



National Fish and Wildlife Foundation

Draft Business Plan for the Path of the Pronghorn

March 24, 2009

What Is a Business Plan?

A business plan serves two broad, primary functions. First, it provides specific information to those (e.g., prospective investors) not familiar with the proposed or existing business, including its goals and the management strategy and financial and other resources necessary to attain those goals. Second, a business plan provides internal guidance to those who are active in the operation of the business, allowing all individuals to understand where the business is headed and the means by which it will get there. The plan helps keep the business from drifting away from its goals and key actions through careful articulation of a strategy.

In the context of the National Fish and Wildlife Foundation's conservation efforts, business plans represent the strategies necessary to meet the conservation goals of Keystone and other initiatives. Each business plan emphasizes the type(s) and magnitude of the benefits that will be realized through the initiative, the monetary costs involved, and the potential obstacles (risks) to achieving those gains. Each of the Foundation's business plans has three core elements:

Conservation Outcomes: A concrete description of the outcomes to which the Foundation and grantees will hold ourselves accountable.

Implementation Plan with Strategic Priorities and Performance Measures: A description of the specific strategies that are needed to achieve our conservation outcome and the quantitative measures by which we will measure success and make it possible to adaptively revise strategies in the face of underperformance.

Funding and Resource Needs: An analysis of the financial, human and organizational resources needed to carry out these activities.

The strategies and activities discussed in this plan do not represent solely the Foundation's view of the actions necessary to achieve the identified conservation goals. Rather, it reflects the consensus or majority view of the many federal, state, academic or organization experts that we consulted with during plan development.

In developing this business plan, the Foundation acknowledges that there are other ongoing and planned conservation activities that are aimed at, or indirectly benefit, keystone targets. This business plan is not meant to duplicate ongoing efforts but, rather, to strategically invest in areas where management, conservation, or funding gaps might exist in those broader conservation efforts. Hence, the aim of the business plan is to support the beneficial impacts brought about by the larger conservation community.

Summary

Most of largest mammal species in the Western United States need migration and movement corridors to survive. This is particularly true in the Upper Green River Valley of Sublette County, Wyoming, a 3.2-million-acre area that forms the southern 20% of the renowned Greater Yellowstone Ecosystem. Freedom to roam is critical to the pronghorn, mule deer, elk, moose, and many other species that depend upon this region and whose populations are at risk.

For many of these species, interacting populations of animals are composed of many separate groups which may spend part of their year together before moving apart to different summer or wintering grounds. In aggregate, the conservation of each of these groups will conserve the whole herd. However, conservation strategies have to be specific to the herds and populations themselves, which face different threats depending on where they summer, winter, and roam in the "Upper Green."

This business plan maps out a 5-year effort to conserve an important herd of wildlife in the Upper Green — the "Path of the Pronghorn" antelope herd that summers in Grand Teton National Park and winters in the region south and west of Pinedale, Wyoming. These pronghorn are part of the larger Sublette Antelope Herd Unit. If successful in implementing this initiative in Years 1 – 3, additional funding may be sought to support additional wildlife corridor conservation efforts, possibly prioritizing (1) the portion of the Sublette mule deer herd that migrates between summer and winter range along the western slope of the Wind River Mountains south and east of Pinedale, Wyoming (known as the "Pinedale Front migration") and (2) the portion of the Shiras moose subspecies herd that migrates between summer and winter range along the eastern slope of the Wyoming Range west of Daniel, Wyoming.

This business plan will guide every aspect of the Foundation's anticipated \$4 million in grant-making associated with the pronghorn and its habitat. However, many of the strategies discussed in this plan are beyond the scope and mission of the Foundation. Ultimately, we hope that the strategy and activities described herein are adopted by the broader community of agencies, corporations and organizations working on the same goals and supported by those entities with the additional \$26 – \$29 million of investments identified as necessary to conserve the Path of the Pronghorn.

The Foundation is working on this pronghorn herd, knowing that it is only one of many conservation priorities in the Upper Green. We are doing so because we believe that success for this target will provide a model for how to succeed elsewhere. Expanded natural gas and other fossil fuel production from the Upper Green is critical to our domestic energy supply and as energy infrastructure expands, so do road, housing and service developments necessary to support workers. We believe this business plan could serve as a model for formal mitigation and voluntary efforts to conserve wildlife movement and migration within these impacted landscapes.

This plan seeks to maintain the viability of the Path of the Pronghorn sub-herd by increasing its size and lowering annual mortality. The Foundation, working with local partners, believes that (1) impeded migration routes between summer and winter range and (2) less-than-optimal winter range quality threaten successful achievement of this goal.

To accomplish this goal, the following strategies need to be implemented (or already are being implemented):

- Modify fences that form barriers to successful migration.
- Construct a crossing structure and associated improvements at a central migratory bottleneck.
- Secure easements from interested private landowners.
- Implement required and voluntary Best Management Practices in resource development areas that improve pronghorn access to winter forage and quality of forage.
- On- or off-site mitigation of gas field development and operation impacts on winter range.

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Values

The Upper Green's wildlife is second to none. The area forms one-fifth of the Greater Yellowstone Ecosystem, holds the headwaters of the Green River, and contains healthy populations of big game, game birds, fish and many of Wyoming's Species of Greatest Conservation Need. The area provides 81% of the crucial winter range for Wyoming's pronghorn, 60% of the crucial winter range for mule deer, and 42% of the crucial winter range for moose. Grizzly bear, wolves, black bear and mountain lion are all found in the Upper Green. Private lands covering riparian areas and irrigated meadows along the Green River and its tributaries rise through mixed public-private sage uplands to aspen-conifer in the Bridger-Teton National Forest to form an interrelated mosaic of habitat used by most big game species at some point in their lifecycle. In 2008, the past director of the Wyoming Game and Fish Department declared the area the "crown jewel" of the state's wildlife.

Ranching has played — and continues to play — a vital role in the health of the Upper Green's wildlife. Nearly all of the area's private land remains in agriculture. The area has more than 350 working ranches, 100 of them "centennial ranches" owned and operated by the same families for 100 years or more. The area is home of the Green River Drift, one of the longest continuously operating cattle drives in North America (began 1889-90) and boasts roughly 75 miles of the Oregon Trail, used by as many as 500,000 pioneers to migrate west.

The Upper Green has one of the largest domestic energy reserves in the country. The area produces more natural gas than anywhere else in the Northern Rockies and contains the Jonah and Pinedale Anticline fields, among the highest-producing natural gas fields in nation. The Jonah and Pinedale Anticline fields support more than a thousand operational wells. At current drilling rates, experts predict it will take from 10 to 20 years to develop these fields. Individual wells may produce natural gas for another 30-50 years. Mineral development generates significant revenues for the county and Wyoming. According to its 2008-09 State of the County report, Sublette County's assessed valuation was \$4.1 billion in 2007 — nearly 20 percent of the total assessed valuation for the entire state. Over 90 percent of this valuation was from minerals and mineral development.

Though the area still has no stop light and fewer than 2 people per square mile, it has seen a large increase in both temporary and permanent residents as a result of amenity and energy development. The number of housing projects and growth in local services has grown with the population. Estimates are that through the year 2020, 80 percent of new development in Wyoming will be on lots of 10-40 acres in size for each housing unit.

A November 2008 *Community Satisfaction and Quality of Life Survey* found that overall community satisfaction was slightly less than 8-10 years ago, with respondents' satisfaction directly related to the importance given to oil and gas and diversity of residents within the county. However, the survey also found that most residents continue to feel very at home in Sublette County and consider people, friends, family and physical setting the most positive aspects of the community.

Conservation Need

The survival of many wildlife species depends on movement — whether day-to-day movements, seasonal migration, gene flow, dispersal of offspring to new homes, recolonization of an area after a local extirpation, or the shift of a species' geographic range in response to changing climatic conditions. For most animals and plants, all of these types of movement require a well-connected natural landscape. Large, open spaces have long characterized the West. However, the burgeoning network of roads, urbanization, exurban development (e.g. ranchettes), energy development, and other land uses now threaten to fragment the West's grand landscapes, cutting off pathways linking crucial habitats and reducing the ecological value of the remaining crucial habitats.

Pronghorn in the Upper Green stand as one of the best examples of an American wildlife population whose survival is dependent on its freedom to roam a vast landscape.

These pronghorn — a population of fewer than 1,000 animals — survive by migrating several hundred miles each year between summer range in Grand Teton National Park and winter range in central Sublette County, Wyoming. This stands as the longest-known terrestrial animal migratory route in the 48 contiguous states, and the third longest non-avian migration in the world. They are part of a larger herd of antelope (Sublette Pronghorn Herd Unit) that winters together, but summers in separate areas throughout the upper Green River watershed.

During their annual migrations, these animals face numerous impediments, including hundreds of miles of fences, busy roads and highways, and stressors from housing subdivisions like lights, fences and pets. These threats will likely grow with Sublette County's expanding population. According to the U.S. Census Bureau, Sublette County was the 5th fastest growing county in the nation between 2006 and 2007.

For purposes of this Initiative, the major threats to the survival of the Path of the Pronghorn herd fall into two categories:

- Physical barriers that prevent movement and stress pronghorn, thereby significantly reducing foraging opportunities and/or resulting in the death of animals as they move north or south on migration; and
- Elimination of high quality range foraging opportunities and degradation of habitat on wintering grounds south of U.S. Highway 191 that runs through Pinedale, Wyoming. BLM and gas field operator efforts through existing planning and decision documents like the Jonah Infill Drilling and Pinedale Anticline Project Area records of decision are helping to minimize and mitigate this threat.

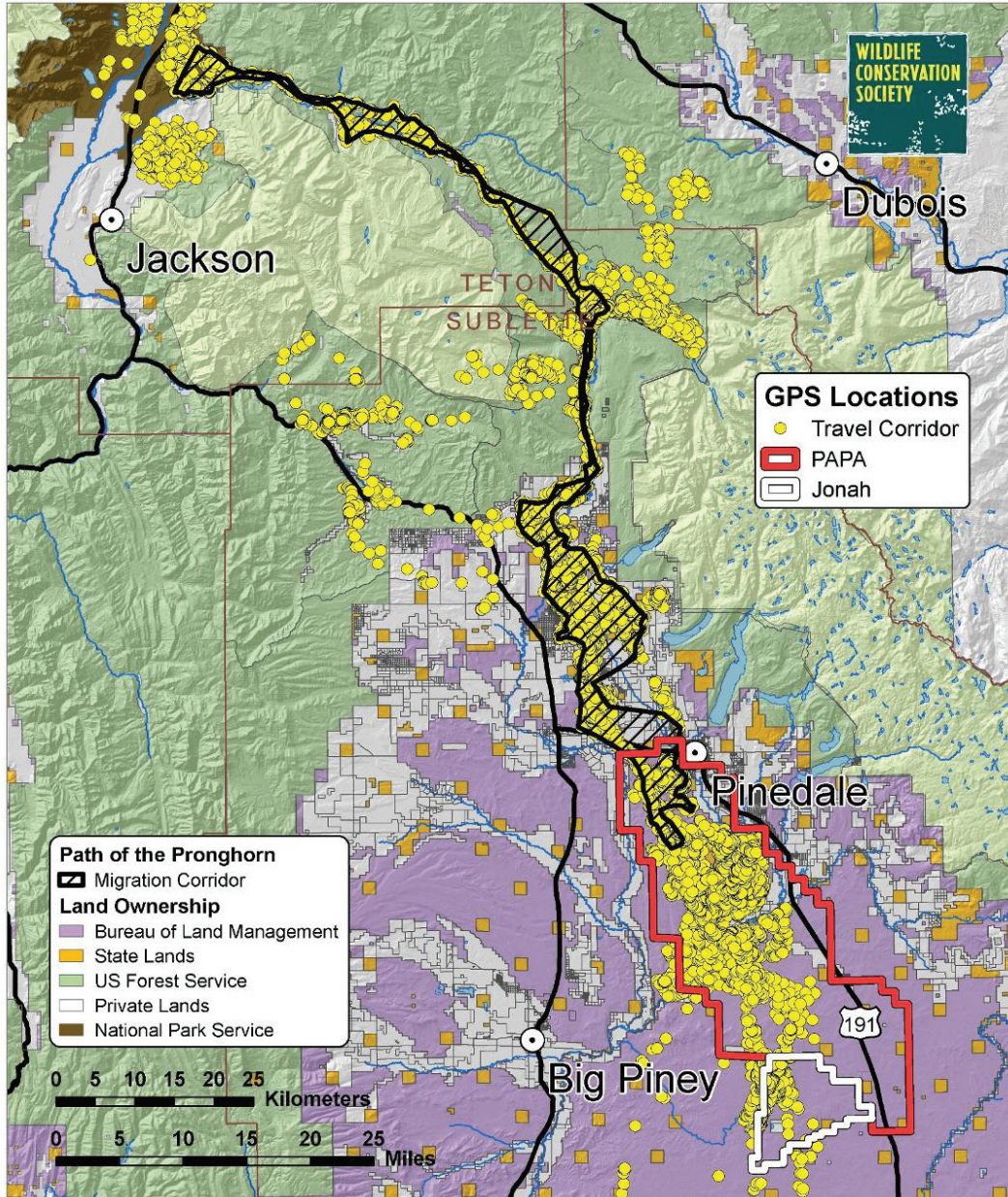
These threats not only challenge pronghorn in the Upper Green, but other species as well, with mule deer and moose showing the most dramatic declines. Other wildlife of concern in the area include multiple species that the U.S. Fish and Wildlife Service is considering for potential protection under the Endangered Species Act and/or the Wyoming Game and Fish Department has listed as Species of Greatest Conservation Need. These include greater sage grouse, burrowing owl, pygmy rabbit, trumpeter swan, Colorado River cutthroat trout, and Shiras moose.

This plan identifies strategies to address these threats and could serve as a site specific model for conserving working lands and specific wildlife populations in close proximity to energy development. The Initiative will complement existing programs like The Nature Conservancy's Energy by Design, the Wyoming Landscape Conservation Initiative, the Jonah Interagency Mitigation and Reclamation Office mitigation fund and the Pinedale Anticline Interagency Office mitigation fund.

Path of the Pronghorn Migration Corridor

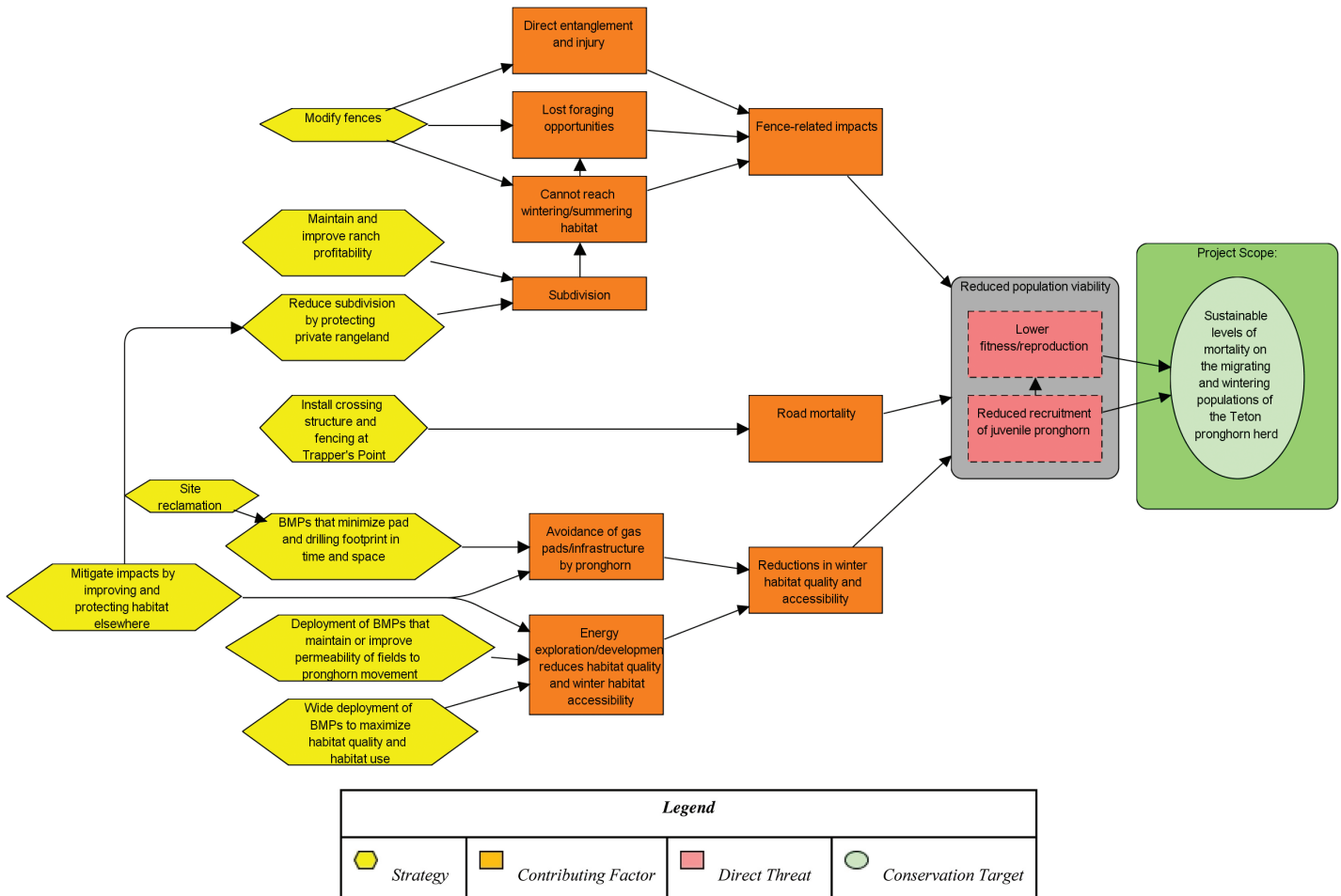
The graphic below, provided by the Wildlife Conservation Society and based on years of radio-tracking of individual pronghorn (yellow dots), shows the movement of pronghorn up the Gros Ventre River Valley through Bridger-Teton National Forest to the north, into the public/private landscape in the Upper Green River Valley and then into the sage brush dominated winter range habitat found mostly on Bureau of Land Management Land, much of which is part of the Jonah and Pinedale Anticline gas fields.

PATH OF THE PRONGHORN - CORRIDOR AND WINTERING GROUND



Logic Framework — Goals, Threats and Strategies

A logic framework diagrams a set of relationships between certain factors believed to impact or lead to a conservation target (species representing Keystone Initiatives). Logic frameworks are typically composed of several chains of logic whose arrows are read as “if-then” statements to help better understand how threats contribute to conservation target declines. Logic frameworks are used to define the conservation problem, assess limiting factors, and prioritize key strategies.



Conservation Outcomes

The results of radio telemetry data show that approximately 15 percent of pronghorn in the Path of the Pronghorn sub-herd are dying between the time that they cross Highway 191 going south in autumn and when they re-cross Highway 191 going north in spring. This mortality comes from all sources, including hunting, on the wintering grounds. An estimated 2 – 4 percent of pronghorn are dying as they migrate between Forest Service lands to the north and Highway 191 as a result of structural barriers or highway mortality. An unknown percent of pronghorn are being harvested by hunters as they migrate north of Highway 191. Thus, approximately 17 – 19 percent or more of the sub-herd is dying every year, to be replaced by fawns born on Grand Teton National Park and other summering habitat.

Implementation of this plan is intended to be successful in accomplishing the following:

- Reducing migration corridor mortality from 2 – 4 percent to 0.5 – 1 percent and wintering ground mortality from 15 percent to 10 – 12 percent. Although these differences may seem small, this should be enough to switch the demographics of the sub-herd from one of apparent decline to an increasing trend.
- Securing the continued ability of pronghorn to migrate through private and BLM lands in the northern part of Sublette County will eliminate a significant risk that the entire population of pronghorn found in Grand Teton National Park would be extirpated in the future because migration was blocked. Success here also helps ensure that current Wyoming Game and Fish Department population objectives for the Sublette Herd Unit are attainable into the future.
- Benefiting other sub-herds of the Sublette Pronghorn Herd Unit that summer on Forest Service lands along Lime Creek, Wagon Creek, Foster Creek and other locations.
- Conserving or enhancing large areas of sagebrush habitat for wintering pronghorn in south of Highway 191.

Implementation Plan

Experts have indicated that the following strategies need to be implemented to address the threats to the Path of the Pronghorn sub-herd. This plan is focused on actions that should take place over the next 5 years. Although additional threats affect the pronghorn, the group of experts who helped develop this plan prioritized threats, and the emphasis of this plan is on the highest priority threats. There are rough 5-year budget numbers assigned to some of the activities herein. If there is no budget next to an activity that activity is not clearly identified as required to achieve the biological impact described above (however in some circumstances, those activities are necessary but are already being covered through others' budgets or staff time).

ADDRESSING THREAT 1 — Fences create barriers to successful migration

Segments of the Sublette Pronghorn Herd (including the Path of the Pronghorn animals) are highly migratory. Summer ranges are expansive, and pronghorn are able to maximize their fitness by summering on higher elevation, high quality summer foraging areas in Grand Teton National Park and surrounding areas. Winter ranges are typically lower in elevation than summer ranges, and pronghorn winter survival is largely due to their ability to withstand harsh winter conditions with lower quality winter forage (sagebrush). The Path of the Pronghorn sub-herd migrates up to 155 miles between summer and winter ranges, the longest-known terrestrial animal migratory route in the 48 contiguous states. The summer habitat and migration corridor in Bridger-Teton National Forest has been designated as a migration corridor in the management plan for the Forest, the first such national designation of its kind. As a result, pronghorn movement in this area is not threatened, but its movement opportunities are threatened to the south of Bridger-Teton National Forest.

Fences can be a serious impediment to migration, however, there are design considerations that make them passable to most wild ungulate species and useful for most livestock operations. Pronghorn use their speed and eyesight to evade predators, and they prefer open terrain. They prefer to cross fences by crawling under the bottom wire, and jumping fences is a learned behavior. Wildlife-passable fences incorporate smooth (not barbed) bottom wires with a minimum height of 16 inches for pronghorn and a maximum height of 42 inches to allow other wild ungulates such as deer, elk, and moose to jump over.

Strategy 1: Modify fences that are a barrier to wildlife migration

Work with landowners who volunteer to have their fences replaced with wildlife-friendly fencing

Activity 1: Assess and map high priority fences for modification \$40,000 Complete

Green River Valley Land Trust worked with a consultant and landowners willing to allow access to their properties to inventory 107 miles of fencing within a portion of the Path of the Pronghorn migration route in late summer 2008. The team was able to access approximately 70% of fence in the core of the corridor; USDA Natural Resources Conservation Service has recently inventoried another mile of additional fencing. In total, all 107 miles of existing fence technically was not "wildlife-friendly" according to Wyoming Game & Fish Department guidelines. Wildlife-friendly fencing is generally no more than 42 inches high with a smooth bottom wire at least 16 inches off the ground, and at least 10, but preferably 12, inches between the top and next wire down. The inventory revealed that 94 miles (88%) of fence had a barbed bottom wire, 88 miles (82%) had a bottom wire less than 16 inches off the ground, 56 miles (52%) were taller than 42 inches, and 34 miles (32%) were taller than 42 inches and had a barbed bottom strand.

**Activity 2: Modify high priority fence with wildlife-friendly fence
\$1.3 to \$1.7 million (\$11,180/mile or \$2.12/foot)**

Between 110 and 152 miles of fencing that is not wildlife friendly exists within the corridor, extrapolating from the survey work already completed. The Green River Valley Land Trust has begun replacing the highest priority fences along the pronghorn corridor. The Land Trust, Wyoming Game and Fish Department, Bureau of Land Management, USDA Natural Resource Conservation Service, Sublette County Conservation District and Jonah Interagency Office agreed that 69 miles of fencing were a priority for modification, but that modification should be delayed on the remaining 38 miles of fencing which may have less of an impact on pronghorn movement or are on hold for other reasons. All activity is contingent on landowner permission.

Existing funding and weather allowed approximately 1 mile to be modified in 2008. Another 68 miles are expected to be modified in early 2009. Fencing costs are based on the types of modifications necessary (typically removing and replacing a barbed bottom wire with a smooth wire 16 inches off the ground and/or re-spacing the remaining wires to meet the height and spacing specifications described above, with post replacement as necessary) and costs for local contractors to complete the work.

**Activity 3: Monitor pronghorn use of migration habitat pre- and post-fence replacement
\$250,000/year (~ \$150,000/year is monitoring that might overlap with this plan)**

Shell Oil Company, Questar Corporation and Ultra Petroleum Company have been supporting research and monitoring by the Wildlife Conservation Society that has already revealed much of what is known about the Path of the Pronghorn sub-herd. Radio telemetry work has documented the precise movement of individual animals and how specific fences may impede movement (see map X, of Teton-summering pronghorn). Continued radio-tracking work will provide pre- and post-fence replacement data to show whether fencing modifications are having an effect on reducing pronghorn migration duration and increasing foraging time relatively to movement periods. It is critical that information on when and where fences are modified are combined with radio telemetry data to show whether fence modification is making an impact.

**Activity 4: Outreach to additional landowners with potential problem fences
\$25,000**

Approximately 45 miles of fence remain to be surveyed because landowners initially were not interested in participating or unwilling to allow access to their property for assessment. Given the importance of some of these properties along the pronghorn migration corridor, it is crucial to inventory and, if appropriate, modify fences on these properties. To accomplish this, the Green River Valley Land Trust, agencies or other organizations will continue communicating and meeting with landowners to identify further opportunities to evaluate and potentially replace fence barriers.

ADDRESSING THREAT 2 — Reduce the impacts of roads

Vehicle collisions are a known source of mortality for pronghorn. In addition to normal vehicle strikes, pronghorn herding and flight behavior make them particularly vulnerable. An incident from 2007 illustrates this problem: two animals were run over by a truck, but because the rest of the herd was also trying to cross the road ahead of the truck, 19 other animals were killed by running into the side and wheels of the same truck as it came to a stop. The need to cross U.S. Highway 191 threatens the pronghorn as they migrate north in spring and return south to wintering grounds in fall. Traffic on roads in and to parts of the Jonah and Anticline gas fields have also created a persistent and spatially extensive road kill problem (BMP-based strategies for which are discussed elsewhere in this document).

High traffic volume roads may also be affecting the overall amount of habitat "available" to pronghorn and their ability to reach suitable habitats. Abandonment of suitable habitat near high volume roads has been documented through telemetry data, but it is unclear whether high traffic volumes constitute barriers that pronghorn cannot cross.

Strategy 1: Install crossing structure and fencing at Trapper's Point

Telemetry data clearly demonstrate that the section of U.S. Highway 191 that traverses a raised ridge called "Trapper's Point" bottleneck is the most important wildlife road crossing in the area. It is a stretch of road of less than 1 – 2 miles where pronghorn commonly cross the highway and is a known area of vehicle-wildlife collisions. Current Wyoming Department of Transportation laser/light equipment installed to warn motorists of wildlife near roads does not appear to have been successful in reducing wildlife mortality at this bottleneck. Wyoming Department of Transportation is currently studying the system's efficacy.

Wildlife overpasses and underpasses have been used successfully in Europe and Canada and in a few locations in the United States. Experts believe that a similar structure with fencing to channel animals to the crossing structure is needed at Trapper's Point to reduce direct use of the roadway. This activity also has the benefit of reducing vehicle/wildlife collisions, damage costs from accidents and potentially human injuries or death that result from collisions.

Activity 1: Vehicle speed

Animals migrate across Trapper's Point along a crossing zone more than one mile wide and animals are only going to be channel to a new crossing structure along a portion of this distance. The most effective way to immediately reduce animal mortality and vehicle accidents is to work to change motorist speed as they cross through this wildlife corridor by educating motorists and/or changing posted speed limits.

Activity 2: Identify possible structure designs and estimate cost Completed

A simple span highway bridge or underpass for animals which provides a 50' x 10' clear opening beneath the structure could cost in the range of \$1,400,000 to \$1,600,000. Structures considered are a simple span steel girder bridge, 3 span steel girder bridge, and 54' x 11' ConSpan structure. A new wildlife bridge over the roadway or overpass for animals with a length based on 18' of vertical clearance over the road, a minimum span of 64' (50' roadway and 7' each side for clear zone), and a top width of 100 feet, could cost in the range \$3,000,000 to \$5,000,000.

Activity 3: Build public support and consensus that structure is needed \$50,000

A critical part of any activity to change the configuration of the road involves public meetings, planning and other review to ensure that public support and landowner support exists for highway changes. Any modification will likely attract criticism from a significant percent of the public because of skepticism about expenditure of public dollars and about likely success of structure in reducing accidents.

Activity 4: Select design and complete engineering design and planning \$100,000

There is some concern from evidence elsewhere that pronghorn will only use an overpass where they have unrestricted visibility of rangeland and will not use an underpass unless it is a very large one. State design options have taken this into consideration.

Activity 5: Install crossing structure \$1.4 to \$ 5 million

Physical construction of a wildlife underpass or overpass is the primary cost and will take time to permit, contract and build.

**Activity 6: Install fencing to guide animals to crossing structure
\$400,000-\$600,000**

Based on recent projects 8 foot high wildlife fence, cost could range from \$100,000 to \$150,000 per linear mile. As an example to fence both sides of a road for 1 mile would cost \$200,000 to \$300,000 per mile. Consideration must be given to where the fence should begin and end based on road mortality, crash data and past animal movement studies.

**Activity 7: Monitor wildlife crossing use and continuing road mortality
\$80,000**

Follow up monitoring is needed to confirm whether new road structure has a significant impact in reducing road mortality and levels of animal stress.

ADDRESSING THREAT 3 — Future subdivision may fracture corridor migration

In Grand Teton National Park and along the northern 46 miles of the migration corridor, pronghorn habitat is protected by almost complete public land ownership on National Forests. However, the central part of the migration corridor is largely private land. Between U.S. Highway 191 to the south and the Bridger-Teton National Forest boundary to the north, the land ownership and protection status of the core part of the pronghorn corridor is as follows:

Owner	Acreage	Percent of Total Project Area
Private	37,029	55
BLM	26,001	39
State of Wyoming	3,718	6
U.S. Forest Service	4	<1
Water/Rivers	267	<1
TOTAL	67,020	100

Although many properties are owned by families or landowners that have been ranching for more than 100 years or otherwise have little intention to sell their land, a number of factors — including the high price of land relative to ranching revenues, aging agricultural operators, estate taxes, and lack of young people entering farming/ranching — makes subdivision a continuing risk that is more acute in some parts of the corridor. High land prices relative to net incomes from ranching make sale to developers more likely. In addition, some properties are more crucial to continued pronghorn movement because pronghorn have relatively few options to cross elsewhere if development occurs on them. This “weakest link” situation means that the viability of the Path can turn on the fate of any one of a handful of properties that it crosses. These areas are more than high priority places for conservation; they are essential if pronghorn are to continue to use the corridor and be found in Grand Teton National Park.

In addition to fragmentation of private land habitat, the open space on public land is indirectly impacted by development. For example, the habitat function of the 26,001 acres of BLM land in and near the “Path of the Pronghorn” corridor is eroded when development occurs on its borders. Fragmentation of open space by residential subdivisions with associated homes, fences, roads, and traffic volume impact pronghorn movements through the landscape and decreases the functionality of the public land habitat.

Strategy 1: Conservation easements

Easements and other permanent or term agreements ensure that land currently accessed by pronghorn as part of their migration pathway is not broken up in a way that would threaten that migration in the future. Approximately 3,406 acres or 9% of the private land in the Path of the Pronghorn has already been conserved under purchased or donated easements from willing landowners. Continued purchase or donation of perpetual conservation easements from interested landowners will reduce the potential for future fragmentation and may improve the ability of pronghorn and other big game like mule deer, elk and moose to move between critical ranges.

Activity 1: Identify properties critical to continued movement of pronghorn \$10,000

Currently, 37,029 acres or 55% of the migration path is on private lands. Continued pronghorn access to approximately 20,000 acres is critical to the continued migration of Path of the Pronghorn herd; other acres are somewhat less important because they are at lower risk of development or are situated such that pronghorn could still move past properties if the properties were subdivided. The Joint Interagency Mitigation and Reclamation Office is working on an additional easement that would protect another 2,571 acre. Thus, approximately 30% of these critical areas are already protected to allow continued pronghorn migration. However, the utility of a migration corridor is only as strong as its weakest link and there is the risk that development on other properties that are bottlenecks for migration could imperil the value of any past easement investments and the corridor itself. Additional assessment is needed to identify which on which other properties the establishment of easements with willing landowners is most crucial.

Activity 2: Secure donated easements \$40,000

Landowners in the Upper Green have expressed an interest in donating conservation easements to the Green River Valley Land Trust in 2009. These easements would conserve approximately 1,500 – 2,000 acres in the migration route from residential and commercial development and keep these properties intact and functional for pronghorn and other wildlife. The Land Trust is seeking to close on these easements by the end of 2009, but additional donated easements may arise each year and although the easement comes at no cost, the process of recording and transferring the easement has a small cost.

Activity 3: Purchase easements using USDA and other funding \$24 to \$28 million

The Green River Valley Land Trust, agencies and other conservation organizations have identified approximately 3,000 – 5,000 acres of potential purchased easements in the migration route that they will continue working with landowners to secure. USDA Farm and Ranchland Protection Program funds will play a vital role in these acquisitions given the properties' locations and active ranching. Additional protection is needed for another 14,000 acres, at an assumed average cost of between \$1,750 and \$2000/acre.

Activity 4: Risk from exercise of mineral rights in the migration corridor

The existence of a split estate means that BLM and private lands within the migration corridor north of Highway 191 could be subject to subsequent mineral development, even if an easement is secured on a property. This risk potentially undermines investments in easements. Through the Pinedale Resource Management Plan, BLM has designated this pronghorn migration corridor as off limits for future leases which significantly reduces this risk. However, some leases already exist on these lands and if mineral rights are exercised, doing so could impact pronghorn migration.

Activity 5: Risk that easements are an unnecessary expense

Easements are a relatively expensive way to help ranchers and secure conservation goals and do little or nothing by themselves to address existing or future issues of habitat quality or permeability to wildlife by themselves. If there are other less expensive actions that are equally or more effective at maintaining unfragmented ranchlands while improving value for pronghorn, those actions deserve significant investment. Investments in easements do not create a risk to the goals of this initiative but they do create a risk that the cost of the initiative is more than was absolutely necessary to achieve these goals.

Strategy 2: Maintain and improve ranch profitability

Efforts to maintain and improve the profitability of area ranches are critical to maintaining the open space and way of life that has kept wildlife populations in this part of Wyoming healthy for so long. Agricultural land is at the greatest risk for residential development. The majority of the land for low density rural development is coming from the sale of ranches to residential and commercial developers. Thus, much of the concern about maintaining open space in the West has focused on private land where landowners face increasing residential and urban development pressures. Because agriculture is the dominant private land use in Wyoming, the future of open spaces on private lands in places like Sublette County depends to a large extent on what happens to the agricultural industry.

Activity 1: Expand assistance to Path of the Pronghorn landowners

Best management practices funded through USDA's Natural Resource Conservation Service conservation programs like EQIP and WHIP are particularly important because many such practices also have benefits that may directly help pronghorn and other wildlife. Many landowners whose properties are critical to the continued migration of pronghorn may not be interested in protecting their properties using a permanent conservation easement, for example, but may be interested in cost-share and other programs.

Funding purely production-related cost-share practices and operational improvements is less likely to be a priority for the National Fish and Wildlife Foundation. Targeted outreach to landowners in the Path of the Pronghorn should identify whether landowners are interested in assistance to adopt practices that help their operations and improve foraging opportunities for pronghorn and ease of migration. USDA is already implemented such programs throughout Sublette County, but additional outreach efforts supported by others might help increase participation in USDA programs among Path of the Pronghorn landowners. Practices that help maintain and improve irrigation infrastructure are also critical to ranch operations.

Activity 2: Develop "pay for performance" assistance for landowners \$30,000

Some landowners not interested in either permanent conservation easements or "pay for practice" cost-share programs have expressed interest in providing wildlife habitat services on a "pay for performance" basis. Services such as increased forage availability, increased width of riparian zone, or other ecological attributes may be of interest to both potential buyers such as mitigation funds interested in securing tangible habitat improvements, and potential sellers like landowners who could have a new income stream to integrate into ranching operations. There is a high risk that such a program would not work out therefore initial investments should be focused on developing and vetting a mutually agreeable program structure with a diverse group of buyers and sellers. If such an effort succeeds in getting consensus around program structure, payment rates and services to be performed, additional investments may be warranted.

Addressing Threat 4 — Gas field impacts

Pronghorn crossing U.S. Highway 191 migrating south immediately encounter the Pinedale Anticline (PAPA) gas field and some subsequently encounter the Jonah gas field. Wintering animals must either remain on the gas fields or move through them to find wintering grounds where snow depth is low enough to allow movement and access to sage (their primary winter food source). The primary driver of pronghorn distribution is snow depth, but snow depth is highly variable across the landscape and between years. The pronghorn's nomadic movements within the wintering grounds allow animals to track low snow-cover areas in space and time. The implication of this for wintering herds is that the absolute quality and quantity of forage or range is less important than the herds' ability to move through the landscape to find places where forage is accessible based on snow cover. Therefore, it is tenuous to produce a static map of "key" wintering grounds for pronghorn. Instead, they must have access to a large enough area to "capture" variably distributed low-snow depth areas. For example, in harsh years like 1987, pronghorn wandered as far as Rock Springs and I-80, 90 miles to the south, in search of accessible forage not buried in snow.

The unpredictable distribution of snow depth and the extensive nature of pronghorn habitat use means that the permeability of gas fields to pronghorn movement and the suitability of surrounding habitats will have important effects on wintering animal movements and as development progresses, potentially their survival.

The threat that gas field development and operations pose to pronghorn access to winter range and quality of that range is being addressed by avoidance, minimization and on- and off-site mitigation measures. Implementing best management practices minimizes gas field operational impacts on pronghorn movement opportunities. Remaining significant impacts of gas fields on movement through are addressed through mitigation. These activities are already underway and are discussed below only briefly.

However, with the United States moving decisively toward energy independence, the lessons learned in Sublette County will go a long way toward informing how minimization and mitigation efforts should or should not proceed in other areas of the country. A shift — from *whether* to develop to *how* to develop gas fields — should form a basis for identifying additional collaborative solutions that further reduce the magnitude of any wildlife population impacts stemming from oil and gas production or mitigate the impacts that are not eliminated. With just a fraction of the Pinedale Anticline gas fields developed, past and future collaborative solutions will have important local impacts as development expands over the remaining years of the 17-year development project which is predicted to affect 8 % of the total surface of the Anticline area; a larger proportion of the Jonah Field surface area has already been affected by gas field development.

Strategy 1: Adopt gas field best management practices

One way to reduce net impacts on wildlife is to reduce the magnitude of impacts taking place by altering the way that exploration, development, or operation of gas fields takes place. Operators are already required or encouraged to adopt a set of gas field best management practices under requirements established when receiving permits from BLM and others to operate in the Jonah or Pinedale Anticline fields. Research is showing that many of these practices such as directional drilling are likely successful in reducing impacts to wildlife.

Activity 1: Apply best practices (ongoing)

Operators, the state and BLM have agreed on where and how to implement best management practices. BMPs are monitored through collaboration between the BLM, Wyoming Game and Fish, Operators and the researchers evaluating management practices like Wildlife Conservation Society, Western Research Institute, WEST and the University of Wyoming.

Activity 2: Completion of management-oriented research
\$200,000/yr (~ \$500,000/yr of additional research ongoing or complete)

WCS and WEST-Inc. have been implementing research plans to evaluate impacts on pronghorn and mule deer respectively. Movement, habitat use, survivorship and behavioral observations are providing data to evaluate management practices. Identifying management practices that maintain permeability of the landscape and thus increase access to winter forage is the most important part of this research that may result in an increase in pronghorn winter survival. Assessing the relative importance of construction and production phases, traffic volumes and the configuration of pad development are key questions for identifying best management practices. We assume that only a portion of this \$700,000/yr. is relevant to this initiative, but it is difficult to determine its portion of total cost.

Activity 3: Workshops to synthesize wildlife impact study results
\$60,000 (funded)

Pronghorn, greater sage grouse and mule deer studies have gone on for more than 5 years. While the Foundation is clearly focused on the Teton-summering pronghorn sub-herd, operators and regulators must approach mitigation from a broader perspective. Review and comparison of the specific management practices and densities, and intensities and configurations of development affecting each species is necessary to craft a comprehensive set of best practices for wildlife. A 1 – 2 day workshop or series of workshops and seminars has been funded and is being convened to synthesize existing findings and develop new recommendations for best management practices and identify new priorities for research.

Strategy 2: Improve Best Practices

Despite the implementation of BMPs, it is clear that gas field development and operations affect pronghorn distribution because pronghorn are significantly reducing use of or abandoning use of high-density operations and development areas within both the Pinedale Anticline and Jonah fields at present. However, it is not clear that development and operations have affected overall pronghorn abundance or mortality. It is also not clear at what density of gas pads and intensity of vehicle traffic pronghorn abandon areas or significantly decrease area use. The ideal configuration of pad sites and roads, and the relative effects of construction versus production phases on pronghorn herds, remains unknown. Preliminary data demonstrate that pronghorn persist in some parts of the extraction landscape, suggesting that there are best practices already in use in at least portions of the fields that can allow pronghorn to coexist with energy development. Regardless of any disagreement over the magnitude of these impact, continued efforts to improve Best Management Practices, research on wildlife behavior and demographics, and identify and adopt new Best Management Practices is needed to keep reducing the magnitude of gas field impacts.

Activity 1: Collaborative assessment of the hydrocarbon development process

An understanding of the gas field development and production processes is essential to understand required and potentially malleable parts of the processes within which there may be some steps that are more easily adjusted (through new BMPs) than others. By building in an understanding of the gas development and production process, conservation interests will establish a more reasonable and collaborative platform from which to engage industry. It is not clear precisely which activities are necessary to implement this assessment, but the Foundation is interested in participating in any partnership which industries, agencies, and organizations seek to pursue if it has a tangible and direct connection to producing an improved set of future solutions for wildlife.

Activity 2: Improve reclamation best practices

The 'footprint' of a gas well is reduced after development and drilling are complete and is further reduced after the well ceased to be operational, potentially decades from now. Both former and latter reduction in footprint could be further reduced if practices were developed and implemented

that reduced the time until range was restored on areas with surface disturbance and improved the quality of that range. Some experts participating in development of this plan indicated that further refinement of reclamation practices would help reduce long-term impacts on pronghorn.

Activity 3: Recommend and agree on adoption of additional or revised BMPs (funded and/or in progress)

Research that is already underway, the workshops discussed above, and other ongoing efforts are already seeking to identify new BMPs or revise existing BMPs using the latest science to better determine how to reduce wildlife impacts. The Foundation is interested in helping fund any effort through which operators, agencies, and organizations seek to identify or develop improvements in BMPs if experts agree that doing so has a tangible and direct connection to producing a better result for antelope that are part of the Path of the Pronghorn sub-herd.

Strategy 3: Mitigation

More than \$60 million in mitigation funds have been committed to offset the impacts of gas development on wildlife and the quality of life of Sublette County residents. The funds do so by supporting on- or off-site projects that are intended to have benefits that more than compensate for those impacts. The Strategic Plan for the Jonah Interagency Mitigation and Reclamation Office has established geographic priorities that are distinct from that of the Path of the Pronghorn corridor, but some activities like fencing modification are being funded on a case by case basis. A similar plan is expected to be developed for the Pinedale Anticline Project Area mitigation fund. Some experts who participated in the development of this plan have argued that no additional investments are needed by the Foundation or any other source within the Jonah or Pinedale Anticline areas. It is argued that the benefits for wildlife created by these mitigation funds, in conjunction with the effect of required BMPs in minimizing impacts, result in wildlife populations being no worse off during field development and throughout operations than before development. Others helping with the development of this plan have argued that required BMPs and existing mitigation funds are inadequate to eliminate significant impacts on wildlife species, because funding is inadequate, BMPs don't go far enough to reduce impacts, difficult to measure but high impact landscape effects of development were not factored into plans, or because funding is not targeted to the right interventions. BMPs are discussed above. For mitigation funds, this plan does not seek to resolve the disagreements discussed above, but there are some strategies identified by people who helped develop this plan that they believe will help reduce the uncertainty that drives some of this conflict.

Activity 1: Mechanisms for selecting mitigation projects (underway)

A key attribute of mitigation funds, given the conflict over whether and how field operations impact wildlife, is to make investments using clear criteria for fund allocation project selection. Doing so fosters increased trust among stakeholders who can conclude that these are strategic interventions chosen and implemented to maximize benefits for targeted wildlife. It is particularly important to guide resources to projects that will have the largest impact on specific herds, sub-herds and populations of wildlife most likely affected by field operations. The Jonah Interagency Office has already produced a strategic plan which indicates geographic and strategic priorities for mitigation fund use and is implementing that plan with public requests for proposals and use of a panel to review and select proposals whose project selection criteria and decisions are transparent to the public.

Activity 2: Develop plans to target projects for other sub-herds

Over time it may be necessary to replicate this plan by developing similar plans that assess the conservation needs of different portions of the Sublette Pronghorn Herd Unit and other wildlife herds that are using these areas to evaluate the best opportunities to mitigate impacts — i.e. documents through which experts identify the interventions that produce the biggest benefits for wildlife species with the fewest possible fund resources.

**Activity 3: Support research designs that facilitate agreement
(underway, budget above)**

The best way to prove that gas field development and operations are causing no significant net impacts to the pronghorn (which are not being mitigated through other actions) is through research. As described above, Western Ecosystems Technology, Inc. and the Wildlife Conservation Society are already engaged in multimillion dollar research programs supported by operators to verify that this is the case. However, if major parties interested in wildlife issues in the Jonah and Pinedale Anticline fields don't agree with the methodologies used or agree over which indicators are the right ones to indicate positive or negative impacts the research is less valuable. For example, two competing press releases from interested parties about the same research were titled, "Study confirms negative impacts of drilling on mule deer" and "study reveals mesa mule deer herd numbers increased." Experts helping develop this plan agree that monitoring and scientific studies are already designed to minimize this sort of outcome and conflicting interpretations of research results.

Funding Needs

Success in achieving the goals of this business plan depends upon the Foundation raising and spending at least \$4.0 million over 5 years on the strategies described herein. It also depends upon government and non-government agencies and organizations and Operator-funded mitigation funds providing an additional \$26 – \$29 million which are allocated to implement the strategies and activities described in this plan.

Other partners who are already committed to making investments to Path of the Pronghorn conservation include USDA Natural Resources Conservation Service, Bureau of Land Management, Wildlife Conservation Society, Green River Valley Land Trust, Mule Deer Foundation, Environmental Defense Fund, Patagonia, Stealth Cam, Operators, The Wilderness Society, Greater Yellowstone Coalition, and others.

Budget estimates for the Path of the Pronghorn Initiative:

Threat	Strategy	Activity	Estimated Costs					
			Y1	Y2	Y3	Y4	Y5	Total
Fences create barriers to migration	Modify fences	Assess and map high-priority fences for modification	\$20K	\$0	\$0K	\$20K	\$0	\$40K
		Modify high-priority fence	\$800K	\$200K	\$200K	\$100K	\$0	\$1.3M
		Monitor pronghorn migration pre- and post-replacement	\$150K	\$150K	\$150K	\$150K	\$150K	\$750K
		Outreach to remaining landowners	\$0	\$0	\$10K	\$20K	\$0	\$30K
Reduce the negative impact of roads	Install crossing structure at Trapper's Point	Design and cost options	done					
		Build public support and consensus	\$0	\$10K	\$20K	\$0	\$0	\$30K
		Select design and complete planning	\$0	\$0	\$0	\$0	\$0	\$0
		Install crossing structure	\$0	\$0	\$1.4M	?	?	\$1.4M
		Install fencing	\$0	\$200K	\$400K	\$0	\$0	\$600K
		Monitor wildlife crossing and road mortality	\$0	\$50K	\$50K	\$50K	\$50K	\$200K
Future subdivision of ranches	Easements	Identify properties critical to continued migration	\$5K	\$5K	\$0	\$0	\$0	\$10K
		Secure donated easements	\$10K	\$10K	\$10K	\$10K	\$0K	\$40K
		Purchase easements	\$2M	\$3M	\$5M	\$6M	\$8M	\$24M
	Maintain and improve ranch profitability	Expand assistance to landowners	?	?	?	?	?	?
		Evaluate 'pay for performance' program	\$30K	?	?	?	?	\$30K

Threat	Strategy	Activity	Estimated Costs					
			Y1	Y2	Y3	Y4	Y5	Total
Gas Field Impacts	Best management practices	Implement BMPs	Done	Done	Done	Done	Done	\$0
		Completion of management-oriented research	\$200K	\$200K	\$200K	\$200K	\$200K	\$1M
		Workshops to synthesize wildlife impact study results	\$60K	\$0	\$0	\$0	\$0	\$60K
	Improve BMPs	Assessment of hydrocarbon development	?	?	?	?	?	?
		Improve reclamation	?	?	?	?	?	?
		Revise BMPs	?	?	?	?	?	?
	Mitigation	Project selection	Done	\$0	\$0	\$0	\$0	\$0
		Plans for sub-herds	?	?	?	?	?	?
		Scientific monitoring design supported	Done	Done	Done	Done	Done	Done
TOTAL			\$3.3M	\$3.8M	\$7.8M	\$6.6M	\$8.4M	\$29.5M

Evaluating Success

All conservation investments are made with a desire to have something change. Monitoring tells us whether that change is occurring. Evaluation tells us whether the combined set of investments being made are being designed and implemented to maximize that change.

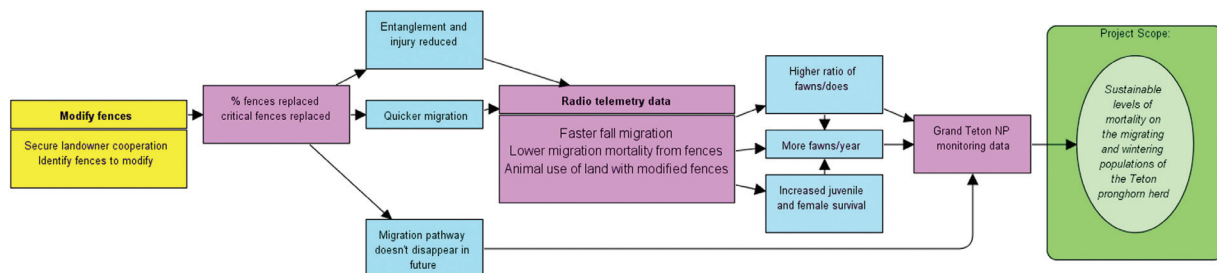
The Foundation will work with outside experts to prioritize proposals based on how well they fit in with the results chains and priorities identified in this plan. Success of funded projects will be evaluated based upon success in implementing proposed activities and achieving anticipated outcomes. As part of each project's annual (for multi-year awards) and final reports, individual grantees will provide a summary of completed activities and key outcomes directly to NFWF. These would likely include outcome metrics identified at the initiative scale.

Periodic expert evaluation of all investments funded under this initiative will occur and will help grantees to monitor key indicators to ensure that data across individual projects can be scaled up to programmatic and initiative levels. Findings from monitoring and evaluation activities will be used to continuously learn from our grantmaking and inform future decision-making to ensure initiative success.

The success of this plan would ideally be measured by changes in pronghorn survival or movement patterns. However, populations may not respond quickly to some of these activities. The following activities and indicators described in detail below (and summarized in Table 1) should serve as good surrogates for the success of this initiative.

Fence modification:

The following results chain shows how fencing modification is tied to our ultimate goal of ensuring that levels of mortality on migrating pronghorn that are part of the Teton sub-herd are sustainable and the migration can continue:

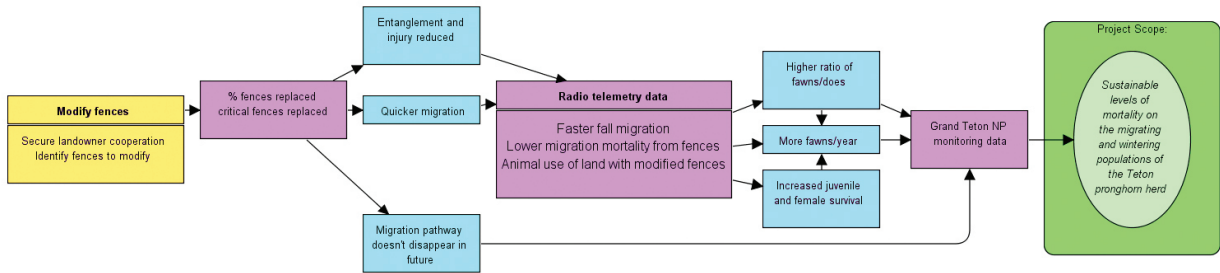


Our goal is to reduce fence-related mortality by 75 percent as animals travel to/from Forest Service land to winter range south of Highway 191. Radio telemetry data will provide an indication of whether mortality is declining. In addition, because the path itself is so narrow, and because pronghorn use of the corridor is limited to a few weeks in the spring and a few days in the fall, the probability of finding mortalities of non-radio collared animals in the corridor is high. Monitoring these mortalities will help prioritize areas for fence removal and traffic mitigation, and it will provide a quantitative assessment of the success of these activities once they have been implemented.

Radio telemetry will also show whether fence modification is allowing animals to move more quickly and increase use of or speed of travel across properties on which fences are modified. By monitoring the width of the area used by collared animals, and by observing the areas used by uncollared animals, we can estimate whether crossing structures, fence modifications and other interventions do in fact facilitate movement through the corridor. A wider corridor will minimize the chances that a single disturbance (like drifting snow, which killed 16 migrating animals in 2008-09) can inhibit movement.

The success of fence replacement will also be measured by tracking the rate at which animals move through the corridor during the fall migration, which happens more quickly than the spring migration.

Road crossing:



Winter habitat use:

Pronghorn survival depends on finding areas of low snow cover. In severe years, animals must move nomadically to avoid deeper snow and reach areas with accessible sagebrush cover. The area of the wintering grounds used and the extent to which pronghorns are able to move through winter habitat provide measures of the intactness of the habitat itself. Specifically, rates of movement through winter habitat and the evenness of use within winter range provide quantitative estimates of habitat use. Six years of baseline data provide point of reference for quantifying changes in winter habitat condition for subsequent years. Repeated winter counts of doe:fawn ratios in “control” and “experimental” herds provide an estimate of increased (anthropogenic) mortality experienced by (“experimental”) animals wintering on gas fields. These rates of mortality can be analyzed in conjunction with movement and snow depth data to quantify the extent to which animals’ movements and habitat selection are constrained by land management practices on the wintering grounds.

Table 1. Possible indicators to measure success of conservation strategies.

Strategy	Possible Indicators
Fence modification	Telemetry data (compared to previous years) will show: <ul style="list-style-type: none"> • Width of path at fence modification sites versus animal use of Path • Speed of movement through the area • New (micro) paths identified and used
Success of wildlife overpass/underpass at Trapper’s Point	Camera trap monitoring WY Department of Transportation data on vehicle collisions Observed pronghorn mortalities (WY Department of Transportation collection rates for pronghorn carcasses in this area) Telemetry data showing crossing activity on structure and nearby areas of highway
Easements	Telemetry data will show continued (or new) use of conserved land Absence of subdivision, new fence construction, structure construction, etc (per easement restrictions)

Long-Term Foundation Support

This business plan lays out a strategy to achieve clear outcomes that benefit wildlife over a 5-year period. At that time, it is expected that the conservation actions taken by partners will have brought about new institutional and societal standards and environmental changes that will have set the population in a positive direction such that maintaining those successes or continuing them will be possible without further (or greatly reduced) NFWF funding. To help ensure that the population and other gains made in 5 years won't be lost after the exit of NFWF funding, the partnership must seek development of solutions that are long-lasting, cost-effective, and can be maintained at lower levels of funding in the future. Therefore, part of the evaluation of this initiative will address that staying power and the likelihood that successful strategies will remain successful at lower management intensity and financial investment.

The adaptive nature of this initiative will also allow NFWF and partners to regularly evaluate the strategies behind our objectives, and make necessary course corrections or additions within the 5-year frame of this business plan. In some cases these corrections and additions may warrant increased investment by NFWF and other partners. However, it is also possible that NFWF would reduce or eliminate support for this initiative if periodic evaluation indicates that further investments are unlikely to be productive in the context of the intended outcomes.

Ancillary Benefits

This initiative will have a measurable benefit for a host of other wildlife which can and should thrive in the Upper Green River Valley. We do not plan to monitor progress in achieving benefits for these species although others may be doing so.

Table 2. High priority species likely to benefit from activities.

Species	Benefit
MAMMALS	<p>The following species would receive slight to moderate benefits from habitat protection efforts; fence modifications will make no significant difference to most species except mule deer; range improvement practices adopted through BMPs supported by operators or USDA-funded cost-share programs are more likely to create significant habitat improvements for many of these species.</p>
Idaho Pocket Gopher	
Moose (Shiras)	
Pygmy Rabbit	
Sagebrush Vole	
Uinta Ground Squirrel	
White-tailed Prairie Dog	
Wyoming Ground Squirrel	
Mule deer	
BIRDS	
Brewer's Sparrow	
Burrowing Owl	
Ferruginous Hawk	
Grasshopper Sparrow	
Great Gray Owl	
Greater Sage-Grouse	
Greater Sandhill Crane	
Lark Bunting	
Long-billed Curlew	
McCown's Longspur	
Sage Sparrow	
Short-eared Owl	
Swainson's Hawk	
REPTILES	
Greater Short-horned Lizard	
Northern Sagebrush Lizard	
Prairie Racerunner	
Rubber Boa	

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About NFWF — The National Fish and Wildlife Foundation is a 501(c)(3) organization dedicated to funding sustainable conservation initiatives. Chartered by the United States Congress in 1984, NFWF leverages federal grants and private support to achieve maximum conservation impact. Recently, the Foundation — through its Keystone Initiatives — strategically repositioned itself to more effectively capture conservation gains by directing a substantial portion of its investments towards programs that had the greatest chance of successfully securing the long-term future of imperiled species. By leveraging innovative program design from scientific experts, the Foundation is able to structure conservation programs that consistently achieve measurable and meaningful outcomes. [www.nfwf.org]



Photo credit: Green River Valley Land Trust © 2008

