

Chapter 4: Environmental Consequences

4.1 Methods used to Estimate Potential Environmental Consequences

Since this is a programmatic review for a possible bison restoration project and no specific locations are under consideration at this time, this analysis is based on information and experiences from the bison restoration case studies in Utah, Alaska, Canada, and on private lands in Montana, in addition to other relevant bison-related projects and scientific research. The guidelines for any restoration effort, test project or otherwise, as described in Chapter 3 were also used to inform this analysis.

Two scales of restoration are considered here: 1) a release of 40 bison and a population goal to be determined; and 2) a release of 40 bison and a long term population goal of over 400 animals, which is the recommended herd size to retain 90% of genetic diversity.

The scale used for description of impact levels:

- **Negligible**—An adverse or beneficial effect would occur, but would be at the lowest levels of detection.
- **Minor**—The effect would be noticeable, but would be relatively small and would not affect the function or integrity of the resource.
- **Moderate**—The effect would be readily apparent and would influence the function or integrity of the resource.
- **Major**—The effect would be substantial and would result in severely adverse or exceptionally beneficial changes to the resource.

The analysis assumes an initial soft release of 40 animals to a property of at least 4,000 acres, i.e., 100 acres per animal. Any site with a final population goal of more than 40 animals would need to be much larger as restoration populations in other areas have grown anywhere from 9-22% annually (Brodie, 2008).

If an alternative(s) to restore bison at some level to a location in Montana is selected, a site-specific environmental assessment (EA) would be prepared by FWP to analyze potential impacts (direct, secondary and cumulative) to the location's existing resources as required under the Montana Environmental Policy Act. A site-specific management plan would also be developed as required by MCA 87-1-216 (5) if placement of restoration bison occurs on private or public lands.

4.2 Physical Resources

4.2.1 Ecosystem Contribution

Case Study Experiences:

Managers at case study sites in Utah and on the lands owned and leased by the American Prairie Reserve (APR) are monitoring the ecological impacts of their bison on existing vegetation and other resources. Presently, the Utah Department of Wildlife manages 325 bison on approximately 300,000 acres and APR manages 440 animals on 31,000 acres. No data on measureable changes to vegetation diversity, quality or quantity with the addition of bison on the landscape could be obtained for this EIS.

Large scale programs such as that initiated recently in Alaska and the Pink Mountain area of British Columbia manage for large herd sizes (>400 animals). These animals are allowed to roam within large geographic areas thus having the ability to select forage and habitat freely. This sort of 'free range' management can result in the greatest ecological impact to the restoration area as bison are allowed to move about freely selecting areas based on their biological needs and preferences.

Alternative #1: No Action

There would be no ecological contributions by restoration bison to additional lands within Montana if this alternative were selected. Bison-related ecological contributions would be restricted to lands where Yellowstone National Park bison migrate into Montana and where tribal and privately-owned bison are raised.

Secondary and Cumulative Impacts

No secondary or cumulative impacts can be predicted at this time for this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

As described in Chapter 2, bison are a keystone species within plains and prairie habitats by influencing localized vegetation and soil conditions with their wallows, sparring, and migrations. They also provide an important source of food for predators and carrion-eating wildlife.

If a chosen site has an acreage ratio of one bison per 100 acres for an initial release of 40 animals, FWP expects minimal negative ecological impacts to existing resources, yet, the site could expect some or all of the benefits previously described (see section 2.3) and as described below. However, actual impacts to ecological resources could vary depending upon the existing resources at a location, such as the type of vegetation, soil, and wildlife present. If a different acreage ratio is used then impacts may vary as well as. Long term ecological benefits could be moderate to major depending on the population goal for a given location.

Ecological benefits from the implementation of a bison restoration effort on private and/or public lands within Montana could include the establishment of new diverse micro-environments where bison graze or develop wallows. This increase in plant diversity is utilized by other animals and increases the diversity of wildlife within the region (Foresman, 2001; Picton, 2005; Gates et al., 2010). Knapp et al. (1999) found that grazing behavior of bison in conjunction with wallows and other ecological events, such as fire, provides suitable nesting habitat for a variety of obligate grassland nesting bird species such as upland sandpiper, grasshopper sparrow, mountain plover, McCown's longspur, ferruginous hawk, and long-billed curlew (Knopf 1996; Gates et al. 2010). Bison play a key role in ecosystem processes by contributing to the maintenance of grasslands and shrublands through rubbing trees and saplings, debarking and sometimes killing them (Knapp et al. 1999; Meagher 1973). It has been suggested that tree rubbing and debarking by bison may impede or even prevent forest invasion of open grasslands (Meagher 1973). Seasonal use of sites within the restoration location would likely create different impacts to different areas.

Furthermore, bison play an ecological role as an important food source for many predators and scavengers. Attacks on bison tend to be infrequent and opportunistic, with predators often selecting older or weakened members of the herd or young calves (Varley and Gunther, 2002; Wyman, 2002). Bison carcasses support wolves, grizzly and black bears, wolverines, bald eagles, ravens, coyotes, and swift foxes (Roe, 1970; Bogan, 1997; Truett et al., 2001). The presence of bison may facilitate predators in new areas as wintering bison or bison calves can be valuable food sources for predators.

There is some indication that grazing by both bison and elk can increase the productivity and stability of grassland systems and enhance the nutrient content of grazed plants (Frank and McNaughton 1992; Singer 1995). Bison may contribute to new plant growth by distributing seeds, breaking up soil surfaces with their hooves and wallows, and fertilizing by recycling nutrients through their waste products (USDI, 2000). However, trampled areas and wallows may also provide opportunities for invasion by nonnative and exotic vegetation and may contribute to soil and stream bank erosion (USDI, 2000).

If changes to vegetation or the presence of predators become a concern to the project landowner(s), FWP could implement mitigation tools that may include additional fencing to limit access to sensitive vegetation or promote movement away from an area and installation of predator deterrents similar to those used in the wolf management program.

Secondary and Cumulative Impacts

Depending upon the location chosen for this alternative, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the past resource management activities by the landowner(s) and adjacent landowner(s), number of restoration bison relocated, and the site-specific bison management objectives.

Alternative #3: Restoration on Tribal Land

Potential ecosystem impacts could be similar to those described for Alternative #2. Some of the potential Montana reservation sites may allow for larger herd size, while others would have less capacity.

Depending upon the terms of the Memorandum of Understanding (MOU) approved by FWP and tribal representatives, which could include all the same requirements of a management plan with a private property owner, FWP would work with tribal partners on rangeland assessments as necessary. Additionally, FWP would also provide support to tribes in identifying ways to mitigate bison-caused impacts to habitat such as reseeding, enclosures, fencing or population control.

Secondary and Cumulative Impacts

Depending upon the location chosen for this alternative, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the past resource management activities by the tribal resource managers, number of restoration bison relocated, and the site-specific bison management objectives.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Potential ecosystem impacts could be similar to those described for Alternative #2. Under this scenario, the potential for a larger herd is greater thus it is possible ecosystem contribution and/or negative resource impacts could be greater than those for Alternatives #2 and #3 over the long term.

Secondary and Cumulative Impacts

Identical to Alternative #2, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the location chosen and the past resource management activities by the landowner(s) and adjacent landowner(s), number of restoration bison relocated, and the site-specific bison management objectives.

4.2.2 Wildlife and Fisheries

Case Study Experiences:

No conflicts between bison and other native ungulates have been noted in the Book Cliffs area. No conflicts have been noted between bison and native ungulates in the Henry Mountains; however, UDWR actively discourages occupancy by elk in order to benefit bison and mule deer. Some conflict between the Pink Mountain herd bison and Stone sheep at high elevations during the winter have been noted. The analysis of the Wood Bison restoration effort in Alaska indicated no conflicts with other ungulates are expected in that area.

Preliminary findings on the APR fence design, as described within the APR case study (section 3.4.2), indicate unimpeded movement of elk, deer, and antelope. APR's mission is to create and manage a prairie-based reserve devoted to all wildlife, not just bison.

Alternative #1: No Action

With the implementation of this alternative, there would be no impacts to or changes for the management of wildlife within Montana by FWP. FWP would continue managing wildlife under the guidance of current statutes and policies. YNP bison would be managed under direction of the Interagency Bison Management Plan.

Secondary and Cumulative Impacts

A possible secondary effect of the selection of this alternative is listing of the American Bison as an imperiled species under the Endangered Species Act (ESA) of 1973, which could change how the species is managed in Montana by FWP. A listing could also change land use in areas designated as critical bison habitat under the ESA.

Currently there are only five Plains Bison conservation herds that have over 1,000 individuals. Seventy-four percent of Plains Bison conservation herds have populations of less than 400 individuals, with 32% having fewer than 50 (Boyd, 2003; Gates et al., 2010).

In 2009, a petition was submitted to the Department of the Interior (USDI) requesting the consideration of listing wild Plains Bison as a threatened species under the ESA. A 2011 lawsuit is still pending from the USFWS finding that a status review to evaluate listing bison as threatened is not warranted. In 2014, another petition was submitted to list the bison as endangered or threatened under the ESA. This petition was filed by the Western Watersheds Project and Buffalo Field Campaign. There has been no finding to date.

Based on three US Department of Interior initiatives related to the conservation and restoration of bison in North America, it is possible that the federal government could have an increased role in bison management in the future resulting in less of a voice for Montana citizens in bison management.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Bison evolved alongside other native ungulate species, such as elk, mule deer, and pronghorn. Due to the limited number of wild herds, interactions between restoration bison and other native ungulates have not been extensively studied; however, bison do co-exist with these species in multiple locations (Knowles, 2001; Barmore Jr., 2003), including the case study locations.

Based on the research referenced previously and below, and assuming a ratio of one bison per 100 acres there may be some minor competition between bison and other native ungulates. A different level of competition for forage may occur if the bison to acre ratio is different and existing vegetation conditions are uniquely good or bad.

Evaluation of any specific impact to native ungulates is based in part on the following biology of those species:

1. Bighorn sheep and bison diets are not significantly associated with each other (Singer et al. 1994). Furthermore, traditional bighorn sheep range in much of North America typically is located in terrain not associated with bison use (Reynolds et al. 2003).
2. Pronghorn antelope are highly selective feeders (Schwartz et al. 1977) whereas bison are more flexible in diet. The theory that large and small ruminants will not compete with each other for food resources (Bell 1971) is further affirmed by the similarity in sheep and pronghorn diets and dissimilarity to bison diets (Peden 1972).
3. Moose and bison habitats of the plains do not overlap (Reynolds et al. 2003). Moose forage on willows and other woody browse, particularly when preferred forage is of poor quality (Larter et al. 1994). Furthermore, because of the difference in height, moose are able to take advantage of taller browse than bison. In general, moose are primarily browsers and bison are primarily grazers and therefore are considered to be more complimentary than competitive in feeding habits (Reynolds et al. 2003).
4. Elk and bison have a low to moderate diet overlap, but a high habitat overlap. Singer et al. (1994) found that even at high ungulate densities in YNP, these two species did not measurably compete for diet components or habitat.
5. There appears to be little, if any, habitat or diet overlap between white-tailed deer and bison. Although bison and mule deer experience some degree of overlap in

habitat use, there appears to be little or no competition between these two species because of differing diet preferences (Singer et al. 1994). Competition may also be precluded by seasonal distribution differences and by the limited ability of deer to deal with deep snow (Barmore 1980).

Competition between bison and ungulates could be more considerable in certain habitats over others. Historically, bison group sizes tended to be smaller in mountainous or mixed terrain than in open prairie (McHugh, 1972; Berger and Cunningham, 1994a; Gates et al., 2010); therefore, a large herd in mountainous or mixed terrain could likely have a greater impact on native ungulates in competition of preferred forage. Elk are more concentrated in western Montana while pronghorn are more commonly found in eastern Montana. Mule deer and white-tailed deer are found across Montana.

This alternative would likely be implemented on a mix of landownership where fences may be abundant for livestock management. Any need to retrofit existing fences to manage movement of bison could positively or negatively impact ungulate movement depending upon the fence's design. See the discussion of fencing in section 2.4.2. FWP would work with landowner(s) to replace or install new fences that are a deterrent to bison movement but provide wildlife passage either below or above the wires. Any fencing associated with a bison restoration effort would be monitored and evaluated for its effectiveness to inform future adaptive management needs.

Some bison management activities, such as hazing or culling, may negatively impact resident or transient ungulates by the additional presence of humans and vehicles. Displacement of wildlife from a management area would likely be only for the duration of the activity and only affecting a limited number of acres.

Potential Impacts to other species

Beyond the six species of ungulates, there are 386 terrestrial wildlife species in Montana; some who evolved with the historic herds of bison moving within the Great Plains of the US. As identified by Ellison (2013), the variations in bison grazing pressure over thousands of years produced grassland endemic species to include 12 species of birds, 15 mammals and thousands of plants and insects. This report focused on the impacts of bison grazing to the populations of six sparrows (Savannah, grasshopper, vesper, Baird's, clay-colored, and song), western meadowlarks, horned larks, and chestnut-collared longspurs. Population densities for seven of the species increased with the presence and activities of bison.

Depending upon the grazing pressure of the restoration bison herd, there could be a minor positive benefit to bird and small mammal species at the site.

Similar to the potential issues acknowledged for ungulates related to fencing there could be no to minor impact to small mammals or birds depending upon fence designs.

Secondary and Cumulative Impacts

A possible secondary impact of this alternative is dependent upon the size of the restoration effort. A large herd restoration effort could be viewed by the USFWS as a

positive contribution to species conservation and could reduce the potential for the species to be added to list of ESA designated species in Montana. Federal bison restoration programs may deter a listing on their own. The National Parks Service's 2014 "Call to Action" document calls the NPS to restore and sustain three wild bison populations across the central and western United States in collaboration with tribes, private landowners, and other public land management agencies as part of celebrating the 2016 Centennial of the NPS. The federal agencies identified areas in Montana for potential bison programs.

Another secondary impact to wildlife could occur from the introduction of public bison hunting at a location where it was not previously permitted. The presence of humans and noise caused by hunting could increase stress on resident wildlife causing them to disperse to adjacent lands during bison hunting seasons, which could negatively impact crop producers. FWP could implement damage hunts as necessary if deer or elk linger on private crop lands.

Cumulative impacts are difficult to predict for this alternative since a location has not been selected and therefore past and existing wildlife uses are also unknown. Additionally, it is not known how long restoration bison would be at a location. There may not be any positive or negative affects to other wildlife species if the addition of bison is for a brief period of time only.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, competition for forage could occur at some level between bison and other native ungulates but is expected to be minor when the population of the bison herd is low and the ratio of one bison per 100 acres is used. However, competition could vary depending upon existing conditions at the site, historic uses of the land, if there is a different bison/acre ratio or if the population of restoration bison increases at a location.

Tribal management of lands and livestock where this alternative would be implemented could allow for fence removal or alteration in potential conflict areas where restoration bison are desired and ungulates are present. FWP would work cooperatively with tribal councils and resource managers to identify terms within MOUs that meet tribal and project goals.

Secondary and Cumulative Impacts

Identical to Alternative #2, there could be secondary and cumulative impacts to the site's wildlife depending upon the attributes of that location and if bison hunting was previously permitted. The placement of restoration bison on tribal lands could contribute to the conservation of the species thus reducing the likelihood USFWS would consider bison an imperiled species under ESA.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Similar to Alternative #2 and 3#, impacts to native ungulates may vary (minor to moderate) depending upon existing conditions, bison density, number of acres available to the bison, and bison management activities. FWP believes impacts related to competition

with other wildlife to still be minor based on current inter-species research and assuming the number of acres available to bison can be expanded as the population of the herd increases.

Identical to Alternative #2, any need to improve existing fences or install new fencing to manage movement of restoration bison could positively or negatively impact ungulate movement depending upon the fence's design. Additional bison management activities to reduce wildlife conflicts could include additional monitoring of bison behavior and use of the restoration area by other wildlife, and/or hazing of bison from areas used by sensitive species.

Secondary and Cumulative Impacts

Similar to the previous two alternatives, beneficial or adverse secondary impacts may occur depending upon the site's attributes. Any impact could be greater based on the larger herd goal of this alternative,

The size of the restoration herd could influence whether the species is considered by the USFWS as a positive contribution to conservation of the species. The large scale of this alternative with a long term population goal of more than 400 animals could be considered a positive cumulative contribution to species' conservation. An effort of this size could have a minor to major impact to ESA listing. A simulation model demonstrates that under ideal management conditions a bison population of 400 is likely to retain 90% of its current genetic diversity with a 90% probability for 200 years (Gross and Wang, 2005).

4.2.3 Vegetation and Habitat Management

Habitat management is defined as efforts to improve habitat conditions through appropriate actions such as water source developments, vegetative or mechanical treatments, prescribed fires, or reseeding if and when determined necessary by monitoring.

Case Study Experiences:

Studies in the Henry Mountains have found that high intensity summer bison grazing, while likely creating short-term reductions in forage availability, does not cause differences in plant community composition or potential productivity (Ware et.al. 2014). In the Book Cliffs area, the bison population levels on the state managed lands are such that impacts to date are small. However, the current bison population on the tribal lands portion may be beginning to have a negative impact and efforts are underway to reduce that population. Population objectives in the Alaska Wood Bison area are low enough that negative impacts on native range are not anticipated. There are some concerns in the Pink Mountain area that large concentrations of bison may impact the landscape. APR is actively monitoring their bison grazing and any impacts to rangelands. APR's bison stocking rates are less than earlier cattle stocking rates when the lands were under different management therefore any negative impacts are expected to be less.

In the Book Cliffs area, the State of Utah spends \$400,000 per year on habitat projects for all wildlife, including the bison. The tribes spend another \$100,000 depending on available funding. Over a million dollars has been spent on habitat and water improvement in the Henry Mountains restoration area to improve resources for both bison and domestic cattle. Much of this funding has been generated through regional hunting organization. The assessment of the Alaska Wood Buffalo program is that the currently available habitat can easily support the proposed population without much additional habitat management.

The type of habitat that a herd occupies can have an effect on group size as historically, groups tended to be smaller in mountainous or mixed terrain than in open prairie (McHugh, 1972; Berger and Cunningham, 1994a; Gates et al., 2010). Historical reports indicate that the 'mountain' bison of YNP congregated usually in bands of 5-30, rarely more (Meagher, 1973). The influence of restoration bison on any native landscape would thus vary dependent on where in Montana that site is.

Alternative #1: No Action

If the no action alternative were selected, habitat community diversity and compositions would remain unchanged and there would be no opportunity to learn how bison may use a new landscape in Montana. There would be no opportunity to assess different habitat management techniques. The lack of restoration bison could result in increased conifer or aspen encroachment into grasslands in some areas.

Secondary and Cumulative Impacts

No secondary or cumulative impacts are anticipated if no bison restoration project is initiated.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

The impact of bison on native landscapes is expected to be minimal so long as the population and distribution of animals is appropriate for the range. The initial release of 40 animals would likely result in minimal noticeable change to the landscape assuming the restoration occurred on a currently healthy native landscape. However, impacts to the diversity and density of existing vegetation may vary at a specific location and depend upon the condition of the lands prior to the bison's arrival. Additionally, weather conditions may also influence the level and frequency of impacts to vegetation.

Native prairie habitats in Montana are adapted to ungulate grazing and grazing can be important to rangeland health. The diet of the Plains Bison consists primarily of grasses, though bison will consume forbs and woody vegetation when their preferred vegetation is not readily available (Nowak and Paradiso, 1983; Foresman, 2001; Long, 2003; Burde and Feldhamer, 2005; Picton 2005). Grazers tend to be important for recycling nutrients in grassland plant communities. Since bison have the ability to move over large spaces and tend not to linger in specific locations for long periods of time, they allow plant communities to recover before being regrazed during the growing season.

YNP bison have been observed to graze more frequently in upland shrub and grassland habitats during the growing season. As the uplands mature late in the summer, YNP

biologists have observed the bison move in to wetland habitats to graze on the sedges that grow around the perimeter of wet pothole habitats and in oxbows that have been either cut off from stream flow or only carry water during the high flow period each summer (R.Wallen NPS, pers. comm. 2012). These sedge habitats provide important food resources for bison. While foraging in the riparian communities, bison browse on early growth portions of willow and cottonwood stems. Across Montana there is a variety of native habitat that bison historically used. Herds utilize smaller home ranges during the summer months and larger ranges during the winter. When in habitat of lower productivity, bison will increase the size of their home range.

Across Montana domestic livestock grazing programs occur on a variety of public lands that are managed by independent agencies. The land management agencies that allow for the most public grazing are the US Forest Service (USFS), Bureau of Land Management (BLM), and Department of Natural Resources and Conservation (DNRC). These agencies also manage for multiple uses, which includes use of the habitat by wildlife. Currently, Montana public lands support a number of wildlife species *and* domestic livestock grazing. Other regions that have bison restoration programs also have domestic livestock grazing permits, which indicates that public grazing permits can be maintained in the presence of bison.

As described in the previous section, Ecosystem Contribution (4.2.1), the grazing and wallowing behaviors of bison may result in the creation of specific micro environments, which contain plant communities that have a greater diversity than the surrounding region and can be beneficial to small mammals and some bird species. In addition, bison hair and fur can transport noxious weed seeds. Trager et al. (2004) found that annual species and exotic species were significantly more common in bison wallows than in grazing lawns and in annual burn sites. The intensity of wallow use has an effect on its vegetation with frequent visitation producing limited vegetation cover of primarily annual weeds (Collins & Uno, 1983). Trager et al. (2004) note that the exotic species they observed were most abundant at species-poor sites subjected to frequent disturbance. The amount of bare ground was significantly correlated with the percent of exotic species at the site level.

The potential for the spread of noxious weeds within restoration lands may be minor to moderate depending upon the level of noxious weeds at the location prior to the arrival of bison, density of vegetation cover, types of soils, and the number of bison at the location. FWP may work with landowner(s) in developing a site-specific weed management plan to define what control methods are to be used and responsibilities of involved parties. FWP has experience with weed management and various control methods on their state-owned properties.

Some sensitive plant species may be impacted by consumption or destruction by trampling, wallowing, or general bison movement within any restoration area. Yet, impacts to vegetation are anticipated to be generally beneficial for the maintenance of biological diversity in native plant communities.

FWP believes impacts to localized habitat resources could be minimal. Negative impacts could be mitigated by bison management activities, such as fencing or habitat management restoration activities. FWP would work with the landowner(s) and the local citizens working group to identify solutions for resolving issues. Beyond the potential for spread of noxious weeds, other concerns or issues may include additional sediment runoff to nearby water sources with the reduction of bank vegetation and/or damage to trees and shrubs.

Habitat management would have to be adaptive based on range capacity, growth of the bison herd, and the desired habitat conditions at the restoration site. Any habitat management activities would have to be agreed to prior to program implementation by FWP and landowner(s). Monitoring the restoration site for changes in vegetation or habitat use would provide FWP data needed to evaluate current management actions for effectiveness and information for any adaptive management adjustments for the restoration of bison in the future.

Any bison restoration program in Montana would have to consider current habitat and whether it could support the proposed species density at a specific location. Prior to the implementation of this alternative, FWP would have a forage analysis prepared by a 3rd party per the requirement of §MCA 87-1-216 (5)(e).

Secondary and Cumulative Impacts

Potential secondary and cumulative impacts to vegetation are difficult to anticipate at this time since a specific location has not been selected and its existing attributes are unknown. Possible secondary impacts may include changes in noxious weed densities near the boundary fences on adjacent lands and changes to noxious weed management on those lands.

Cumulative impacts are much more difficult to anticipate because in addition to not knowing an exact location, FWP does not know the past and present use of any site nor how those activities influenced the diversity and density of vegetation. Cumulative impacts may be negligible if the chosen area was maintained as open space and the restoration bison are at the location for a limited period of time; however, there could be beneficial impacts if the lands were used historically for a more intensive agricultural business or if the restoration bison are at the location for an extended period.

Alternative #3: Restoration on Tribal Land

Identical to Alternative #2, impacts may vary depending upon the existing habitat conditions at a restoration site, size of the area available to bison, and the population level of bison managed at the site. Methods to mitigate any negative impact could also be the same as described for Alternative #2. In this alternative, the involved tribal entity could be responsible for all necessary habitat management activities or they may be shared between any involved parties.

Secondary and Cumulative Impacts

Identical to the difficulty in predicting secondary and cumulative impacts for Alternative #2, such is the case if tribal lands were used for the placement of restoration bison. There are too many unknown variables to predict secondary or cumulative impacts at this time.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Anticipated impacts under this alternative may be less than for Alternative #2 and #3 when an initial group of 40 bison are released since the lands available to bison is to be ultimately greater in size than with the other two alternatives. However, moderate to major impacts to vegetation could be expected with a population of at least 400 bison that are allowed to move freely around the restoration area creating wallows and eating preferred species of vegetation. Seasonal use of the area would likely create different impacts to different areas.

Similar to Alternative #2, the need for habitat management and bison management activities would depend on the specific site and would be determined cooperatively with the landowner(s) and the local citizens working group.

Secondary and Cumulative Impacts

Identical to the difficulty in predicting secondary and cumulative impacts for Alternative #2, such is the case if this alternative is implemented. Additional to the unknown factors previously mentioned, there is the potential for the number of restoration bison to be much higher than considered for Alternatives #2 and #3. Potential secondary and cumulative impacts to vegetation could therefore be of a greater variety and greater intensity than for those alternatives.

4.2.4 Water Resources

Case Study Experiences:

Hunter groups in Utah have invested in water resource enhancements for both bison and cattle in the Henry Mountains (B. Bates, UDWR, pers. comm., 2014), which has minimized bison leaving the designated restoration area. In the Book Cliffs area there has been some concern over water resources particularly the lack of water in certain areas. Sportspeople and landowners have worked to address this by developing water sources for both livestock and bison. APR is currently studying the relationship between bison and water sources. Information to date indicates bison spend less time around those areas than domestic livestock (APR, pers. comm., 2014). In areas where natural water is extremely scarce it becomes a limiting factor for bison restoration.

Alternative #1: No Action

There would be no change to any existing water resources or need to change existing water resource management programs because a bison restoration program would not be initiated.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to Montana's water resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Since the specific water features of a potential restoration site are unknown, it is difficult to state how the placement of 40 bison would affect those resources. Potential issues could include increased sediment, increased erosion of banks, and reduction of bank vegetation. However, based on the documented research, FWP believes impacts to localized resources would be minimal. Any negative impacts could be mitigated with bison management activities, such as exclusion fencing or vegetation restoration. FWP would work with the landowner(s) and the local citizens working group to identify solutions for resolving issues.

Bison have been known to congregate in larger groups around permanent sources of water, but then separate to feed (Bamforth, 1987). A study of bison in Theodore Roosevelt National Park reported that bison did not center foraging activities near permanent water sources, but were instead highly mobile in order to utilize different water sources. Bison also used temporary water sources, went without water for at least one day, and utilized snow instead of water when available (Norland, 1984). Fuhlendorf et al. (2010) found that bison spend less time near water than cattle. Some bison managers believe the location and accessibility of water is essential to maintaining bison within fencing, as bison's motivation to breach the fence increases if more adequate resources are on the other side. Depending on existing water resources (natural and human-made) at the chosen restoration location, additional sources of water may or may not be necessary.

Secondary and Cumulative Impacts

There is the potential for positive or negative secondary impacts to water resources depending upon a variety of variables including the types and number of existing water sources, condition of bank vegetation, seasonality of water sources, and the number of restoration bison at the location. Since no location has been selected, it is difficult to predict secondary impacts but they may include improved localized water quality with a switch from cattle to bison, additional sediment downstream from the restoration location, or spread of noxious weed seeds downstream. Efforts would be taken to mitigate secondary impacts if they arise.

Cumulative impacts are also difficult to predict since an exact location for bison restoration has not been selected and FWP does not know what water resources may be present nor the condition of those resources at the time restoration bison would be released. Furthermore, FWP does not know what past or present landowner(s) actions may be contributing to the state of those water resources.

Alternative #3: Restoration on Tribal Land

Impacts to water resources on tribal lands may be identical to those described for Alternative #2 but could vary depending upon the existing types of water resources available to bison. Efforts to mitigate negative impacts to those resources could be mitigated by the same methods described for Alternative #2. FWP would work with tribal

leadership, tribal wildlife managers, and the citizens working group to identify solutions for resolving issues.

Secondary and Cumulative Impacts

Identical to Alternative #2, there could be positive or negative secondary impacts attributed to the placement of restoration bison on tribal lands for the reasons previously described but discussion of those possible impacts is difficult because a specific location has yet to be identified.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

With the availability of a large landscape, there may be the potential for numerous water resources within the project area. If so, bison would have a greater opportunity for movement between sources of water when seeking out grazing areas. FWP expects the impacts to an individual water resource to be minimal with greater movement between water sources.

If water resources are limited even within a larger restoration area, accessible resources would be more heavily utilized. As a herd's size increases, there is the potential for additional impacts to occur to water resources depending upon soil conditions, weather conditions, and the overall movements of the bison between water resources.

Identical to Alternatives #2 and #3, FWP would work with the landowner(s) and citizens working group to resolve and mitigate bison-caused negative impacts.

Secondary and Cumulative Impacts

There is the potential for positive or negative secondary impacts to water resources depending upon a variety of variables including the types and number of existing water sources, condition of bank vegetation, seasonality of water sources, and the number of restoration bison at the location. Since no location has been selected, it is difficult to predict secondary impacts but they may include improved localized water quality with a switch from cattle to bison, additional sediment downstream from the restoration location, or spread of noxious weed seeds downstream. Efforts would be taken to mitigate secondary impacts if they arise.

Cumulative impacts are also difficult to predict since an exact location for bison restoration has not been selected and FWP does not know what water resources may be present and the condition of those resources at the time restoration bison are placed. Furthermore, FWP does not know what past or present landowner(s) actions may be contributing to the state of those water resources.

4.2.5 Air and Soil

Case Study Experiences

None are known or documented.

Alternative #1: No Action

There would not be any impacts to existing air quality or soil resources since bison restoration would not be initiated.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to Montana's ambient air quality and existing soil resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

FWP predicts there would be negligible impacts to the existing air quality if a bison restoration program were established on public and/or private lands in cooperation with a willing landowner(s). Dust baths by bison in wallows would increase the particulates in the immediate area for the duration of the bison's activity.

Impacts to soils at a specific site may be minor to moderate depending upon the existing soil conditions, groundcover vegetation at that site, and the number of bison at a location. As previously described, bison will roll in sandy soils for dust baths; thus wallows are developed and localized disturbances to soils occur. Bison have the ability to remove localized vegetation, remove top soil, compact lower soil layers, and establish wallows in new locations that can be 15 feet wide and one foot deep. Wallowing is a behavior that creates disturbance to plant communities but provides adequate sites for re-colonization of early seral stages of plant communities adding to the diversity of the community. The soil within a wallow becomes exposed and compacted from use. This compacted shallow bowl collects rainwater and creates a microenvironment in which seeds can sprout. The seedlings of sedges and rushes occur in wallows that are otherwise absent in the prairie (Coppedge et al. 1999; Knapp et al. 1999; Lott 2002).

Methods to mitigate impacts to soils would be similar to those described for vegetation, which could include the installation of fences, hazing of bison away from sensitive areas, and reseeded of affected areas. FWP would work with landowner(s) to address concerns and to identify solutions in consultation with the citizens working group.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on private and/or public lands.

FWP predicts there would be no secondary impacts to soil conditions; however, there could be cumulative impacts depending upon previous land uses of the chosen site, vegetation coverage, soils types present, and the number of restoration bison utilizing the site. As an example, a large herd may contribute to localized negative effects to areas already denuded of vegetation and where sandy soils are present.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, impacts to air quality are expected to be negligible and impacts to soils could vary (negligible to moderate) depending upon a number of variables at a given

location. Active bison management by FWP and tribal staff could mitigate many of the negative impacts.

Secondary and Cumulative Impacts

Identical to Alternative #2, no secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on tribal lands. Similar to the previous alternative, FWP predicts there would be no secondary impacts to soil conditions; however, there could be cumulative impacts depending upon a variety of variables and the existing conditions of the site.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Similar to Alternative #2, impacts to air quality are expected to be negligible and impacts to soils could vary depending upon a number of variables at a given location. If the herd's size reaches 400 animals, impacts to soils could be more numerous and possibly more detrimental even though the size of the restoration area is expected to be larger than the lands used for Alternatives #2 and #3. FWP would work with landowner(s) to address concerns and to identify solutions in consultation with the citizens working group.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on large area of private and/or public lands.

Identical to Alternatives #2 and #3, FWP predicts there would be no secondary impacts to soil conditions but a larger herd of restoration bison, as anticipated under this alternative could add to existing negative conditions of exposed soils depending upon previous land uses of the chosen site, vegetation coverage, soil types present, and the number of bison.

4.4 Human Environment

4.4.1 Public Safety

Case Study Experiences:

None of the case studies have reported noticeable public safety issues. The bison programs in Utah have not had any reported incidents of bison threatening or injuring humans, even though the region of the Henry Mountains occupied by bison has seen a large increase in public recreational use. As a result of hunting, the Henry Mountains bison have become very wary of humans, with most tending to flee at the sound of a stopping vehicle or the smell of approaching hikers. Observations found that bison would often flee from an area after coming into contact with humans (Nelson, 1965).

In the Delta Basin of Alaska, there have been no reports of public safety concerns from restoration bison. There have been no reports of disease transmission from bison to humans in the case studies (see section 2.3.6 for a thorough discussion of reportable diseases found in bison.)

Other Experiences:

YNP annually reports bison encounters and related human injuries, which typically result from individuals attempting to approach, feed, pet, or be photographed with bison (Conrad and Balison, 1994; Olliff and Caslick, 2003). During 1980-1999, bison charged and made contact with humans 79 times, an average of 3.95 per year (the number of incidents each year ranged from 0 to 13) with every incident occurring in Yellowstone's developed areas or along roads. During that 20-year period, the average annual number of visitors to the Park was 2.7 million (NPS 2012). There were no injuries reported in 18 (23%) of the incidents (Olliff and Caslick, 2003) but nearly half of the injuries reported were sustained after a visitor approached a bison for a photograph or to view the bison more closely. The average distance between the bison and the human when the bison charged was 28.5 feet as estimated by reporting YNP rangers (Olliff and Caslick, 2003). YNP has taken extensive measures to educate its visitors on the importance of maintaining the proper distance from bison. In 2010 there were two reported bison incidents, one of which resulted in a non-life threatening injury. There were no reported incidents in 2011 (D.Wenk NPS, pers. comm. 2012). There are guide services that offer horseback trail rides to visitors throughout YNP but there were no reported incidents between bison and horses/trail rides during 2010 or 2011. More current data was not available from YNP for this EIS.

There have been incidents of the Jackson Hole, Wyoming bison herd moving into nearby neighborhoods and a golf course, but there have been no public safety incidents despite the large number of people in this area. The Wyoming Game and Fish Department haze bison from these areas when needed.

There have been no reported incidents involving human injury as a result of contact with bison in the Sturgeon River Plains Bison Herd, which moves between Prince Albert National Park and the surrounding region in Saskatchewan. There was one instance of a man being charged by a bull bison that he startled on a trail but he was not injured. Landowners in Saskatchewan have reported that bison tend to move off when humans enter an area, noting that it is possible to approach them more closely on horseback. A study of the behavioral response of the wild Sturgeon River Plains bison herd to human activity found that following the detection of human presence, bison reacted by fleeing the area (51% of 384 observations), looking in the direction of the human while remaining in place (46%), or approaching the human (3%) (Fortin and Andruskiw, 2003).

A study was completed during the summers of 2000 and 2001 on Antelope Island in Utah that examined the reaction of bison, mule deer, and pronghorn antelope to hikers and mountain bikers who were on designated trails. The study took place prior to implementation of a bison-hunting program and attempted to determine at what distance a bison would flee from a lone silent hiker or mountain biker. Of the 98 trail encounters with bison, the study found that 77% of the bison groups fled from the person, compared to 56% of pronghorn and 60% of mule deer (Taylor and Knight, 2003). The study found that on average bison became alert to the presence of the human when the person was 531 feet away, began to flee when the individual was 308 feet away, and tended to flee 82 feet from their original position (Taylor and Knight, 2003). The study found that a larger group size

tended to increase the flight response, as did the presence of calves (Taylor and Knight, 2003).

Alternative #1: No Action

There would be no new threats to human health or safety from bison if a bison restoration project was not initiated. Incidents of bison-human conflicts and bison-vehicle collisions would likely continue within YNP and in adjacent areas where YNP bison migrate to during the winter.

The risk of bison transmitting brucellosis to humans would continue to be low with the continued use of FWP guidelines for the handling of bison meat and the DSA cattle management zones in southwest Montana.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to the public's safety are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

FWP predicts there may be only minor impacts to human safety from an initial release of 40 bison onto a designated restoration area since the acres would likely lack residences in its' interior, the private property would likely have been used to graze cattle, the public lands would likely have been managed as open space, the lands would likely have some form of boundary fences, and there would likely be limited interior public roads. The actual site attributes might vary from these descriptions, thus impacts may be less or considered moderate at a given location.

Many of Montana's wildlife pose some level of threat to humans through vehicle collisions or direct contact (bites, attacks, disease etc.). Public safety issues related to bison most often fall into three categories: vehicle collisions, personal injuries by direct contact, and spread of disease.

Bison Vehicle Collisions: FWP acknowledges there could be a minor to moderate increased risk of bison-vehicle incidents since the location where restoration bison would likely be located would not have had bison previously and thus drivers in the area would lack experience with bison along roadways. The chosen site for the bison restoration project could be required to have fences or geographic deterrents along roadways to limit bison presence. (See section 2.4.6 for more information on bison-vehicle collisions.)

Personal Injury: FWP anticipates there would be a minor to major risk of personal injury to visitors near or within any restoration site since it has likely not had any presence of bison in recent times and humans may not behave appropriately. The potential for user conflicts with bison would be dependent on the number of restoration bison at the site, how large the property was, if the rut was ongoing, if bison calves were present, and the behavior of the visitors.

Efforts to minimize bison-human conflicts and incidents may include signage in the area of restoration describing bison behavior and best practices when in close proximity to them, educational outreach in local communities, increased monitoring on the locations and activities of bulls or bachelor groups, and monitoring of bison behavior on the landscape. FWP would work with landowner(s) and the citizens working group to identify potential conflicts and means of reducing those conflicts and issues.

FWP could also work with state and local road managers to post wildlife caution signs in pertinent locations to inform travelers of the possible presence of bison. Other measures such as fencing and hazing would be emphasized to reduce conflicts and limit the need for lethal control of problem animals.

Disease transmission: There would be no increased risk for the transmission of disease carried by bison to humans or other livestock because the bison used for this restoration effort would have to be certified free of reportable diseases by Montana's state veterinarian. The risk of transmission of common wildlife diseases would be no greater than the risk from other wild ungulates assuming standard meat handling recommendations were followed by successful bison hunters. Recommendations would be provided to hunters in pursuit of bison.

Secondary and Cumulative Impacts

Secondary impacts to public safety may include alterations to interior roads of the restoration area at the request of the landowner(s) to control vehicle traffic or usage of specific areas. There could also be an increased use of local emergency services when bison-vehicle incidents or bison-human conflicts occur. FWP could consider locating staff closer to the restoration site to provide improved monitoring of the restoration bison. Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods could be considered as well by FWP, landowner(s), and the citizen working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, it is unknown what level of user activities would occur within the property, the bison/acre ratio, and the configuration of roads and associated traffic.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, there could be some minor or moderate increase in bison-human conflicts within or near the sites where restoration bison are located for the reasons previously described. FWP and tribal representatives could implement educational efforts and bison management programs to reduce risk of conflicts. Identical to Alternative #2, there would be no additional disease transmission risks associated with the implementation of this alternative.

Secondary and Cumulative Impacts

Secondary impacts of this alternative could be identical to those described for Alternative #2 depending upon the fencing, interior roads, visitor use of the restoration site, and other variables. Methods to mitigate these types of impacts could include increased efforts

previously described for direct impacts, but different methods could be considered by FWP, tribal resource managers, and the citizens working group as necessary.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, it is unknown what level of user activities would occur within the property, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

There could be minimal to major risk of bison-human conflicts with a bison restoration effort to restore up to 400 animals depending upon the number of bison initially released, the site's geographic proximity to public roads, residences, and communities, use of the area by the public, and the distribution of bison within the restoration area. FWP and landowner(s), in consultation with the citizens working group, could implement public education programs or implement bison management activities to improve public safety.

As this is a large landscape alternative it is possible that bison could change their behavior and patterns of land use over time as they explore and learn new habitat areas. They would likely use areas based on forage productivity and potentially avoid humans when harassed or hunted, which would be consistent with the behavior of the bison herd at Sturgeon River and Antelope Island.

Secondary and Cumulative Impacts

Secondary and cumulative impacts are expected to be generally similar to those for Alternative #2. Unlike Alternative #2, secondary impacts may be less or greater in scale depending upon the number of bison and acres available to them. A larger area with a small herd might equate to minimal secondary impacts because bison could be dispersed across the property and rarely come in contact with humans.

Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods could be considered as well by FWP, landowner(s), and the citizens working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected. It is unknown what level of user activities would occur within the property, the bison/acre ratio, or the configuration of roads and associated traffic.

4.4.2 Property Damage

Case Study Experiences:

There have been no complaints of livestock fence damage from the bison in the Book Cliffs area. Fence damage that does occur is often attributed to elk in the area. In the Pink Mountain area bison have been fenced out of haystacks and away from buildings. Since, there are minimal agricultural lands in the Pink Mountains, Book Cliffs, and Wood Bison restoration areas; there have been no reports of property damage related to croplands.

Bison have reportedly gone through fences in the Henry Mountains area but since there are very limited agricultural lands in the Henry Mountains area, there have been no land-use conflicts. Conflicts have been mainly over the use of rangelands. APR's current containment program includes fencing on APR lands which has minimized access by their bison to neighbor's agriculture lands.

Other Relevant Experiences:

Reports from other existing bison restoration programs indicate that bison have an impact on fencing that is similar to other big game species. Bison have the potential to impact fencing particularly when being pursued by hunters or being hazed. There are occasions when bison break or damage fencing, but most managers report that bison tend to move along fences until they come to a break or an opening. Managers of captive bison programs note that containing bison within fencing is more difficult if bison have learned that there are desirable resources on the other side.

While there have been reports of bison horning, rubbing on, or damaging buildings or corals in the area of YNP it appears to be relatively minimal and typically fixed with fencing. Some Interagency Bison Management Plan annual reports have documented damage to landscaping (trees), fences, and lawn ornament by Yellowstone bison.

In the Delta Basin in Alaska, motorized vehicles can be used during bison hunts. This has led to some hunters using all terrain vehicles and snow machines in an illegal manner to pursue and herd bison while hunting. This activity commonly results in bison being chased through fences.

Alternative #1: No Action

There would be no new risk of damage to agricultural crops, structures, or fencing by bison within Montana. Threats to private property would continue in areas adjacent to YNP when bison migrate outside the park.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to private property would be anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

There would be minimal to moderate risk of property damage with an initial release of 40 animals depending on the design and condition of existing area fences, types of natural boundaries to deter bison movements, weather conditions, and proximity to residences, road, and communities. Environmental conditions could increase or decrease the potential for escapes to neighboring properties.

A containment strategy would be developed prior to the placement of restoration bison at any location which would meet the requirements of §87-1-216(5ci) MCA. The strategy would identify containment measures, removal strategies if bison escape to other properties, and an exit strategy if the project needs to be stopped and bison relocated. Per §MCA 87-1-216(7), FWP would be liable for all costs incurred, including costs arising from

protecting public safety, and any damage to private property that occurs as a result of FWP's failure to meet the requirements of containment (§87-1-216 (7) MCA) and/or when efforts to follow a management plan endorsed by the citizen working group have not been made.

In locations where drifting snows occurs in severe winters, boundary fencing may be knocked down or drifts may develop into ramps over fencing. In other locations, geographic containment features could fail to keep bison in the target area. In such instances, bison may migrate out of a designated restoration area resulting in property damage. Depending upon the issue or complaint, FWP may deter conflicts by installing additional fences near buildings, assist in the replacement of damaged fencing, or haze bison away from areas of concern. Additionally, FWP staff would respond to public safety and property owner concerns as is done for other wildlife species; potentially with the assistance of project partners. Educational outreach could be conducted to educate local residents or visitors to the area.

Secondary and Cumulative Impacts

It is difficult for FWP to predict secondary impacts to property damage since a site has not been selected and thus its attributes are unknown. However, secondary impacts of this alternative may include the need for adjacent property owners to install additional fencing to protect livestock, crops, or buildings from restoration bison that stray from their designated restoration location. Depending upon the restoration bison's visibility from a boundary road, wildlife viewers stopping along a highway or county road may create a traffic hazard to moving vehicles. This type of traffic hazard could be managed through signage prohibiting stopping on the road's edges and redirected to parking or safer viewing areas.

Cumulative impacts to property damage are impossible to predict since a specific location has yet to be selected, and thus, it is unknown what level of user activities would occur within the area, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

Identical to the methods to mitigate direct impacts, FWP could include increased efforts to implement those methods, but different methods could be considered by FWP, landowner(s), and the citizens working group as necessary.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, there is the potential for minimal to moderate risk of property damage with an initial release of 40 animals at a location depending upon the existing attributes of the site and adjacent areas. FWP and its tribal partners would respond to public safety and property owner concerns as is done for other wildlife species. As an example, collaborative agreements for managing wildlife conflicts already exist between FWP and the Fort Peck Tribes. Additionally, conflicts may be mitigated by the methods described for Alternative #2.

Secondary and Cumulative Impacts

Secondary impacts of this alternative could be identical to those described for Alternative #2 depending upon the existing location's attributes, proximity to buildings and livestock, and other variables. Methods to mitigate these types of impacts could include increased efforts to implement those used for direct impacts, but different methods could be considered by FWP, tribal resource managers and leaders, and citizens working group as necessary to address issues.

Cumulative impacts to property damage are impossible to predict since a specific location has yet to be selected, it is unknown what level of user activities would occur within the area, the bison/acre ratio is unknown, and finally, the configuration of roads and associated traffic.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

FWP predicts there may be additional public safety challenges for FWP and partners with restoration at a larger scale. Potentially, there would be moderate to major risk of property damage with a herd of 400 bison depending upon the location's existing attributes and environmental conditions.

Steps to mitigate conflicts and concerns could be similar to those previously described for Alternatives #2 and #3.

Secondary and Cumulative Impacts

Similar to the secondary impacts for property damage described for Alternative #2, impacts may include the installation of additional fences by neighboring property owners to ensure any bison that stray from the restoration area do not come in contact with cattle, damage crops, or damage buildings. Unlike Alternative #2, secondary impacts may be less or greater in scale depending upon the number of bison and acres available to them. As an example, a larger herd on a large landscape may translate into less risk of bison escaping from the designated restoration area because the available forage and water would meet their needs. Environment conditions could increase or decrease the potential for escapes to neighboring properties.

Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods would be considered by FWP, landowner(s), and the citizens working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, and thus it is unknown what the site's attributes are, what level of user activities would occur within the area, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

4.4.3 Livestock Resources

Case Study Experiences:

Restoration bison and cattle have coexisted within the same regions of the Henry Mountains in Utah since the 1940s. The cattle there are managed with a traditional fencing system, yet, the bison are able to move across the landscape. As the population of bison increased, so did tensions with regional landowners and livestock producers. Efforts to mitigate these issues included the creation of the Henry Mountains Bison Committee. Through the hard work of this committee, public support and tolerance of the wild herd appears to have increased. Efforts have been made to work through the remaining conflicts and maintain open communication between the regional stakeholders. The BLM, the Utah Division of Wildlife Resources, conservation organizations, regional livestock producers, and sporting groups have worked together to ensure that grazing continues to be shared by bison and cattle within the Henry Mountains. Over a million dollars has been spent on habitat and water improvement projects to improve resources for both bison and domestic cattle. Much of this funding has been generated through regional hunting organizations.

None of the programs with restored bison have reported observing bison attempting to breed cattle nor have they had any reports from regional livestock producers of bison trying to breed cattle. No hybrid offspring have been born. There are no reports of bison preventing cattle from using vegetation or water sources nor are there reports of bison goring cattle.

Other Relevant Experiences:

Ranchers have reported occasional observations of the wild Sturgeon River Plains bison herd in the presence of cattle, but they have not had incidents of bison harassing the cattle, and note that the two species appear to be pretty tolerant of each other. Bison do not breed with cattle in a natural environment.

Alternative #1: No Action

There would be no impact to livestock resources, positive or negative, from bison as wildlife on the landscape if a restoration project was not initiated. Wild bison could still be present in Montana as they migrate from YNP in winter and privately-owned bison would continue to be managed as domestic livestock. There would be no increased disease risk to livestock or other wildlife species. Yellowstone bison management would continue under the Interagency Bison Management Plan to include management based on a Designated Surveillance Area (DSA) for brucellosis transmission prevention. There would be no loss of grazing allotments or allotment availability to ensure there was a place on the landscape for bison managed as wildlife.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to Montana's livestock resources are anticipated with the selection of this alternative because no restoration bison would be located to new locations.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Landowners could consciously choose to replace cattle on range land with a release of 40 restoration bison on a designated restoration area. Direct impacts to the immediate area could be minimal because of the limited number released, required containment of the restoration bison, and the fact that any restoration bison would be certified as free of reportable diseases.

There could be the perception by some of the public that restoration bison pose a threat to Montana's cattle industry. Since the mid-1890s, livestock ranching has been an integral part of Montana's social character. Ranching and other agricultural activities continue to provide open range for wildlife. All 56 of Montana's counties have livestock operations. As reported in the 2012 Agricultural Statistical Bulletin, agricultural industries (crops and livestock) remain Montana's number one industry. Agriculture is valued at \$3.8 billion with the inventory of cattle valued at \$3.4 billion (National Agricultural Statistics Service, 2012). Value added to the U.S. economy by livestock production in Montana was \$1.4 billion in 2011, of that amount \$1.2 billion was contributed by meat animals (National Agricultural Statistics Service, 2012).

On bison restoration lands where cattle grazing would continue, comingling of the species could occur. Observations of interactions between cattle and bison have shown that they will sometimes graze within close proximity of one another (e.g. Van Vuren, 2001). However, bison and cattle often differ in the elevation and degree of slope in which they graze; with bison grazing on steeper slopes (Van Vuren, 2001). Cattle and bison display different foraging behaviors, with bison behaving more as energy maximizers (Nelson, 1965; Peden et al., 1974; Norland, 1984; Van Vuren, 2001; Fuhlendorf et al., 2010). Due to the differences in the behavior of bison and cattle the species are not ecologically functional equivalents (McMillan & Pfeiffer, 2011).

Bison could be fenced out of particular areas at the request of the landowner(s) which may have moderate to major costs likely to be the responsibility of the livestock producer. The effectiveness of fencing would be monitored and adjusted to ensure spatial separation of livestock and bison when deemed necessary. Separating bison from cattle to decrease comingling or disease transfer risk has worked very well in the DSA where bison seasonally migrate out of YNP. As restoration bison would be certified free of reportable disease the transmission risk of disease between restoration animals and domestic livestock is inherently minimal.

Livestock producers could incur additional costs to erect fencing specifically to keep bison that may have strayed from the restoration area off of their properties or to fix fences that bison may damage. Additional ranch staff time could be needed to haze bison off of private properties if bison were to stray.

Prior to the implementation of this alternative, FWP would have a forage analysis prepared by a 3rd party per the requirement of MCA 87-1-216 (5)(e) to determine if the proposed carrying capacity is appropriate for the designated restoration site.

FWP would conduct monitoring to track the restoration herd's size, behaviors and movements within the designated area, as well as the herd's health. Response protocols for disease outbreaks for any bison at a restoration site would be coordinated among FWP, the MDOL, and the state's veterinarian. Measures to comply with any applicable animal health protocol required under Title 81, 2(b) or by the state veterinarian would be detailed in a herd management plan (§87-1-216(5a) MCA).

Secondary and Cumulative Impacts

A secondary impact of restoration bison on federally or state-owned public lands may be conflict over grazing allotment use. Resource managers could consider changes to land use to accommodate the restoration of a native species and decrease user conflicts. This type of decision would be at the discretion of the federal or state agency.

Depending upon the perception of disease risk transmission from restoration bison to cattle, states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time since there are too many unknown variables related to the actual site and how other states receiving Montana cattle may react to the presence of more bison in Montana.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, any bison restoration program would involve some inherent but minor risk to livestock operations although FWP predicts they could be minor as; 1) the restoration bison would be certified free of reportable diseases by the state veterinarian, and 2) restoration bison movements would be restricted to a specific area. Some or all of the risk and liability could be assumed by involved tribal entities depending on negotiated management agreements.

Livestock stocking and grazing management decisions would be at the discretion of the tribe. Disease monitoring and response protocols for potential disease outbreaks would be coordinated by MDOL and the state veterinarian but followed by the tribal landowner.

Methods to mitigate bison-cattle conflicts could be similar to those used for Alternative #2 but could include additional options agreed upon by FWP and tribal representatives as identified in any MOU.

Secondary and Cumulative Impacts

Identical to a potential secondary impact for Alternative #2, perception of disease risk by other states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time for the identical reasons stated for Alternatives #2 and #3.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

As with the previous alternatives, the initial release of 40 disease-free restoration bison at a location is unlikely to impact livestock resources. However, bison restoration at the scale of at least 400 animals could result in moderate risk to livestock operations. The risk of any negative impact to livestock however is supposed to be minimal within this alternative as the goal is to identify a restoration area with minimal current occupancy by livestock. The geographic area identified for this alternative could include only those areas where there are no current livestock operations or no active livestock grazing. Only willing landowners would be involved in implementation of this alternative as in Alternatives #2 and #3.

Identical to Alternative #2, FWP would have to meet all the requirements of MCA 87-1-216 with the development of a site-specific bison management plan prior to the implementation of this alternative.

Secondary and Cumulative Impacts

Identical to a potential secondary impact for Alternative #2, perception of disease risk by other states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time since there are too many unknown variables related to the actual site, the livestock industry at large in Montana, and how other states receiving Montana cattle may react.

4.4.4 Cultural and Historic Resources

Case Study Experiences:

No discussion of physical cultural or historic resources are documented for the Book Cliffs tribal herd case study nor any of the other case studies. The social and spiritual connections between Native American people and bison are discussed in detail in 2.7.2, 'Tribal Cultural Values of Bison'.

Other Relevant Experiences:

In the area of the House Rock Arizona herd, there were concerns about potential impacts of bison on historic resources and cultural sites, particularly in Grand Canyon National Park where there had been human occupancy several thousand years ago. The structures built by these native peoples were built of rock and could be damaged by bison. There is currently no published data documenting damage to date.

The linnii Initiative of the Blackfoot Confederacy is an example of a large, landscape restoration effort to bring bison back to fill their ecological niche and the historic cultural role for native peoples. The goal of the Initiative is to restore bison which are central to the historical, cultural and ecological legacy of the region, conveying multiple benefits to the Blackfeet and providing native peoples the opportunity to reconnect with a living symbol of their ancient culture. The linnii Initiative also seeks to connect restoration efforts to the

economic sustainability of communities. These same themes of reconnecting Native Americans to bison can be found in the initiatives to restore bison by other Montana tribes.

Alternative #1: No Action

There would be no opportunity to increase the general public's connection with an iconic North American wildlife species or tribal cultural ties to bison with a no action alternative. Tribal entities could continue efforts to restore bison on tribal lands. No archeological sites could possibly be disturbed under this alternative.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to existing historic or cultural resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Bison have the potential to negatively impact historic or archeological sites by horning, rubbing or otherwise damaging objects or structures. Bison would have the ability to establish wallows in new locations, remove localized vegetation, disturb top soil, and compact lower soil layers.

Since it is difficult to predict what cultural or historic resources may be present at a particular site, FWP can only acknowledge that negative impacts to cultural or historic resources could occur. A site-specific environmental assessment would be completed prior to the implementation of this alternative which could include consultation with Montana's State Historic Preservation Office or a federal heritage preservation officer as required by §22-3-433 MCA and the National Historic Preservation Act, respectively. Ways of mitigating impacts may include excavation of a site, primarily done for prehistoric sites, and/or installation of fencing around a historic site to deter any impacts bison may inadvertently cause.

Secondary and Cumulative Impacts

A possible secondary impact could be through bison movements and activities at a site which could result in the identification of new historic or cultural artifacts within a property's boundaries. If this should occur on federal lands, the resource manager would follow the agency's reporting requirements and the National Historic Preservation Act.

No cumulative impacts can be predicted at this time since a specific site has not been chosen and it is unknown if historic or cultural resources exist on site.

Alternative #3: Restoration on Tribal Land

Bison are an essential and highly valued element of the spiritual and religious customs and culture of many Native American cultures. Historically tribes depended on bison for numerous materials and as a main food source. More recently there have been efforts, such as the Iinnii Initiative, to reestablish the ecological and cultural ties between bison and native peoples.

Implementation of this alternative could inherently restore the cultural, spiritual, and historical connection between Native Americans and the bison. Restoration of bison onto any lands is anticipated to have a minor to major positive impact to tribes and those who support bison restoration. The cultural impact of restoring bison to tribal lands would likely be larger than restoring bison to other lands.

The Assiniboine and Sioux (Nakota, Lakota, and Dakota) tribes of the Fort Peck Reservation manage a cultural herd of approximately 183 bison that were transferred to the reservation from Yellowstone National Park following a quarantine process. This herd is managed on approximately 13,000 acres. (R. Magnan, Fort Peck Fish and Game Director, pers. comm.).

As of 2014, the Gros Ventre and Assiniboine tribes of the Fort Belknap Reservation established a cultural herd of 45 bison that were transferred to the reservation from Yellowstone National Park following a quarantine process.

Increased concern over the high rate of diabetes on reservations has led to a movement toward returning to a more traditional bison-based diet, thus many native tribes have restored domestic bison herds for meat production. There has also been momentum from many tribes for Montana or the federal government to restore wild bison in order to honor tribal treaty hunting rights.

Secondary and Cumulative Impacts

Any secondary or cumulative impacts to cultural or historic resource if restoration bison are placed on tribal are predicted to be positive because of the importance the species holds in native systems.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Impacts by restoration bison to historic and cultural resources on a large landscape would be identical to those described for Alternative #2, as would the possible methods used to prevent negative impact to those resources. Also similar to Alternatives #2 and #3, restoration efforts could increase tribal connections between Native Americans and bison and those of the public who consider bison a romantic icon of the Old West.

Secondary and Cumulative Impacts

Secondary impacts could be identical to those described for Alternative #2.

No cumulative impacts can be predicted at this time since a specific site has not been chosen and it is unknown if historic or cultural resources exist.

4.4.5 Recreation and Hunting

Case Study Experiences:

Bison hunting opportunities are highly sought after in many places (see sections 2.4.3 and 2.7.3). Public harvest is allowed and used as a management tool in the Henry Mountains,

Book Cliffs, and Pink Mountain areas. Over 10,000 applications are submitted annually for 60-100 highly sought after once-in-a-lifetime permits in the Henry Mountains with an annual harvest of about 55 bison. About 200 bison are harvested in the Book Cliffs area annually with proceeds from hunting tag auctions going to tribal schools and scholarships. Up to 550 permits are issued annually in the Pink Mountain area. Public harvest can be used to control population growth, manage herd distribution, obtain biological samples for herd health monitoring, reduce public safety hazards or increase local support. The opportunity for public harvest has bolstered support by the hunting groups for bison restoration and in some cases habitat management projects such as those in the Henry Mountains area.

Public viewing is discussed in all of the case studies and is particularly important to the mission of the American Prairie Reserve.

Other Relevant Experiences:

Over 23,500 hunters applied for 138 Alaska hunting permits in 2013. Over 2,000 hunters applied for 25 Arizona permits in 2013. The 2014 Antelope Island hunt in Utah brought in more than 2,000 applications for less than 10 tags while the 2014 Wyoming hunt brought in over 3,000 applications for 336 tags. As of 2014, the Crow Tribal bison herd consisted of approximately 1,600 bison. Hunting tags are occasionally issued to the general public as a population management tool. (T. Jefferson, Crow Reservation, pers. comm.).

There has been licensed bison hunting in the areas north and west of YNP since 2005. Bison hunting season is from November 15 to February 15. Montana's bison license quota for the 2014-2015 hunting season was 80 either-sex licenses (20 in HD 385 and 20 in HD 395) with the potential for 200 additional second-choice state-issued licenses if conditions warrant. Of the 80 either sex licenses, 16 were allocated to Montana's Native American tribes in accordance with MCA 87-2-731. For the 2014-15 season, over 9,500 applicants put in for Montana's available bison hunting tags.

The Assiniboine and Sioux (Nakota, Lakota, and Dakota) tribes of the Fort Peck Reservation manage a tribal production herd that consists of approximately 121 bison (post hunting season), which are contained on approximately 9,000 acres (R. Magnan, Fort Peck Fish and Game Director, pers. comm.). There is a hunting program that is open to tribal and non-tribal members; approximately 50 tags were issued for the 2010 hunt. As of 2011, there were two additional private herds on the reservation. The first had approximately 100 head, and the second had around 50 head of bison.

As of 2014, the Gros Ventre and Assiniboine tribes of the Fort Belknap Reservation managed a herd approaching 618 bison in an enclosure that is approximately 22,000 acres. The tribes would be interested in expanding their herd if additional acreage was available. There are currently some limited hunting opportunities available to tribal members and the general public, mainly to cull older bulls.

As referenced in section 4.4.6, the presence of wild bison can be an incentive for people to visit a location. A report by Duffield et al. (2000) indicates about 50% of surveyed resident

and non-resident visitors to YNP indicated that seeing bison was a reason for their trip, and about 5% said they would not have come to the area if bison had not been present. In 2012, 40,000 visitors came to the federal and tribally managed National Bison Range Visitor Center near Moise, MT to see its bison and other wildlife species.

Alternative #1: No Action

There would be no changes to existing recreational activities on public or private lands nor any increased opportunity to hunt bison as wildlife in Montana. No new benefits or costs to wildlife viewers, hunters, or tribal entities would occur from restoration bison on the landscape.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to recreational opportunities or resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

The probability and extent of any increased visitation to a specific location by wildlife viewers, hunters, or recreationists is unknown with an initial release of 40 animals and unknown details of the restoration site such as size and accessibility. Project implementation at a site that has been historically closed to public access would in essence increase opportunity for hunters or wildlife enthusiasts as public access to restoration bison would be required. This could result in a moderate positive benefit to recreationists. If the site has been historically open to the public, e.g., federal lands, then the addition of restoration bison would likely pose only a minor to moderate benefit to recreationists.

Outfitters could benefit from a minor increase in economic opportunity and FWP could benefit from the sale of additional bison hunting permits but only if the initial herd of 40 was allowed to grow to a size that could tolerate harvest. Many bison programs in other states use hunting as a tool to manage population size and distribution. Well managed hunting programs may have the potential to increase public support for and visibility of the species.

The addition of restoration bison at any location has the potential to impact outdoor experiences at a negligible to moderate level depending upon the circumstances of the situation. The two primary ways are physical inconveniences and physical endangerment. Physical inconveniences are considered to be situations where bison impede hunters, anglers or other recreationists progress on trails, along shorelines, or movements through campgrounds. Physical endangerment situations are described as when personal safety is threatened when bison are approached too close, when calves are present, during the rut, or if an animal is startled.

As referenced in section 4.4.1, one of the fundamental ways to decrease the potential for bison-human conflicts, especially those with the possibility for bodily harm is to maintain a large distance between people and bison. The research completed by Taylor et al. (2003) investigated the perceptions of hikers and mountain bikers to the responses of wildlife,

including bison, on Antelope Island in Utah. The results of their study showed that most recreationists felt that it was acceptable to approach wildlife at a much closer distance than was tolerated by the wildlife. On average, the real bison approach tolerance was approximately 103 yards versus the recreationist perception of 64 yards. The distance that bison tolerate humans can vary depending on the season, time of day, herd size, and presence of calves. In YNP, the average distance between the bison and the human when the bison charged was 28.5 feet as estimated by reporting YNP rangers (Olliff and Caslick, 2003).

Educational outreach efforts could be conducted in areas where restoration bison may be encountered to minimize bison-human conflicts. Hazing or lethal removal of problem bison could be conducted when needed. Actual mitigation methods for a location would be agreed upon by FWP, landowner(s), and the citizens working group.

Secondary and Cumulative Impacts

Secondary consequences of the implementation of this alternative are difficult to estimate since a site has not been selected and recreational opportunities for that site are unknown. Possible secondary impacts could include adjustments to big game hunting district quotas or hunting season adjustments if there are user conflicts between bison hunters and other hunters. Adjustments would require FWP Fish and Wildlife Commission approval. Other secondary impacts could include: 1) additional game damage hunts on adjacent lands if ungulates move from the restoration site other locations; 2) need for local emergency responders or FWP staff to go to the restoration location to address bison-human conflicts; 3) need for additional weed control because high visitor traffic is spreading seeds; and 4) need for establishing a dedicated parking area for visitor vehicles to decrease traffic hazards.

A secondary impact of this alternative could be increased hunting opportunity for tribal treaty hunters particularly during summer and fall seasons. Currently, some tribal hunters are not allowed to hunt in areas adjacent to YNP after February 1 due to tribal rule or out of respect to the bison, especially pregnant cows. Some tribes do hunt through the end of March, while others do not identify a limited season. Historically, tribes hunted bison during the summer months when the "buffalo had firm flesh, with plenty of fat, needed in the Indian's diet" (Whealdon et. al. 2001). During the summer bison's hair becomes very thin so the pelts can be dressed on both sides and made into a variety of articles such as clothing and teepee covers. Winter hides are thicker and show the stress of winter conditions. Any changes to the state's current bison hunting season outside of YNP would require FWP Fish and Wildlife Commission and MDOL approval.

Predicting cumulative impact is not possible at this time because there are too many unknown variables such as the size and geography of the site, historical and current public access, current recreational use, the number of restoration bison to be located at the site and the potential for the population to increase.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2 there could be a minor to moderate increase in bison hunting and/or viewing opportunities if restoration bison were placed on tribal lands. There could also be a minor increased threat to humans or interference with hunting or recreational opportunities similar to Alternative #2 depending upon the existing conditions at the site and the bison/acre ratio.

Hunting for tribal and non-tribal members would have to be allowed for this to be a true publicly owned herd. Any hunting program details would have to be agreed upon by FWP, tribal entities and the citizens working group. FWP and the tribe(s) would have to clarify if any financial incentives for allowing public access would be appropriate or desired.

Secondary and Cumulative Impacts

As with Alternative #2, secondary consequences of the implementation of this alternative are difficult to estimate since a site has not been selected and recreational opportunities for that site are unknown. However, secondary impacts could include those predicted for Alternative #2.

Predicting cumulative impact is not possible at this time because there are too many unknown variables such as the size and geography of the site, historical and current public access, current recreational use, the number of restoration bison to be located at the site and the potential for the bison population to increase.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

There could be a moderate to major increase in bison hunting and/or viewing opportunities if the initial herd of 40 restoration bison was cultivated to a herd size of 400. Bison-human conflict could also be more common with this alternative as a large herd would occupy and move over a large area where they could encounter more people.

Methods to decrease or mitigate bison-visitor conflicts would be identical to those described for Alternative #2 and would also be developed by FWP, landowner(s), and the citizens working group.

Secondary and Cumulative Impacts

Identical to the difficulties with estimating secondary and cumulative impacts for the previous two alternatives, such is the case with this option. Possible secondary impacts could be the same as those described for Alternative #2 but more noticeable because of the size of the herd size called for in this alternative.

4.4.6 Local Economy and Social Values

Case Study Experiences:

APR manages a privately owned but publicly accessible bison herd. As of 2013, APR reports spending of over \$24 million in the local community, including land purchases, equipment, supplies, payment to contractors, wages for local staff, real estate tax, and other reserve

management costs. APR pays real estate taxes on all of its deeded lands as well as taxes on personal property. APR is now one of the top tax payers in Phillips County.

See previous section’s case study experiences for description of the different programs’ current fencing experiences and agricultural impacts.

Alternative #1: No Action

There would be no restoration program under this alternative and thus no related change, i.e., positive or negative, in local employment or local economies that may have been attributed to the addition of bison on the local landscape. There would be no new benefit or cost to wildlife viewers, hunters, tribal entities, local governments, local emergency responders, livestock owners, or others.

Secondary and Cumulative Impacts

A possible secondary effect of the selection of this alternative may be the continued complaint of some of the public that the State of Montana and FWP are not doing enough to restore bison to the landscape. Some would thus continue to take steps to support the ESA listing of the species potentially forcing FWP into action to preserve wild bison.

No cumulative impacts are anticipated under this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

The presence of publicly owned bison in additional areas of Montana has the potential to bring increased tourism and hunting dollars to local economies. Public hunting would be a method for controlling the restoration herd’s size and a community could experience a minor to moderate positive economic benefit with the management of restoration bison nearby. As an example, Table 4 represents a summary for hunter expenditures per day in FWP’s Region 3 when hunters purchase food, fuel, lodging, guiding services, and supplies locally. Specific expenditures by bison hunters have yet to be researched and quantified.

Per day expenditures	Elk	Deer	Moose	Bighorn Sheep	Mountain Goat
Resident	\$ 85	\$ 66	\$ 246	\$ 288	\$ 277
Non-resident	N/A	\$ 232	N/A	\$ 460	N/A

Table 4. Summary of hunter expenditures per day in FWP’s Region 3.

Montana has hosted roughly 10 million non-residents visitors each year since 2005 (Grau, 2013). The combined 2011-2012 local expenditures from non-resident *and* resident travel within the state was \$3.6 billion, which supports \$2.9 billion of economic activity in the state and an additional \$1.6 billion of economic activity, indirectly (Grau, 2013).

Regions around Yellowstone and Glacier National Parks receive large amounts of tourism revenue due to the millions of annual visitors to the national parks that also visit the surrounding states. About 50% of surveyed resident and non-resident visitors to YNP

indicated that seeing bison was a reason for their trip, and about 5% said they would not have come to the area if bison had not been present (Duffield et al. 2000a, 2000b).

The National Bison Range complex receives an average of 125,000 annual visitors (USFWS, 2014). Visitors come from all over the Nation and the world to visit, learn about, and enjoy a variety of wildlife on the complex that includes the National Bison Range property, Ninepipe National Wildlife Refuge, Pablo National Wildlife Refuge, and the Northwest Montana Wetland Management District. In 2012, approximately 203,500 resident and nonresident visitors viewed and photographed wildlife, hunted, fished, and participated in events and programs. Fifty thousand visitors came for wildlife photography opportunities and 40,000 visitors came specifically to the National Bison Range Visitor Center (USFWS, 2014). Bison restoration could be a way to increase tourism revenue in additional areas of the state assuming public viewing access was established and promoted as part of the restoration effort.

FWP utilizes hunting as a wildlife management tool, which in turn, generates public interest in the conservation of wildlife. Access would be required for public hunting in any restoration program. Any hunting program would have to be agreed upon by FWP, the landowner(s) and the citizens working group to include clarification of financial incentives (or not) for allowing public access. Bison have been hunted in Montana when they migrate out of YNP since 2005. During the 2014-15 bison hunt season, state licensed hunters harvested 40 bison and tribal treaty hunters harvested 142 bison. Bison hunting or the presence of restoration bison could negatively impact other hunting opportunities to include big game, upland game bird, and waterfowl hunting by increasing the number of hunters in a particular area or decreasing the comfort of some hunters pursuing game in areas where bison are present.

Outfitters in Montana offer clients a variety of recreational opportunities throughout the state including guided services for hunting, fishing, trail rides, mountain biking, and cross-country skiing. Outfitters are permitted on specific National Forests, hunting districts, or locations. Outfitters could be impacted by a potential restoration program, along with other outdoor recreationists. Bison presence on a landscape could offer additional opportunities for guiding hunters and wildlife viewers, but could also complicate activities historically pursued in an area if use regulations were altered due to bison presence.

Outfitters could benefit from a minor increase in economic opportunity and FWP could benefit from the sale of additional bison hunting permits but only if the initial herd of 40 was allowed to grow to a size that could tolerate harvest. Many bison programs in other states use hunting as a tool to manage population size and distribution.

Bison restoration near a city of any size could result in bison-human conflict and conflicting land uses, even in remote areas of Montana with low human populations where cattle ranches and crop production dominate the economy. Additionally, local emergency responders may be fiscally impacted if they are required to respond to bison-human conflicts or if restoration bison escape from their designated area.

Agricultural crop or livestock producers could incur additional costs to erect fencing specifically to keep bison that may have strayed from the restoration area off of their properties or to fix fences that bison have damaged (see sections 4.4.2 and 4.4.3). Additional ranch staff time could be needed to haze bison off of private properties if bison were to stray. In 2012, there were over 9.5 million acres of harvested cropland in Montana with nearly \$2 million of those acres irrigated. The market value of grains, oilseeds, dry beans, and dry peas was \$1.7 billion (National Agricultural Statistics Service, 2012).

Methods that could be used to decrease negative impacts from the presence of restoration bison may include increased financial support by partners to improve boundary fencing to restrict bison movements, reducing the size of the restoration herd to protect preferred forage for other wildlife species, or dedicating FWP staff to manage local user conflicts.

Social Values

The general public has strongly-held divergent values and opinions on public policy issues concerning bison management and potential bison restoration to additional locations within Montana.

Those who have championed the cause for reintroduction of bison to Montana's landscape would likely see implementation of this alternative as having a minor or moderate positive impact. However, those who oppose bison as wildlife in Montana, particularly in areas outside of the Yellowstone ecosystem would see implementation of this alternative as having major negative impact.

In 2011 on behalf of the Wildlife Conservation Society and the National Wildlife Federation, Moore Information conducted a survey of Montana resident's feelings about bison restoration. The telephone survey of 400 voters found that 70% supported restoring wild populations of bison on state and federal public lands, 24% were opposed to any restoration activities, and 6% were neither. Concerns of those opposed; 1) it would be impossible to keep bison off privately-owned land, 2) bison disease may damage Montana's cattle industry, 3) bison would compete with other wildlife and cattle for food, and 4) bison pose a threat to people and damage fences.

In 2015, Tulchin Research conducted a survey on behalf of Defenders of Wildlife to assess public attitudes toward bison and various public policy approaches to their management and restoration. The survey of 500 registered voters found that: 1) 81% hold bison in high regard versus 4% who hold unfavorable views of bison; 2) 68% view bison as wildlife versus livestock; and 3) 67% support efforts to relocate YNP bison to other parts of the state - 76% supported populations on public lands and 78% supported restoring wild bison to tribal lands.

Some social conflict around bison restoration could potentially be lessened if a willing private landowner(s) could be identified for program implementation to demonstrate bison restoration does not necessarily lead to negative impacts in private property rights. Yet, some public trust advocates worry that bison restoration to private lands could be akin to private ownership of public wildlife.

Bison restoration to federal lands would involve the voices of not only Montanans but citizens from across the nation and would require NEPA process. Many portions of federal land have private land in-holdings further complicating the acceptance of bison restoration on federal lands.

See section 2.7 for more on the recreational and social value of bison.

Secondary and Cumulative Impacts

If federal public lands are chosen for the implementation of this alternative, a secondary impact could be a change in current land uses in order to prevent recreational and grazing-related conflicts on public land grazing allotments. Communication and coordination between FWP, the landowner(s), and the citizens working group could identify methods to decrease these types of conflict.

Since a specific location has not been identified, it is very difficult for FWP to predict if there could be cumulative impact to a local economy or to social values. Many variables would need clarification before these types of impact could be described, such as the types of industries near the restoration area, the current economic vitality of the community, proximity to major traffic corridors, how many bison would be at the location, how long the bison would be present, etc.

Alternative #3: Restoration on Tribal Land

Tribal lands across Montana have different neighbors and thus different potential conflicts. Many of the land uses within and adjacent to reservations are similar in nature to include livestock grazing, agriculture, hunting, and recreation. The exact human uses of a particular area would depend on the specific restoration site selected.

Some of Montana's tribes have established bison-associated businesses, such as meat processing operations, in addition to maintaining commercial bison herds for fee hunting and cultural purposes. Depending upon the size of the restoration bison herd, need to control the herd's size, and terms of the MOU between the parties, there could be opportunities to support community programs with the addition of a nearby restoration bison project.

Social Values

Though widely absent from the plains, wild bison still hold an important place in the cultures and spiritual lives of many modern native tribes. In addition to the cultural and spiritual importance of bison there is also an initiative to improve tribal health by returning to the traditional diet of bison meat. Many tribes have established domestic bison herds for meat production *and* cultural purposes.

There have been moves from many tribes in Montana and the federal government to restore wild bison in order to honor tribal treaty hunting rights. Many tribes native to Montana and surrounding regions entered into treaties with the U.S. government that preserved their right to continue to hunt bison outside of their respective reservations.

In 2012, the Montana Wyoming Tribal Leaders Council passed a resolution that called for the state of Montana to recognize the trust responsibility and treaty obligation to American Indian Nations by providing for viable populations of migratory buffalo in their native habitat. The Council passed a second related resolution in March of 2013. This resolution continued to call for the state of Montana and Federal agencies to “recognize and honor its trust responsibility and treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in the wildlife species’ native habitat.”

A recent survey of residents within the Montana area of the Linnii Initiative (Blackfeet Reservation) showed 74% of survey participants strongly agreed that bison are especially important to Blackfeet people and are an important symbol of Blackfeet history and culture. Seventy percent strongly supported the Blackfeet tribe partnering with neighboring federal, state or provincial land management to create more bison habitat. Fifty-seven percent strongly supported restoring bison populations somewhere in Blackfeet Country.

A number of polls or petitions have shown support for restoration of bison on tribal lands. One hundred fifty-five people signed a petition organized by a Hinsdale, MT resident in 2014 supporting full tribal ownership of quarantine bison by the Fort Peck and Fort Belknap Indian reservations.

Identical to the social values described for Alternative #2, there would be differing opinions, both positive and negative, on the topic of placement of restoration bison on tribal lands. Additionally, there are some who have expressed concern that tribal ownership of bison is a violation of public trust as traditionally non-tribal hunters have not had the same access to wildlife on tribal lands.

Secondary and Cumulative Impacts

Similar to the difficulties in predicting secondary and cumulative impacts for Alternative #2, such is the case for the possible implementation of a bison restoration project on tribal lands. There are too many unknown variables to predict secondary or cumulative impacts.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

This alternative has the potential for the restoration location to include private, public, and tribal lands to potentially accommodate 400 or more restoration bison. With that in mind, there is the potential for beneficial and adverse impacts to the local community or nearby communities similar to the examples mentioned for Alternatives #2 and #3. Because no location has been selected, specific effects are difficult to predict with any accuracy but some effects are likely.

Social Values

Those who have championed the cause for reintroduction of bison to Montana’s landscape would likely see implementation of this alternative as having a major positive impact being that it calls for restoration of a genetically viable herd of 400 bison. However, those who oppose bison as wildlife in Montana, particularly in any areas outside of the Yellowstone

ecosystem would see implementation of this alternative as having major negative impact to the ranching culture of the state.

See the discussion of social values for Alternative #2 and section 2.7 for additional details.

Secondary and Cumulative Impacts

Similar to the difficulties in predicting secondary and cumulative impacts for Alternative #2, such is the case for the possible implementation of a bison restoration project on a larger landscape. There are too many unknown variables to make reasonable predictions.

4.4.7 Costs

Case Study Experiences

Reportable costs from the case studies vary greatly. In most cases, bison management activities are conducted in conjunction with other activities so specific costs for bison management only are not tracked. Survey and management costs for the Henry Mountains herd average \$25,000 annually. Hunters in the Henry Mountains area invest \$100,000 per year on wildlife enhancement projects. The American Prairie Reserve (APR) reports spending \$50,000 or less annually to manage bison. Most activities and monitoring are conducted for multiple species and APR staff that manage and monitor bison have other duties. Start up costs to initiate the program on the Reserve were considerably more and annual costs to manage bison can increase in years with extreme weather conditions or research project costs (S. Gerrity, APR, pers. comm., 2015).

The track-able annual costs for bison management by the tribes in the Book Cliffs area is around \$100,000 with specific habitat projects costing \$80,000-100,000 each year. Much of the staff time for management, monitoring, and other activities of the Book Cliffs bison are included in the day to day general wildlife duties of UDWR staff.

The maintenance program costs in the Pink Mountain area are about \$100,000 (CAD) annually with approximately \$10,000 (CAD) directed specifically at bison habitat every 2-3 years. The inventory costs for a population assessment in 2014 were \$40,000 (CAD). Estimated costs for establishing a Wood Bison herd in Alaska is around \$2 million over 25 years dependent on a variety of factors including the number of bison to be released, where they are to be released, and where they will be translocated from (Mowry, 2005).

Other Relevant Experiences

The 2011 USFWS National Bison Range operating budget was approximately \$2,100,000 for wildlife management, site maintenance, visitor services, law enforcement, and personnel costs. Within Custer State Park in South Dakota, 1,500 bison are managed alongside other species so while there is not a separate bison management budget some costs directly bison related are estimated to be around \$60,000 annually. The Raymond Ranch in Arizona where 90 bison are maintained has an annual operating budget of approximately \$100,000. The Canadian government has committed 6.4 million dollars over

a five year period to fund a bison restoration program of 600-1,000 bison in Banff National Park.

The Buffalo Expansion Feasibility Study from Oglala Sioux Parks and Recreation Authority in South Dakota identified four alternatives for their project given the landscape, its boundaries, and the desire to create a wild, free-roaming herd. The alternatives show required fencing estimates of \$15,000/mile. They estimated cost of corrals large enough to handle the buffalo herd and meet National Park Service specifications to be \$500,000. All their alternatives could be expected to employ at least one GS-5 through GS-7 Full Time Equivalent (FTE) at current rates of \$31,000 to \$39,000 (Licht, 2014).

In 2011, FWP's Interim Translocation of Quarantine Facility Bison EA estimated start-up costs for fencing, gates, handling facilities, equipment, water infrastructure, and storage shelters to be between \$846,110 and \$1,163,910 depending upon the translocation site and the existing facilities there. Below is a summary of costs from that EA that could be relevant to Alternatives #2, #3, and #4.

The following is not intended to represent a full economic analysis of any restoration project. Costs could vary greatly depending on site condition, existing facilities, existing personnel on site, and geography. Costs could be assumed by any partner of the restoration project to include MFWP, land management agency, private landowner or tribal entity. Assessment of fund availability would be included in any site-specific Environmental Analysis.								
	Unit Cost		Initial release of 40 animals		Herd size of at least 400 animals			
Fencing (assumes new fencing over ½ of the restoration area)	Low cost estimate (\$3.00/ft)	½ of a 4,000 acre area (4,000 acres =	\$49,500 (\$15,840/mile for 3.1 miles)	½ of the 40,000 acre area (40,000	\$495,000 (\$15,840/mile for 31.5 miles)			
	High cost estimate (\$8.00/ft)	6.25 square miles)	\$132,000 (\$42,240/mile)	62.5 square miles)	\$1.32 million (\$42,240/mile)			
Gates	\$300/gate		\$3,000		\$30,000			
Water Infrastructure (improvement of existing water sources)			\$5,000		\$50,000			
Personnel for Herd Management (annual)			\$50,000		\$100,000			

Table 5. Preliminary cost estimates of a bison restoration program from the 2011 Interim Translocation of Bison Environmental Assessment.

Alternative #1: No Action

The bison restoration project would not be initiated, thus no new costs would be incurred by FWP. However, the future costs to continue the discussion of bison on Montana’s landscape would likely continue to impact FWP. Costs of no action could include: 1) legal expenditures to fight accusations that FWP is not following its mandate to restore wildlife; 2) continued expenses to manage migrating YNP bison in the Gardiner Basin and near West Yellowstone; and 3) potentially being required to manage wild bison under the guidance of USFWS in response to an Endangered Species Act listing.

Secondary and Cumulative Impacts

A possible secondary cost of the No Action Alternative is a need to allocate staff time in the preparation of a bison conservation plan to be approved by USFWS if the species is listed under the ESA.

No cumulative costs are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Based on the expenditures from other bison restoration programs in other states and Canada, costs for a Montana restoration program could range from \$100,000 to over one million dollars depending upon the start-up and personnel costs required at a location. Implementation of this option would likely impact both the partner landowner(s) and FWP financially, but estimating costs is not possible at this time because there are too many unknown variables such as fencing requirements (new or improvements) and personnel necessary for oversight or monitoring. The availability of funding resources for a specific location is also unknown.

Annual costs are also difficult to predict since they are also site-specific. FWP regional staff may be required to allocate time to address bison-related concerns and incidents which may impact their abilities to complete usual duties. Local law enforcement staff and/or emergency responder staff could be impacted as well in responding to bison-related conflicts. Montana Department of Livestock staff could also be required to respond to concerned livestock owners within the area of bison restoration. Involved land management agencies could be required to commit additional staff time to monitor habitat conditions on the restoration site.

FWP anticipates some of the costs for the project would be shared between the FWP and landowner(s). Funding support would be sought from non-profit organizations, and federal and state agencies. Benefits or incentives through public/private funds or business opportunities could be offered but would have to be negotiated with partners, the citizens working group, and funders.

Additional revenue could be generated for FWP if hunting was used as a management tool to control the restoration herd's size. In 2014, sales of bison hunting applications and bison hunting licenses generated approximately \$140,000 for the department. The revenue generated from the sale of additional bison hunting licenses could offset some of the costs associated with the management of a restoration bison herd. Any changes to FWP's bison hunting regulations and bison hunting quotas would need to be adjusted accordingly and approved by the FWP Fish and Wildlife Commission.

If this alternative were selected, FWP would be required to identify long term, stable funding sources for implementing all the provisions of the restoration bison management plan for meeting the requirements of MCA 87-1-216 (5). A budget would be developed by FWP and landowner(s) and would be included and evaluated within a site-specific EA. If FWP were to fail in meeting the requirements of MCA 87-1-216 (5), FWP would be liable for all costs arising from protecting public safety and damage to private property.

Secondary and Cumulative Impacts

Sustaining a long term restoration bison herd may have hidden costs to FWP, the landowner(s), and partner organizations that are unknown at this time. Both types of impacts are difficult to identify since this kind of project has not been attempted before by FWP.

Alternative #3: Restoration on Tribal Land

Identical to the potential costs and consequences of Alternative #2, a State and tribal partnership has numerous variables related to expenditures for a bison restoration project that make estimating costs impossible for this document. Multiple sources of funding, including tribal, would likely be required for project implementation and for annual costs.

Unlike Alternative #2, FWP is not required to meet the provisions of statute 87-1-216 (5) if restoration bison are transplanted to tribal lands. However, FWP would prepare a management plan to outline all management and funding responsibilities of involved parties.

Secondary and Cumulative Impacts

Without a particular site, there are too many unknowns to sufficiently predict what secondary or cumulative impact to FWP or tribal finances there may be.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Costs associated with the placement of restoration bison on a larger landscape than considered for Alternative #2 could be greater than described for that alternative because the need for fencing or watering improvements may be greater. Additionally, costs related to the active management of bison may be greater, especially if the herd's size is permitted to increase.

Secondary and Cumulative Impacts

Sustaining a long term restoration bison herd may have hidden costs to FWP, the landowner(s), and partner organizations that are unknown at this time. Both types of impacts are difficult to identify since this kind of project has not been attempted before by FWP.

4.5 Irreversible/Irretrievable Resource Commitments

FWP must consider whether the effects of the alternatives cannot be changed or are permanent; that is, the impacts are irreversible. FWP must also consider whether the impacts on the site's existing resources would mean that once gone, the resource could not be replaced, restored, or otherwise retrieved. These terms apply primarily to the effects of using nonrenewable resources, such as minerals or cultural resources, or to those factors such as soil productivity that are renewable only over long periods. It could also apply to the loss of an experience as an indirect effect of a "permanent" change in the nature or character of the land.

An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. A useful example of an irretrievable commitment is found in the National Park Service's 2012/2013 Winter Use Supplemental EIS, "The amount of recreation activities foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production. An example of such a commitment would be the loss of cross-country skiing opportunities as a result of a decision to allocate an area to snowmobile use only. If the decision were reversed, skiing experiences, although lost in the interim, would be available again."

No irreversible resource commitments are predicted for any of the alternatives. Under the No Action Alternative, there would be no change to Montana's landscape or existing land uses because a bison restoration project would not be initiated. With the selection of one of the other alternatives, FWP still believes there would be no irreversible resource commitments since impacts could be mitigated and no nonrenewable resources are expected to be affected by the presence of restoration bison.

Pertaining to irretrievable resource commitments, there would be no commitments under the No Action Alternative since the project would not be initiated and there would be no changes to how the landowner(s) use their lands. However with the selection of one of the other alternatives, there is the potential for irretrievable commitments depending upon the current use of the lands where the restoration bison are placed. A possible situation could be described as the following: If restoration bison are placed on property (A) there could be a loss of cattle production at that location but cattle production could resume if the restoration bison were removed. It is difficult for FWP to predict what those resource commitments would be if the project were initiated because site-specific resources is unknown at this time.