impressive: 2001 Wyoming Game and Fish Landowner of the Year, 2010 the Sommers-Grindstone Conservation Project (which conserved 19,000 acres of ranch lands through multiple conservation easements), and 2012 Wyoming Leopold Conservation Award (Sommers Ranch n.d.). Motivating all these efforts is a land ethic that has been passed down in the family: “If you take care of the land, it will take care of you.”

The Sommers Ranch is located in the Upper Green River Valley, where the RD2H migration corridor branches out, entering the Salt River Range and Hoback Valley in its northern third. Bottomlands provide irrigated hay as well as the ranch’s winter headquarters and seasonal rangelands include Bureau of Land Management and Forest Service allotments.

Ecosystem services: “the conditions and processes through which natural systems, and the species that make them up, sustain and fulfill human life” (Daily 1997).

Multiple conservation easements on the ranch are held by the Wyoming Stock Growers Land Trust. Since RD2H migration corridor designation in 2016, the ranch has benefited from wildlife-friendly fencing projects on the Upper Green River Valley Cattle Association shared grazing allotments.

In Mr. Sommers’s view, conservation-focused projects tied to migration have positive spillover effects on ranch assets and profits. “Not every time, of course, but often these fences needed to be replaced, so [wildlife-friendly] fencing comes right off annual ranch budgets.” He views migration-related fencing projects on the ranch’s federal grazing allotments as long-term assets that benefit ranch management.

Mr. Sommers talks about conservation easements as having three main benefits for the ranch. First, they preserve what the family values most, which is livestock and wildlife. Keeping ranch lands whole and protected from subdivision is important and tied to wildlife conservation

values. Second, the easements are a help in handing down the ranch to the next generation. Lastly, while boosting annual ranch profitability and assets are also an upside, they were not the main motivation for conservation work in his case, however, “Different ranches come in at different places, so for some, cash flow might be more important.”

Land manager experience case study: Walter Wehtje, Jackson Fork Ranch

The Jackson Fork Ranch is located in the Upper Hoback River Valley, near the northern end of the RD2H corridor. The ranch includes a private lodge with recreational opportunities for tourists (JFR 2016) and hosts conservation studies through the Ricketts Conservation Foundation, including tracking shorebird migration (RCF 2020). Elk, mule deer, antelope, and moose cross ranch lands as they move to nearby seasonal feeding grounds.

As director of the Ricketts Conservation Foundation, Walter Wehtje, addresses conservation-related issues for the Jackson Fork Ranch. He has helped to implement a range of migration-related projects on the ranch. In a recent project, Mr. Wehtje worked with the Wyoming Game and Fish Department and Jackson Hole Wildlife Foundation to create

Table 3. Direct and secondary economic benefits related to RD2H designation

	Wildlife-friendly fencing projects	Habitat and forage projects	Total fencing and habitat project economic activity
Local project spending impacts			
Direct project spending	\$7,626,266	\$718,000	\$8,344,266
Secondary project spending	\$2,287,880	\$252,018	\$2,539,898
Economic impact multiplier	1.3	1.3	
Total economic impact	\$9,914,146	\$933,400	\$10,847,546
Local labor spending and jobs			
Direct and secondary jobs supported	71	22	93
Total supported labor spending	\$3,550,158	\$78,980	\$3,629,138

openings for 22 wildlife crossings through their ranch fences. The openings reduce the impact of livestock fencing on migrating elk, mule deer, and antelope, but also benefit the ranch by reducing damage to fences from wildlife.

Mitigation efforts tied to Jonah Field and Pinedale Anticline energy development provided funding for the fence modifications. Mr. Wehtje views wildlife-friendly fencing as fostering wildlife in the area and wider migration-related conservation projects as in helpful for the ranch in adapting to wildfire, water management, and other landscape-wide, long-term adaptability.

The primary motivation for initiating fencing projects on the Jackson Fork Ranch relates to wildlife conservation and reducing wildlife damage to ranch fences. The ranch also touts its abundant wildlife and conservation work to tourists, who come to the Upper Hoback Valley to fly fish, bird watch, view wildlife, and tour the area with naturalists and outfitters.

Migration Corridor Benefits for All of Wyoming

Conservation related to migration corridor designation has numerous benefits for wildlife, agriculture, tourism, hunting, fishing, and public safety that extend to the people of Wyoming more broadly. Direct benefits to landowners support local economies, promoting strong agricultural communities, and project impacts spill over property boundaries, boosting the state's tourism industry, providing ecosystem services, as well as providing untrammelled views, clean water, and abundant wildlife that Wyomingites value.

Wildlife and wildlands

The primary purpose of migration corridor designations is to conserve wildlife and protect seasonal landscape-scale habitats. In the case of RD2H, the focus is on mule deer and antelope.

However, protections extend to intact habitats along migration routes that are home to plant and animal communities, including other big game species, such as moose and elk.

When a migration corridor is designated by the state, wildlife managers are better able to focus resources on routes animals use to access seasonal forage and breeding areas. Corridor mapping can also help to identify stopovers and bottlenecks. By prioritizing these areas, designation focuses taxpayer dollars on the landscape for meaningful, science-driven, voluntary projects, with measurable benefits for Wyoming's wildlife.

Economic benefits from hunting and fishing, tourism and recreation

Hunting, fishing, and wildlife viewing all have economic benefits from tourism and recreation in Wyoming and the RD2H area. Big game hunting, fishing, and wildlife watching contributed \$802.2 million in direct spending, generating over a billion dollars in total economic activity in Wyoming in 2017 (Taylor 2018). Outdoor recreation added \$1.7 billion to Wyoming's economy in 2019, accounting for 4.2 percent of the state's gross domestic product (USBEA 2021). Calls for diversifying Wyoming's economy emphasize growth in agriculture and tourism (ENDOW 2018).

Hunting and fishing are economically important in Sublette County as well, with hunters and anglers spending an estimated \$22.5 million in the county in 2015 (Taylor and Foulke 2017). In 2019, Sublette County benefited from \$1.9 million in tax revenue and \$43.8 million in spending from travel and tourism (WOT 2021).

Many Wyoming ranches and farms appreciate secondary income associated with outfitting, hunting, fishing, and other wildlife-related tourism on their lands. Agricultural producers

reported \$548,000 in agricultural tourism and recreational services as farm-related income in Sublette County in 2012 (NASS 2021a) and \$29.1 million in Wyoming in 2017 (NASS 2021b). Wildlife migration corridors help to ensure that the economic benefits of the animals and landscapes tourists (including hunters) come to enjoy are protected.

Strong agricultural communities

Dollars spent on conservation projects support local communities in Wyoming. While dollars spent on fencing and forage or habitat projects directly benefit individual landowners, they also support local companies supplying materials and contractors who do the work. Direct project spending is magnified as supported businesses in turn do business with other local businesses, to make purchases in regional supply chains and hire more workers. These workers in turn make other purchases from other local businesses.

Strong ranching communities supported by this local direct and secondary project spending have economic benefits for the local economy as a whole. Each new dollar spent locally generates additional economic activity as it is re-spent by local businesses (IMPLAN Group 2020a).⁴ Direct economic spending includes fencing materials and labor, secondary or indirect economic activity takes into account supply chain purchases and hiring by local businesses and labor income spent in the local economy (IMPLAN Group 2020b).

It is estimated that each dollar of the \$7.6 million spent on wildlife-friendly fencing projects related to the RD2H corridor designation generates an additional \$0.30 in local spending among

county businesses,⁵ adding up to \$2.3 million in secondary spending, for a total of \$9.9 million in total economic activity. Total economic activity related to RD2H fence project spending supports 71 direct and secondary jobs in the county and \$3.5 million in direct and secondary labor income (Table 3, column 1).

The economic benefit to Sublette County from RD2H related to \$718,000 spent on habitat and forage projects likewise generates an additional \$0.30 for each dollar spent resulting in \$252,018 in secondary spending, and \$933,400 in total economic activity. The total direct and secondary spending related to these projects would support 22 direct and secondary jobs and \$78,980 in direct and secondary labor income (Table 3, column 2).

Total spending of \$8.3 million on wildlife-friendly fencing and habitat and forage projects related to RD2H designation resulted in \$10.8 million in direct and secondary spending with economic activity generated by local spending. This amount of economic activity would support 93 direct and secondary jobs and \$3.6 million in direct and secondary labor income for contractors in Sublette County (Table 3, column 3).

Safe roadways

The Wyoming Department of Transportation (WYDOT) estimates each of the 6,000-plus vehicle-wildlife collisions in Wyoming results in \$11,600 in injury and property damage costs, adding up to nearly \$70 million in direct annual costs for drivers (WYDOT 2021), in addition to health hazards. Migration corridor designations help focus transportation funding, to reduce wildlife mortality and hazards for Wyoming drivers. The RD2H corridor has a good example of this at Trapper's Point, where a new

4 Economic impact analysis provided by Dr. David T. Taylor, University of Wyoming Department of Agricultural and Applied Economics.

5 The IMPLAN model assumes a 60/40 split in labor to materials for economic activity related to fencing.

housing development and increased oil and gas production narrowed a migration bottleneck west of Pinedale. This pinch point was alleviated by two wildlife underpasses constructed by WYDOT that reduced wildlife-vehicle collisions along Highway 191 by 80 percent (Kauffman et al. 2018, p 115).

Economic benefits from ecosystem services

Benefits we receive from a healthy ecosystem may seem intangible, but they are both important and valuable. Think of these benefits as services, such as filtering water, that a functioning ecosystem provides for humans, seemingly for free. These “ecosystem services” are not just theoretical; they have sizable and measurable economic benefits.

Private lands protected from development by conservation easements or similar contracts have public benefits that spill over property lines. Substantial public investment in purchasing easements recognizes the value of intact open spaces to the people of Wyoming (Korfanta et al. 2018). For example, conservation easements protect watersheds that link headwaters to the state’s Blue Ribbon trout fisheries, and also provide natural filtration and purification of water supplies for drinking water, agriculture, and wildlife. Open lands provide ground water recharge and flood control. Water quality also affects land values in a state where water resources can be scarce.

Of course, undeveloped private working lands add value and acres to the ecosystem services even when they are not protected by a conservation easement. Easements both recognize this value with financial benefits to the landowner and ensure that lands remain undeveloped into the future.

Linking Benefits across the Migration Landscape

Wyoming is home to some of the most iconic intact ungulate migrations in the world. Wyoming also leads in recognizing these pathways through migration corridor designation.

Landowners and Wyoming communities alike benefit from programs designed to protect migration routes crossing a patchwork of lands. No one landowner or agency can work alone to protect migration routes; it takes a coordinated effort. Protections link migration routes on private and public land, as well as highways and waterways, which Wyoming’s ungulate herds cross to access seasonal forage each year. Wyoming’s wildlife migration corridor designations are a key step to maintaining these paths, prioritizing funding and focusing conservation with direct benefits for landowners.

The Wyoming Game and Fish Commission adopted the Ungulate Migration Corridor Strategy that allows the designation of migration corridors in 2016. Designation status prioritizes conservation funding on the landscape and opens up an array of programs with direct benefits for landowners as well as benefits that extend more broadly to the state. Quantifying benefits related to the RD2H migration corridor in southwest Wyoming highlights the impact of migration-focused science, policies, and funding in Wyoming.

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