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Superintendent, YNP
Brucellosis Remote Vaccination Program, DEIS Comments
P. O. Box 168
Yellowstone National Park, WY 82190

Superintendent Lewis:

Please consider these comments on the Draft Environmental Impact Statement for a Brucellosis Remote Vaccination Program for Bison in Yellowstone National Park (March 24, 2010). Page numbers refer to the DEIS pages.

Unfortunately, I found the DEIS hard to work with. Admittedly, it deals with a complicated, technical subject, including aspects that are described in the previous Record of Decision for the IBMP. However, these difficulties should compel extra efforts toward clarity and conciseness.

For example, I did not find a clear, precise statement of what the goals of the vaccination program are in any one place in the document. Rather, I found references to the goals, benefits, and purposes of the program on page 5, pp. 6-7, pp. 7-8, p. 8, p. 15, and pp. 32-33. The only quantitative goal statement, citing a desired outcome of a 50% reduction in seroprevalence, is found in an unexpected location in the DEIS (p. 32). I predict there are additional references to goals in other locations in the document.

It is not made clear that Alternative A, the No Action alternative, is not really an option because a commitment to remote vaccination was made in the previous ROD/EIS, as indicated on pp. 7-8 of the DEIS

The numerous and diverse impacts of the proposed vaccination program are not clearly disclosed in one place within the DEIS. Rather, they are scattered throughout the document. This will inhibit public awareness and understanding of the magnitude and import of the proposal.

Many expected impacts of the proposed field vaccination program are given as “short-term” in the DEIS (pp. 47-49). While these evaluations may refer to the durations of impacts upon individual bison, it is misleading to describe impacts as “short term” when the program is expected to last for 30 years and its effectiveness will not be evaluated for 15-20 years (p. 33).

These and several other problems with the DEIS will prevent the public from understanding and weighing the costs, risks and possible benefits of the program.

More specifically:

The proposed vaccination program violates the NPS mandate to leave Park resources as unimpaired as possible for future generations.

1. The most basic mandate of the Park Service is to leave park resources unimpaired for future generations. Thus, parks must seek to avoid or minimize human impacts upon park resources (p. 79), allowing natural processes including natural selection to respond to natural changes in the environment. However, some human-caused perturbations in parks have been unavoidable. Examples are the introduction of the non-native pathogen *Brucella*, and climate change.
2. Some parks, especially Yellowstone NP, serve importantly as "control areas" for comparing, evaluating and understanding human impacts upon ecosystems across the rest of the continent. We maintain ecosystems in national parks as natural as possible and practicable because we admit that we do not fully understand the complexities of these ecosystems. This value of national parks is compromised whenever human impacts outside parks are applied inside parks. Parks must seek to retain this value, unimpaired, for future generations. The "wildness" value of the Yellowstone bison herd is extreme because it is the only large, truly wild plains bison herd left on native range in North America.
3. In dealing with an unavoidable human-caused perturbation within a park, the Park Service should intervene to eliminate or control impacts of the "unnatural" element only when such intervention will not cause more deviation from naturalness and integrity of park resources, than would allowing the unnatural element to persist (p. 163). (Thus, we do not broadcast herbicides in parks to control non-native plants; nor do we irrigate park meadows in response to global warming.)
4. Disease has been a natural process throughout the evolution of bison. Natural selection has been the process to develop resistance and accommodation between host bison and their diseases. (Accommodation includes evolution of the pathogen whereby the disease organism persists with little or no impact to the host.) There is already evidence of Yellowstone bison having resistance to *Brucella* infection (p. 155 and Seabury et al. 2005). Moreover, there is considerable variation among mammals, including bison, in their reactions to *Brucella* exposure (p. 155). This variation allows natural selection to operate in developing resistance and accommodation.
5. There are many unknowns in pathogen-host relationships that may influence results of a vaccination program in unexpected ways. Bison are expected to carry populations of many competing and synergistic strains of viruses and bacteria, interacting with several humoral and cell-mediated

aspects of host resistance. This micro-system is extremely complex and interrelated, such that interventions in one part of the system may cause unexpected effects elsewhere in the system. Furthermore, there is the possibility of linked genetic effects. Bison responding "positively" to RB51 could be unique in other genetically-controlled ways, some of which could be harmful. Still further, the proposed vaccination program may lead to adaptive changes in *Brucella* toward variants able to avoid immunological responses to the vaccine. This could lead to greater persistence of *Brucella* within bison and increased pathogenicity (p. 73). Our wildlife in national parks are not appropriate populations for experimenting with vaccinations.

6. Vaccination will interfere with natural selection for resistance and accommodation between bison and *Brucella*. Vaccinated animals may not experience symptoms of disease and therefore not experience reduced rates of survival and reproduction, that is, natural selection. Bison already exhibiting resistance to *Brucella* will be less favored by selection and overall resistance to *Brucella* in the bison herd could decline.
7. Since *Brucella* will not be eliminated from YNP, the vaccination program will be a permanent commitment to use of vaccines, and related interventions, to replace natural selection and to control brucellosis in Yellowstone bison. Lurking in the background is Montana's request that immuno-contraceptives be added to the bison biobullets.
8. In addition, NPS admits that several adverse impacts will occur under the vaccination program (pp. 87, 89, 94). These include altering bison behavior and tolerance for people (described as long-term on p. 91 and short-term on p. 95), increased susceptibility to predation and to injuries from con-specifics, muscle trauma and infections, injuries during handling for monitoring seroprevalence, occasional deaths due to biobullet injury (p.89) or during dart-capture of animals for disease surveillance, and likely paint-marking of bison – which will be abhorrent to Park visitors.
9. In many years when sufficient bison are not available for capture at Stephens Creek, up to 200 or more bison will be darted and captured for disease surveillance purposes (p. 27).
10. NPS considers these impacts as short-term and negligible to minor. I contend these impacts are numerous, diverse and persistent deviations from a natural bison herd, with some cascading effects to other ecosystem components. (How can impacts that will continue over 30-years, at least, be considered "short-term"?)
11. Disease, as a process, has been, and is, natural in wild bison. Clearly, the impacts of disease intervention described in the DEIS will constitute a greater deviation from naturalness in Yellowstone bison, compared to allowing bison and *Brucella* to coevolve in YNP. The latter option is the only way to leave Yellowstone bison unimpaired for the use of future generations of Americans. It appears this mandate of the Park Service is being greatly compromised, solely in response to the intolerance of Montana for wild bison outside Yellowstone National Park.

The methods to be used in the vaccination program have not been tested or evaluated. Consequently, a commitment of public resources and funds, and of the entire bison herd, to a multi-year program is not justified.

1. NPS admits that a goal of the in-park vaccination program is to "test for a safe, effective, low risk remote delivery system" for vaccinating bison (p. v). Many aspects of the proposed program remain uncertain; yet an expensive, long-term commitment of Park resources, impacting all of the Park's bison is being promoted.
2. "The effectiveness of RB51 against field strain *Brucella abortus* is not conclusive" (p. 17).
3. "Moving forward depends on addressing" (numerous) "uncertainties" and improving "the effectiveness of vaccines, vaccine delivery methods, and disease testing" (p. 77). "Field validation trials should be conducted to evaluate effectiveness of vaccine delivery before widespread application of vaccination programs in the GYE." (p. 73).
4. Numerous uncertainties with the proposed vaccination program are listed on pp. 76-77, p. 174 and elsewhere. There are unknowns regarding the effectiveness of the vaccine, the remote vaccine delivery methods, vaccine stability and storage, optimal vaccine dosage, methods for marking bison that presumably have been dosed, and methods for testing for *Brucella* presence in bison.

There is good reason to expect that there will be a very inefficient, but costly, delivery of effective doses of RB51 sufficient to create immunity in individual bison.

1. Ability to approach and successfully deliver biobullets to bison will likely decline as the animals learn to avoid the vaccination team (T. Roffe, personal communication).
2. Penetration of the biobullets into bison may be less than 70% (p.88).
3. Delivery of sufficient dose to cause an immune reaction in bison is uncertain.
4. When the above uncertain probabilities of approach, delivery, penetration and providing a sufficient dose are multiplied, there likely will be a low probability for approaching a bison and delivering a sufficient dose.
5. The effectiveness of RB51 against field strain *Brucella* is inconclusive. The reduction of infection is expected to be less than 10-15% (p. 17). Thus the proportion of approached and harassed animals that are successfully protected from infection will be extremely low. (Note that the probabilities described above must be multiplied. Thus, if 80% of bison can be approached and fired upon, with 95% success at hitting the bison, 70% penetration with a sufficient dose 90% of the time; and a 15% effectiveness of avoiding subsequent infection with *Brucella*: the ultimate success of the activity will be (0.8)(0.95)(0.7)(0.9)(0.15) = 0.07; and the probabilities used here may be generous.)
6. Costs for this inefficient program are discussed below.

Benefits of the vaccination program are uncertain at best; and may be zero.

1. Benefits to the Park bison are supposed to include (p. 17, emphasis mine) a decreased, but not eliminated (p. 21), infection rate with *Brucella* bacteria. In exchange, there will be frequent capture, handling and testing of bison within the Park. In remote vaccination attempts, some bison will bleed, incur muscle trauma and possible infection. There may be increased susceptibility to predation and to injury by conspecifics (pp. 88-89). Bison probably will be marked with colored paint. There will be interference with natural selection that would lead to *Brucella* resistance and accommodation. There may be unknown effects of this intervention upon the immune systems of bison. These impacts may alter their resistance to other, native diseases.
2. Under the proposed alternative, the decrease in population infection rate may only be moderate (p. 46).
3. Reduced seroprevalence for *Brucella* should lead to a larger rate of increase of bison. However, this can be expected to result in more frequent culling operations to maintain the bison population at levels acceptable to Montana. There is no commitment to a population of bison larger than 3000.
4. The proposal will not reduce seroprevalence sufficiently to alter perceptions of livestock operators and regulators regarding the risk of brucellosis transmission. Effects to socioeconomics will be negligible. (p. 21).
5. The proposal "is supposed (emphasis mine) to result in increased tolerance for untested bison on winter range lands outside the park in the northern boundary area." (p. 21). Under the IBMP, this tolerance will be limited to 100 bison, total, west and north of the Park within "zone 2". (The minimal extent of zone 2 is not described in the DEIS.) Page 21 says nothing about increased tolerance for bison outside the Park in the Gallatin and Madison Valleys. The paragraph (p. 21) notes that increased tolerance for bison outside the Park is related to removal or control of cattle, not to the rate of seroprevalence in bison. Experience has shown that this tolerance extends only during late winter through May 15, minimizing the value of this uncertain, limited benefit.
6. An indirect, but politically important and perhaps compelling, benefit of the vaccination program is supposed to be a reduction in the risk of transmitting *Brucella* from bison to domestic cattle. However, this risk is already near zero, as no case of field transmission has been discovered. Moreover, there are no cattle on many winter ranges available to bison and there have been no cases of brucellosis in the small numbers of cattle maintained in areas recently used by wintering bison near YNP.
7. The risk or rate of transmission of *Brucella* from elk to bison is unknown. Transmission from elk will negate any value of the remote vaccination program.

8. There is no evidence that the proposed program will improve opportunities for public or tribal harvest of bison.

Costs of the vaccination program are large. Funding for at least some components of the program has not been secured.

1. In 2000, the IBMP agencies estimated the annual cost of an in-park vaccination program would be $330,500, or about $9 million over a 30-year period, not adjusted for inflation.
2. The DEIS estimates an initial cost of $230,000 for research studies and an annual cost of $295,000 (depreciating equipment costs over 10 years. This estimate is $2.95 million per decade and $8.85 million over 30 years. One research study, determining the effectiveness of syringe vaccination for Brucella (p. 177) is not included in the initial costs.
3. No costs are estimated for vaccination, monitoring or marking activities that may occur at the Duck Creek capture facility (p. 27, p. 173). Any additional costs associated with the program and incurred by Montana Department of Livestock or Montana Fish, Wildlife and Parks are not included.
4. Important aspects of the monitoring program to evaluate the effectiveness of field vaccination in the Park are not yet funded (p. 177). Costs for the monitoring/evaluation program remain uncertain (see next section). There is a danger of initiating field vaccination of bison without adequate capability to evaluate the results and benefits, if any.
5. Although the costs of the proposed in-park vaccination program would be minor compared to the federal budget, they are repulsive in the current debt-ridden national economy and they are huge in comparison with the predicted minor and questionable benefits discussed above.

The monitoring protocol is vaguely described and unlikely to allow evaluation of the incremental effects of a remote vaccination program.

1. Vague descriptions of a surveillance plan (pp. 26, 183-184) and the DEIS discussion of “adaptive management” (pp. 29-30) illustrate what is perhaps the most common and serious failing in the profession of wildlife management. Promotion of adaptive management is almost meaningless unless plans include management/experimental designs calculated to provide reliable information on the impacts of management in relation to clearly defined goals. Management experiments must incorporate the elements of randomness, sufficient sample sizes, and controls or baselines. Otherwise, measured results from monitoring or surveillance will include confounded effects of treatments and environmental variation that may not be separated. Little, if any, reliable information results. There is no clear measure or demonstration of the impacts, positive or negative, of management. A need for planned experimentation in wildlife management was described more than 20 years ago (Bailey, 1982). Modeling is not a necessary component of this process.

2. Three treatments that may reduce seroprevalence in bison will be confounded in the preferred alternative. These are irregular selective culling of seropositive bison (p. 27), irregular vaccination of bison by syringe injection at Stephens Creek, Duck Creek and elsewhere (p. 27), and field vaccination of bison throughout the Park. There is no indication that the separate effects of field vaccination on seroprevalence or other objectives will be evaluated. Measuring separate effects of field vaccination will be necessary to evaluate the need for, and value of, field vaccination in the Park.
3. NPS commitments to the surveillance program are ambiguous. "NPS may mark vaccinated animals". "NPS may capture bison in the Stephens Creek capture facility or dart them with immobilizing drugs to sample their serostatus". "NPS may request Montana and Forest Service capture and sample bison outside" the Park. (Quotes from p. 27.) These statements indicate that sampling will be largely opportunistic. No sampling plan addressing needs for sample sizes or randomness (or at least representativeness) is presented. Further, funding for most of the monitoring has not been committed (p. 177). These issues should be addressed before there is any commitment to field vaccination of bison in the Park, not after such commitment.
4. The <u>combined</u> effects of the above three treatments on seroprevalence <u>may</u> be detected by sampling (randomly) 200-250 bison annually for 5-20 years (p. 27). However, research captures from darting bison are likely to be fewer than 100 in any year (p. 185). Appendix I, on needed sample-sizes, does not refer to age classes of bison. There is no clear evaluation of sample sizes needed to detect a significant reduction in seroprevalence among pre-reproductive bison (a goal alluded to on p. 32). It is not clear how a statistically significant decline relates to the desired outcome of a 50% reduction in seroprevalence (p. 32).
5. There is no assessment of how the duration of immune protection from field vaccination (p. 32) will be measured. How will this be estimated? What sampling and sample sizes will be necessary?
6. Will there be a direct measure of expected changes in the frequency of fetal abortion events and of Brucella shedding in the Park? (Or will it simply be assumed that these frequencies are related to seroprevalence rates?) If direct measures are contemplated, what sampling methods and sample sizes will be necessary to detect significant changes?
7. Note that any resulting reduction of the risk of transmission of *Brucella* to livestock can not be measured, because it is already near zero, especially in large areas where no cattle exist during the season when bison might transmit the pathogen.

If remote vaccination is to be used or tested as a tool for managing the risk of *Brucella* transmission to domestic livestock, adult cattle – not wild bison – should be remotely vaccinated.

1. For reasons stated above, Park wildlife are not appropriate for intrusive management, especially when benefits are minimal or non-existent.
2. Ranchers in the GYA tend to oppose the added expense of handling and vaccinating adult cattle.
3. Compared to remotely vaccinating bison, applying remote vaccination to cattle will be more efficient, less costly, and easier to evaluate.
4. Remotely vaccinating adult cattle will provide the important benefit of reducing the risk of contracting brucellosis from elk, a risk that is much greater than the very small risk of transmission from Park bison.
5. This alternative should have been analyzed in the DEIS.

Proposed expenditures for remote vaccination would better be spent to establish a trust fund to acquire lands, allotments and easements where bison could winter outside the Park with zero risk to Montana livestock.

1. Previous generations of Americans, including Montanans, have recognized the need for increased winter ranges for big game outside Yellowstone National Park, and have contributed to providing additional public winter ranges. This generation should do no less. Resorting to the severe methods of the IBMP, including proposed in-park vaccination of bison, is a denial of this responsibility for contributing to a permanent solution to the problem of Park boundaries that do not include ecologically complete habitats for migratory big game.
2. The IBMP is becoming a permanent waste of taxpayer funds that accomplishes very little. The proposal for in-park remote vaccination of Yellowstone bison will add to that permanent “money pit” with little assurance of meaningful, important benefits.
3. Public funds would be spent more effectively, with more permanent results, if they were spent, not on a Yellowstone field-vaccination program, but to purchase land, allotments and easements from willing sellers, allowing bison and other big game to winter naturally, without livestock conflicts, on the borders of the Park.

For the above reasons, I oppose alternatives B and C of the DEIS. NPS should determine that these alternatives would not be cost effective and would violate NPS mandates. Further, NPS should request that field vaccination programs be removed as commitments by the IBMP partners, for essentially the same reasons. The proposed field vaccination program is yet another step from wildness toward domestication of unique Yellowstone bison. The IBMP partners should admit that the only permanent solution would be a long-term commitment to securing additional winter grazing areas, where conflicts with livestock are minimal, for Yellowstone big game, including bison.

Sincerely,

James A. Bailey
Wildlife biologist, retired

Literature Cited

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