

From: [Clarke, Patrick R. - APHIS](#)
To: [Rhyan, Jack C - APHIS](#); [Frey, Rebecca K - APHIS](#)
Subject: FW: Case Number - 16-11669
Date: Friday, April 01, 2016 12:02:02 PM
Attachments: [16-11669-125272.pdf](#)

R43 aborted fetus

P. Ryan Clarke, DVM, MPH
Regional Epidemiologist -GYA
USDA, APHIS, VS, District 5
406-388-5162

From: Montana Department of Livestock [<mailto:livdiagnosticlab@mt.gov>]
Sent: Friday, April 01, 2016 11:08 AM
To: Clarke, Patrick R. - APHIS
Subject: Case Number - 16-11669



MONTANA VETERINARY DIAGNOSTIC LABORATORY

1911 WEST LINCOLN, BOZEMAN, MT 59718
P.O. Box 997, BOZEMAN, MT 59771
WEB: www.liv.mt.gov/lab

PHONE: (406) 994-4885
FAX: (406) 994-6344
EMAIL: livdiagnosticlab@mt.gov



PATRICK RYAN CLARKE
187 E TOBIANO TR
BELGRADE MT 59714

CASE: 16-11669
Name/ID: Red 43 - fetus
Species: American Bison

Sex: Unknown **Age:** Fetus
Owner: Bison Research APHIS

FINAL REPORT 04/01/16

Accessioned: 02/22/16
Authorized by: DJM

Previous Reports
02/29/16
02/29/16
03/11/16
03/11/16
04/01/16

CASE SUMMARY

Verified on: 04/01/16 by: DJM

ADDITIONAL INFORMATION 3-31-16:

NVSL REFERRAL:

We were notified by NVSL on the 4th March 2016 that the isolate from this fetus was confirmed to be Brucella abortus.

D. J. Marshall, BVSc, PhD

ADDITIONAL INFORMATION 2/29/16:

CLINICAL MICROBIOLOGY:

A suspect Brucella abortus isolate has been isolated from abomasal fluid from this fetus. This isolate will be forwarded to NVSL for confirmation and typing. Results will be forwarded as soon as available.

D. J. Marshall, BVSc, PhD

REASON FOR SUBMISSION:

Bison abortion from a brucella seropositive cow.

LABORATORY DIAGNOSIS:

Bison abortion;

COMMENT:

004539

Case No: 16-11669 - ,

Clinical microbiological investigations are in progress and will be reported as soon as complete.



D. J. Marshall, BVSc, PhD

PATHOLOGY

Verified on: 02/29/16 by: DJM

GROSS DESCRIPTION:

A male bison fetus was submitted for necropsy and subsequent laboratory evaluation. Necropsy was performed between 2.30 and 3.00 pm on Monday 22 February 2016. Crown rump length measures 56 cm. Tissues are moderately autolysed. Abomasal fluid is pale red and mucoid. No other significant gross abnormalities are detected.

HISTOLOGIC DESCRIPTION:

Sections of brain, liver, lung, kidney, heart, spleen, thymus, skeletal muscle, abomasum and small intestine are examined. Lung is not aerated. No significant abnormalities are detected in the remaining tissues.

HISTOLOGIC DIAGNOSIS:

Lung: Non-aeration.

CLINICAL MICROBIOLOGY

Tritrichomonas foetus Culture

Verified on: 02/29/16 by: JR

| Animal ID | Specimen | Isolate # | Organism | Amount |
|----------------|----------------|-----------|------------------------------------|--------|
| Red 43 - fetus | Abomasal Fluid | | Negative for Tritrichomonas foetus | |

Brucella Culture

Verified on: 03/04/16 by: KK

| Animal ID | Specimen | Isolate # | Organism | Amount |
|----------------|----------------|-----------|------------------|--------|
| Red 43 - fetus | Abomasal Fluid | | Brucella abortus | 2+ |

Campylobacter Culture

Verified on: 02/29/16 by: JR

| Animal ID | Specimen | Isolate # | Organism | Amount |
|----------------|----------------|-----------|--------------------------------|--------|
| Red 43 - fetus | Abomasal Fluid | | Negative for Campylobacter sp. | |

Aerobic Culture

Verified on: 02/29/16 by: JR

| Animal ID | Specimen | Isolate # | Organism | Amount |
|----------------|----------------|-----------|-----------|--------|
| Red 43 - fetus | Abomasal Fluid | | No Growth | |

REFERRAL

Culture Identification

Abomasal Fluid

Verified on: 03/31/16 by: JR

| Animal ID | Test | Result |
|----------------|------------------------|-----------------------|
| Red 43 - fetus | Culture Identification | Positive-See attached |


National Veterinary Services Laboratories

PO Box 844

Ames, Iowa 50010

Phone: 515-337-7514 Fax: 515-337-7938

FEDERAL RELAY SERVICE (Voice/TTY/ASCII/Spanish) 1-800-877-8339

The USDA is an equal opportunity provider and employer.

FINAL REPORT

Laboratory Test Report

Sensitive But Unclassified/Sensitive Security Information - Disseminate on a Need-To-Know Basis Only

Owner

USDA, APHIS, VS

Corwin Springs, MT

Accession Number:**16-007149****Animal Location**

Park County MT, US

Date Collected:

02/22/2016

Date Received:

03/02/2016

Submitter - 2046

MT Department of Livestock

Diagnostic Laboratory Division

1911 W Lincoln St

PO Box 997

Bozeman, MT 59718

FAX #: 406-994-6344

Phone #: 406-994-4885

Date Completed:

03/31/2016

Collected By:

Dr. Jeff Marshall

Purpose:

General Diagnostic

Referral Number:

16-11669

This is not a billable case.**NOTE:** Condition of the sample(s) was adequate unless otherwise noted.

Sample: 16-11669 Animal ID: Red 43 fetus Brucella Case Number: B16-0113 Specimen Type: Culture Species: Bison

Brucella Final Identification

Brucella abortus



16-11669

02/22/16

**Results authorized by:**Dr. Suelee Robbe-Austerman, Section Head, Mycobacteria and Brucella Section
NVSL MB General Phone: 515-337-7388



16 - 11669

02/22/16

Krantz, Kaylee

From: Moore, Tess
Sent: Friday, March 04, 2016 1:09 PM
To: Marshall, Jeffrey; Krantz, Kaylee; Rogers, Jessica
Subject: FW: Brucella Test Report 16-11669

From: Layton, Dr. Bill
Sent: Thursday, March 03, 2016 9:52 AM
To: Moore, Tess
Subject: Fwd: Brucella Test Report

Another tx

Sent from my iPhone

Begin forwarded message:

From: "Quance, Christine R - APHIS" <Christine.R.Quance@aphis.usda.gov>
Date: March 3, 2016 at 11:49:48 AM EST
To: "blayton@mt.gov" <blayton@mt.gov>
Subject: Brucella Test Report

Good Morning,

We identified *Brucella abortus* from the following culture submission:

NVSL Acc. 16-007149, B16-0113
Owner: USDA, APHIS, VS
Species: Bison
Animal ID: 16-11669, Red 43 (fetus)

Brucella abortus is a APHIS/CDC Select Agent, and requires reporting to the APHIS/CDC Select Agent Program whenever it is identified.

I need you to reply to this email to acknowledge that you have been informed of this identification, and to answer the following questions:

- 1) Was there any exposure that occurred during sample collection?
- 2) Did you retain or send any samples elsewhere?

As you are aware, any samples retained by your laboratory must be secured immediately from theft, loss or release, and then destroyed, transferred or registered within 7 days.

Thanks!

P.S.- Both Jenny and Mary Ann are gone correct? Did you want to add someone else on these emails? I took a call from Janet last week, but not sure her email address.

Chris Quance

16-11669

Microbiologist
National Veterinary Services Laboratories
Diagnostic Bacteriology Laboratory
Mycobacteria and Brucella Section
1920 Dayton Avenue
Ames, IA 50010
Ph: 515-337-7347
Fax: 515-337-7315
Christine.r.quance@aphis.usda.gov

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REPORTING THE IDENTIFICATION OF A SELECT AGENT OR
TOXIN FROM A CLINICAL/DIAGNOSTIC SPECIMEN
(APHIS/CDC FORM 4A)

FORM APPROVED
OMB NO. 0579-0213
OMB NO. 0920-0576
EXP DATE 11/30/2018

INSTRUCTIONS

Detailed instructions are available at <http://www.selectagents.gov/form4.html>. Answer all items completely and type or print in black ink. This report must be signed and submitted to either APHIS or CDC:

Animal and Plant Health Inspection Service
Agriculture Select Agent Services
4700 River Road Unit 2, Mailstop 22, Cubicle 1A07
Riverdale, MD 20737
FAX: (301) 734-3652
E-mail: AgSAS@aphis.usda.gov

Centers for Disease Control and Prevention
Division of Select Agents and Toxins
1600 Clifton Road NE, Mailstop A-46
Atlanta, GA 30329
FAX: (404) 471-8468
E-mail: CDCForm4@cdc.gov

Reference ID Number:

Submit completed form only once by either e-mail, fax, or mail

SECTION C - SAMPLE PROVIDER INFORMATION

| | | | | | |
|--|--|--|--|---------------------------------|--|
| 1. Name of individual completing Sections C and D: First: Arthur MI: W Last: Layton | | 2. E-mail address: blayton@mt.gov | | 3. Telephone #: 406-994-4885 | |
| 4. <input type="checkbox"/> Registered Entity (APHIS or CDC Registration # _____) <input checked="" type="checkbox"/> Clinical or Diagnostic Laboratory [non-registered entity (NRE)] (NRE # (provided by APHIS or CDC): 071355) | | 9. Entity name: Montana Veterinary Diagnostic Laboratory | | | |
| 5. Responsible Official or Laboratory Supervisor name (if same as field 1 then skip to field 9): First: MI: Last: | | 10. Address (NOT a post office address): 1911 W. Lincoln Street | | | |
| 6. E-mail address: LIVDiagnosticLab@mt.gov | | 7. Telephone #: 406-994-4885 | | 8. Fax #: 406-994-6344 | |
| 11. City: Bozeman | | 12. State: MT | | 13. Zip Code: 59718 | |

SECTION D - SPECIMEN(S) CONTAINING SELECT AGENT OR TOXIN PROVIDED TO REFERENCE LABORATORY

| | | | |
|--|--|---|--|
| 1. Select Agent or Toxin Identified: Brucella abortus | | 2. Date notified of select agent or toxin identification: 03/03/2016 | |
| 3. Case/patient/sample ID #(s): 16-007149, B16-0113 | | 4. # of samples shipped: 1 | |
| 5. Sample type provided: Clinical/diagnostic-Animal | | 6. Case/patient/sample origin (zip code): 59030 | |
| 7. Date sample(s) shipped to Reference Laboratory: 03/01/2016 | | 8. Name of Reference Laboratory: NVSL | |
| 9. Disposition of any remaining select agent or toxin by entity listed in Block C9: <input checked="" type="checkbox"/> Destroyed (Provide destruction method and date. Method: <u>Autoclave/Incineration</u> Date: <u>2/26/16 + 3-07-16</u>) <input type="checkbox"/> Retained (Provide name of Principal Investigator retaining sample. Name: _____) <input type="checkbox"/> Not applicable, the entire specimen was transferred to the Reference Laboratory. | | | |
| 10. Were any of the samples containing a select agent or toxin handled outside of primary containment which may have led to an unintentional release and/or exposure to the select agent or toxin? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If Yes, you are required under 7 CFR Part 331.19, 9 CFR Part 121.19, and 42 CFR Part 73.19 to complete and submit an APHIS/CDC Form 3) | | | |
| 11. Was your entity the source of the sample(s)? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If Yes, skip to field 18) | | | |
| 12. Do you anticipate receiving additional samples/specimens for this case/patient that originate from the initial case (e.g., patient, environmental sample)? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If Yes, please refer to the guidance instructions at www.selectagents.gov for further directions.) | | | |
| 13. Has the sender(s) (i.e., sample provider(s)) of the specimen(s) been notified of the identification of the select agent or toxin? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes NOTE: Please request completed and signed Sections C & D from each facility that was in possession of the specimen(s). | | | |
| 14. Sample Provider Entity Name: APHIS | | | |
| 15. Sample Provider Point of Contact: First: Patrick MI: R Last: Clarke | | 16. Sample Provider E-mail Address: patrick.r.clarke@aphis.usda.gov | |
| 17. Sample Provider Contact Number: 406-539-6899 | | | |

18. Comments / Notes:

Whole aborted fetus(bison) submitted to our laboratory by Dr. Clarke. We performed necropsy - carcass disposed of by incineration 2/26/15. Abomasal fluid cultured. Tissues fixed in formalin for Histology. Remaining tissues incinerated. Culture material and original sample autoclaved 3/7/16.

I hereby certify that the information contained in Sections C and D of this form is true and correct to the best of my knowledge. I understand that if I knowingly provide a false statement on any part of this form, or its attachments, I may be subject to criminal fines and/or imprisonment. I further understand that violations of 7 CFR 331, 9 CFR 121, or 42 CFR 73 may result in civil or criminal penalties, including imprisonment.

Signature of Responsible Official/Laboratory Supervisor: [Signature]

Date Signed: 3-07-16

Public reporting burden: Public reporting burden of providing this information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Reports Clearance Officer, 1600 Clifton Road NE, MS D74, Atlanta, Georgia 30329; ATTN: PRA (0920-0576).

MVDL case 16-11669 [Signature]

16-11669

| | | |
|---------------------------|---|------------------------------------|
| Doc ID: 5.10.5.1 |  | Pages: 1 |
| Revision Date: 10/28/15 | | Revised By: T Moore |
| Approve Date: 10/28/15 | | Approved By: AW Layton |
| Supersedes Date: 08/26/15 | | Archived Version By: MA Heagney |
| Adopt Date: 05/01/13 | | Adopted By: MVDL |
| Review Date: 08/26/15 | | Reviewed By: AW Layton, MA Heagney |

MVDL Select Agent Disposal Record

Associated Document: MVDL Reportable Disease & Select Agent Processing Systems SOP 5.10.5.0

MVDL Case Number: 16-11669 MVDL Responsible Official: _____

MVDL NRE Number: 071355 Suspect Select Agent: Bruella

| Date | Initials | Action |
|------------------------------------|------------|---|
| <u>2-22-16</u> | <u>M</u> | Receipt of Case <input checked="" type="checkbox"/> Clin Micro <input type="checkbox"/> Other: |
| <u>02/25/16</u> | <u>M</u> | Isolation of Suspect Select Agent at MVDL |
| <u>3-1-16</u> | <u>M</u> | Sent to Referral Lab <input checked="" type="checkbox"/> NVSL <input type="checkbox"/> MTPHL <input type="checkbox"/> Other: |
| <u>02/22/16</u> | <u>M</u> | Secured Against Theft, Loss or Release while Referral Pending |
| <u>3-3-16</u> | <u>Ang</u> | Confirmation of Select Agent from Referral Lab Referral Acc#: <u>NVSL 16-007149,</u> |
| <u>3-6-16</u> | <u>Ang</u> | Known MVDL Exposure <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <u>B16-0113</u> |
| | | Involved Employees' Initials: <u>NO JR</u> |
| Disposal (attach copy of records): | | |
| <u>03/07/16</u> | <u>M</u> | <input checked="" type="checkbox"/> All Culture Work-up Materials <input checked="" type="checkbox"/> Autoclaved <input type="checkbox"/> Incinerated <input type="checkbox"/> Other: |
| <u>03/07/16</u> | <u>M</u> | <input checked="" type="checkbox"/> All Culture Plates/ Slants <input checked="" type="checkbox"/> Autoclaved <input type="checkbox"/> Incinerated <input type="checkbox"/> Other: |
| <u>03/07/16</u> | <u>M</u> | <input checked="" type="checkbox"/> All Microbiology Specimens <input checked="" type="checkbox"/> Autoclaved <input type="checkbox"/> Incinerated <input type="checkbox"/> Other: |
| <u>2-26-16</u> | <u>Jmw</u> | <input checked="" type="checkbox"/> All Necropsy Tissues <input type="checkbox"/> Autoclaved <input checked="" type="checkbox"/> Incinerated <input type="checkbox"/> Other: |
| <u>2-26-16</u> | <u>Jmw</u> | <input checked="" type="checkbox"/> Carcass <input type="checkbox"/> Autoclaved <input checked="" type="checkbox"/> Incinerated <input type="checkbox"/> Other: |
| <u>3-07-16</u> | <u>Ang</u> | <input type="checkbox"/> Other: _____ |

Form 4A Sections C & D Completed & Submitted w/in 7 Days of Confirmation

Records Completion Verified by Responsible Official: _____

Signature/Date

16-11669

FEES:

| | |
|--|--------|
| Hematoxylin & Eosin | 0.00 |
| Tritrichomonas foetus Culture | 0.00 |
| Brucella Culture | 0.00 |
| Campylobacter Culture | 0.00 |
| Aerobic Culture | 0.00 |
| Case Summary | 0.00 |
| Fetal Necropsy | 73.50 |
| Referral Culture | 0.00 |
| Shipping | 14.00 |
| Carcass Disposal (< 100 lbs) [Minimum] | 26.25 |
| Total | 113.75 |

(This is not a bill. Do not make payments from this report.)

From: [Clarke, Patrick R. - APHIS](#)
To: [Herriott, Donald E - APHIS](#)
Cc: [Frey, Rebecca K - APHIS](#); [Rhyan, Jack C - APHIS](#); [McCollum, Matthew P - APHIS](#); [Nol, Pauline - APHIS](#); [Ahola, Sara C - APHIS](#)
Subject: Montana Future Research plan
Date: Sunday, January 08, 2017 3:14:53 PM
Attachments: [FUTURE RESEARCH 1-04-17 V3 FINAL.docx](#)
[RTR_estimates.docx](#)

Don,

I know you are meeting with Burke this week on GYA issues so I wanted to get this final version of the Future Research plan to you. Also attached the cost analysis that Sara had worked on.

We are working bison all this week so we're going to be hard to get a hold of if you have any questions, but I will be checking my phone whenever I get to a spot that has reception.

Ryan

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

FUTURE RESEARCH (Montana Facility)

Investigators:

USDA, APHIS, VS: Jack Rhyan, Ryan Clarke, Rebecca Frey, Pauline Nol, Matt McCollum

Background:

APHIS-VS leases three double-fenced bio-secure pastures (SNS, Riglers, and Brogans) in Montana approximately 7 miles north of the town of Gardiner. The lease for one of these three properties (SNS) will be vacated in January of 2018. There are three other properties in the vicinity that are being proposed as new leases. (Trestle Ranch North, Trestle Ranch South, and Aldridge Lake).

—Bovine brucellosis, a zoonotic bacterial disease caused by *Brucella abortus*, is transmitted among animals, including cattle, bison (Bison bison) and elk (*Cervus canadensis*), primarily through contact with infected aborted fetuses, placentas, parturient fluids, or post-parturient uterine discharge. Additionally, the organism is shed in the milk from infected dams and can be transmitted to calves through suckling. Following infection, females often abort. Subsequent pregnancies may result in abortion or the birth of weak or normal calves and may result in shedding of the organism. Transmission of disease in cattle, bison and elk therefore is primarily dependent on the occurrence of pregnancy and abortion or calving of infected animals.

Herds of Yellowstone National Park (YNP) bison and elk persist as the last known reservoir populations chronically infected with brucellosis (Herman et al., 2014; Rhyan et al., 2013), a contagious disease that APHIS is striving to eliminate. Between 2002 and present, there have been 23 herds detected in the Greater Yellowstone Area (GYA) with brucellosis. Of these, 19 were beef cattle herds, and 4 were bison herds. In all these herds elk have been identified as the transmission vector for *Brucella abortus*. As more elk are exposed to Brucella in the region, the potential for the disease to move to new areas and the risk of livestock contracting the disease may become higher. (Brennan, 2015)

Elk Research:

Currently, elk are the primary concern for disease transmission to livestock. Minimal live animal research has been done on the transmission of *Brucella abortus* from infected elk to cattle. There are gaps in the research record that need to be addressed in order for wildlife management/ animal health agencies to make the best decisions with regard to the control of *Brucella abortus* in the GYA. Three studies are proposed below that will increase our understanding of disease transmission within elk herds, disease transmission from elk to cattle, and the potential of remote vaccine delivery systems for elk...

Study A: *B. abortus* transmission in elk

Study A Major objectives:

To investigate the basics of brucellosis transmission in elk:

- Frequency of abortions/stillbirths/ weak calves over several pregnancies for seropositive elk cows vs sero-negative elk cows
- Titer fluctuation as linked to age, pregnancy status, reproductive history, reproductive success.
- Characterize shedding of *B. abortus* by sero-positive elk cows following abortions/stillbirths/normal parturition

Study A Minor objectives:

- a. Evaluate latency of *B. abortus* in elk
- b. Evaluate the ability of the fluorescence polarization assay (FPA) to measure *B. abortus* antibody in the whole blood of elk.

Facility:

We intend to use the present USDA/APHIS/VS Brogan facility at Corwin Springs, Montana which presently houses bison enrolled in the GonaCon study. If the Trestle Ranch South property becomes available before this study begins it is our preferred facility for this study over Brogans. As the GonaCon Study comes to a close, the Brogans facility will transition to hold elk. Brogans was originally an elk game farm and still retains much of the basic infrastructure used for elk. The swinging gate/tub system would need to be reconverted to restrain individual elk. The corral complex would need to be rehabilitated and a suitable chute for elk would need to be installed.

Animal Source(s): 1) MTFWP -elk
2) Game farm elk

Study A Duration: Once appropriate pens are available, the study will last through four calving cycles. Proposed enrollment in June 2018 with conclusion in Fall 2022.

Study A Plan:

Two pastures will each house separate elk study groups: Group 1 will consist of 20 seropositive elk heifers on one pasture. Group 2 will consist of 10-15 seronegative elk heifers in the second pasture. Four young seronegative elk bulls will be maintained separately except during breeding season. These animals will be monitored by serology. Each pasture will be followed through four calving seasons. Each cow will be tested on a schedule for the shedding of *B. abortus* (swabs) and *B. abortus* antibodies (serum and whole blood). Newborn calves will be tested (swabs, blood) and testing will continue into adulthood. During the study selected individuals will be sacrificed and their tissues will be cultured for *B. abortus*. At the conclusion of the study, all remaining individuals will be sacrificed and cultured.

Whole blood will assayed using the FPA. Results will be evaluated and compared with regard to age, sero-status, and culture results. Swabs will be tested by culture

(Internal Note: If we have room, we could separate out 5 elk cow/calf pairs (both dam/ female calf are seropositive), isolate, and follow until calf has own calf. (latency)

Commented [NP-A1]: If we go 4 calving seasons, we will see the first calves go through a calving as well theoretically.

Study B: Assess effectiveness of oral bait vaccines in elk

Study B Background:

One strategy to combat *B. abortus* in the GYA would be the development of a safe and effective vaccine for use in elk. Regardless of what form that vaccine would be manufactured in (powder, liquid, aerosol), delivery methods that are safe, effective, and customized for the remote delivery of the vaccine to large populations of wild ruminants will have to be developed. Vaccine formulations and delivery mechanisms need to provide effective field performance, safety, cost-effectiveness, and environmental compliance (Ballesteros et al., 2007)

Study B Major Objective:

To assess oral/aerosol delivery systems for the delivery *B. abortus* vaccine to elk
Develop and test an effective and safe vaccine delivery system/unit suitable for the delivery of brucellosis vaccine to elk

- a. Investigate other delivery methods as they become available

Commented [NP-A2]: Do we need objective b?

Facility and Animal sources: same as for study A

Study B Duration: Once elk have been enrolled and the appropriate pens are available, the study will last through three calving cycles. Proposed enrollment in June 2018 with conclusion in Fall 2022.

Study B Plan:

Working with APHIS-NWRC and other knowledgeable parties in the private or academic sectors, various candidates for vaccine delivery will be developed and evaluated. Different formulations of delivery units will be subjected to field trials using the elk in this study. The baits will be evaluated with regard to palatability, stability, cost, and safety. This study will be an initial step in bait development and most likely will run its course in parallel with the elk transmission study. Effects in non-target species will not be evaluated.

Commented [CPR-A3]: Pauline changed some wording in her to get away from using "bait"

Commented [NP-A4]: I feel like we are limiting ourselves to "bait" and we don't necessarily want to deliver a vaccine in a bait form. We used the term "Vaccine Delivery Units" (VDUs) to talk about TB vaccine delivery in WTD. I feel to keep it general, we might just want to refer to Vaccine Delivery System??

Study C: Investigate vaccination protocols in cattle heifers and demonstrate elk-to-cattle transmission

Study C Background:

Transmission from infected elk in captive herds to susceptible cattle occurred when the two species were in close contact and pregnant elk gave birth or aborted (Thorne and Herriges 1992). There is still some disbelief in the stakeholder public that elk to cattle transmission actually occurs. Our study would reinforce the mechanism of elk to cattle transmission documented by Thorne only in this rendition using natural transmission of field strain *B. abortus* under conditions closer to local field conditions.

A recent cattle study has shown that RB51 revaccination promotes an increase in the immune response by heifer calves with some of the parameters assessed being even higher in animals prime-vaccinated with RB51 compared to animals prime-vaccinated with S19. In this study we will use both live and killed RB51 in two different vaccination regimes. These results strengthen the argument in favor of use of RB51 revaccination of cattle in regions where brucellosis is present. (Dorneles et al., 2015).

Commented [CPR-A5]: Pauline commented "if we say this, we really need to compare to a group booster vaccinated with RB51."

And we really need to say this. This study has to be particularly strong in order for FWP to justify providing elk. See more below.

Study C Major Objective:

To investigate the reproductive success of vaccinated cattle heifers after exposure to brucellosis in elk using two different vaccination protocols

Commented [CPR-A6]: This might become "three"...see note below.

Facility: Trestle Ranch South. If the Trestle Ranch Facility is being used for Bison Quarantine this study will be housed at the Aldridge Lake Facility

Animal sources: elk as for study A
cattle: market

Study C Duration: Once appropriate pens are available, the study will last through one calving cycle.
Proposed enrollment in September 2018 with conclusion in Fall 2019.

Study C Plan:

Twenty vaccinated cattle heifers (8 month old) will come in with twenty, 17-month-old seropositive bred elk in a pen. The vaccinated cattle heifers will be divided into two groups of 10 heifers each (SQ and M). The SQ (Injection) group will be vaccinated SQ at 7 months (September 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$). The M group will be vaccinated at 7 months (September 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$) given SQ and at 13 months of age (March 30) with a dose of killed RB51 ($1.0-3.4 \times 10^{10}$) given intra-nasally. At 15 months of age the cattle heifers will be sero-tested and bred by a utility bull. Elk females that abort or calve will be immobilized and tested (blood, swabs, discharge). At the conclusion of the cattle calving season the cattle/calves and elk will be assessed for reproductive success, sero-status, shedding of *Brucella*, etc. After final assessment cattle will be removed from the elk pens and sold for salvage.

| | bred | abort | delivery |
|---------------|------------------|------------------|-----------------|
| elk | Sept 15 | Feb-May | June 1 |
| cattle | June 1 | Nov-March | March 1 |
| bison | August 15 | Jan-April | May 15 |

Commented [CPR-A7]: Pauline thought we should compare to a group of heifers boosted with another live dose of RB51.
We did talk about this in our huddle....in the initial version we were looking at last month we had vaccinated and un-vaccinated heifers, with the vaccinated heifers getting a booster of ML RB51: In Pen A 10 vaccinated and 10 un-vaccinated cattle heifers (twenty 8 month old cattle heifers) will come in with twenty 17 month old seropositive bred elk). The vaccinated cattle heifers will have been vaccinated at 7 months (September 30) and 13 months (March 30) of age with full doses of RB51 ($1.0-3.4 \times 10^{10}$). So we could have a 3rd (?) subgroup of heifers that get the ML booster at 13 months....that would be 30 heifers and 20 elk in one pen

Commented [FRK-A8]: They will all commingle from age 8 mos?

Commented [CPR-A9]: Yeah. I think we give them a month (Jan) to build immunity after the first vaccination and then dump them in with the elk before they (the elk) start aborting (Feb?)

Bison Research:

Progress is being made in the GonaCon study in bison, but many questions remain surrounding the onset of puberty in bison, latency in bison, and titers. Also, some disbelief remains in the public opinion that bison can transmit *B. abortus* to cattle. Two studies are proposed below to address these questions.

Study D: Investigate the onset of bison puberty, *B. abortus* titers, and latency in bison heifers.

Study D Background:

There is not much information backed by scientific data on the onset of puberty in female bison: most literature sites a rough range based on age and weight. In cattle, puberty is considered to have occurred when plasma progesterone concentrations of 2 ng/ml were present in 2 out of 3 consecutive samples.

Our Bison Quarantine Feasibility Study seemed to indicate a relationship between the onset of puberty and the appearance of a measureable titer (*B. abortus* antibodies) in several exposed bison that had previously tested negative on a regular basis since enrollment/exposure. Investigation of the linkage of puberty onset and antibody development is important as its results will be informative concerning latent brucellosis infection in bison and will provide knowledge needed concerning potential streamlining of any future quarantine program.

Study D Major Objective:

- a.) In exposed bison moved into isolation, to investigate the relationships between brucellosis titers, the onset of puberty in bison and the ability to culture *B. abortus*.
- b.) Investigate latency in bison heifers

Facility: This study will be take place at the APHIS WILDIT pens at Colorado State University, Ft Collins, CO.

Animal Source(s): 1) Excess from GonaCon study
2) Excess from WILDIT
3) DOL traps
4) YNP trap

Study D Duration: Once appropriate pens are available, the study will last through one bison calving cycle. Proposed enrollment in May 2018 with conclusion in Fall 2020

Study D Plan:

Twenty sero-negative bison heifers (12 months old and exposed at birth) would be kept in a pasture near a working facility. The chute would be equipped with a scale. We would measure progesterone levels\ab titers\weight every 30 days until the heifers were 24 months of age. Vaginal swabs will be taken to assess shedding. Those bison that show a titer by 24 months of age, will be killed and cultured. As long as there is no shedding in the group, remaining exposed females that do not show a titer by the onset of by 24 months, will be bred and kept through parturition and watched for latency. The use of GonaCon study heifer calves will provide knowledge of the clinical history of the dam which is critical in investigating latency.

Study E: Transmission of *B. abortus* from exposed bison to cattle

Study E Background:

There is still considerable skepticism among the stakeholder public regarding the concept of bison to cattle transmission under GYA landscapes/conditions. This small study will possibly settle this transmission question once and for all. In this study we look at transmission between exposed bison and vaccinated vs unvaccinated cattle.

Study E Major Objective:

- A) To determine if seropositive exposed YNP bison transmit brucellosis to vaccinated cattle heifers
- B) To investigate the reproductive success of vaccinated cattle heifers after exposure to brucellosis in bison using two different vaccination protocols

Commented [NP-A10]: Three?

Facility: This study will take place at the Rigler Property once the GonaCon Study has been completed. The alternate property will be a pen at the Brogan property.

Animal Source(s): bison: as above for study D
cattle: market

Study E Duration: Once appropriate pens are available, the study will last through one calving cycle (bison and cattle). Proposed enrollment in October 2020 with conclusion in Fall 2022.

Study E Plan:

In January a female bison group (mixed ages, early/mid-pregnancy, containing at least 2-3 high-titer pregnant bison heifers) will be placed in a large pasture with 20 vaccinated cattle yearlings (~20 months old- born June). The vaccinated cattle heifers will be divided into two groups of 10 heifers each (SQ and M). The SQ (Injection) group will be vaccinated SQ at 7 months (September 30) with a full doses of ML RB51 ($1.0-3.4 \times 10^9$). The M group will be vaccinated SQ at 7 months (September 30) with a full doses of ML RB51 ($1.0-3.4 \times 10^9$) and at 13 months (March 30) of age with a dose of killed RB51 ($1.0-3.4 \times 10^9$) given intra-nasally. At 15 months of age the cattle heifers will be sero-tested and bred by a utility bull. Cattle females that have an abnormal birthing event will be immobilized and tested (blood, swabs, discharge). Bison females that abort or calve will be immobilized and tested (blood, swabs, discharge). Thirty days after all bison have calved, all open animals in the pasture will be tested: open bison will either be immobilized or go through the chute while all cattle will be tested/cultured (blood, swabs, tissue) at slaughter (sold for salvage).

Priority of projects: #1- Study A
#2- Study C
#3- Study D
#4- Study B
#5- Study E

{Internal Note: For Study E above, we can breed the cattle heifers and assess abortion or we can just kill and culture the heifers after they seroconvert.}

{Internal Note: I would like to help test the new Univ of Wyoming PCR at some point.....not sure where.....will have to talk to the WY people more}

Commented [CPR-A11]: Pauline thought the monitoring of abortion occurrence in cattle is important and I agreed so I added the lines in the paragraph above. We'll wait until the end of the calving season then culture all the cattle at slaughter.

References:

Ballesteros, C.; De la Lastra, J.M.; De la Fuente, J. Recent Developments in Oral Bait Vaccines for Wildlife. In *Recent patents on drug delivery & Formulation*, 2007, 1 (3), 230-235

Brennan A. Landscape-scale analysis of livestock brucellosis. 2015 Final Report #14-9200-0376.v2 Report prepared by, Institute on Ecosystems, Montana State University, Bozeman, MT 59715

Dorneles, E.M.; Lima, G.K.; Teixeira-Carvalho, A.; Araujo, M.S.; Martins-Filho, O.A.; Sriranganathan, N.; Al Qublan, H.; Heinemann, M.B.; Lage, A.P. Immune response of calves vaccinated with *Brucella abortus* S19 or RB51 and revaccinated with RB51.

Herman, J.A., Piaggio, A.J., Halbert, N.D., Rhyon, J.C. and M.D. Salman. 2014. Genetic analysis of a Bison bison herd derived from the Yellowstone National Park population. *Wildlife Biology* 20(6): 335-343.

Olsen, SC. Brucellosis in the United States: Role and significance of wildlife reservoirs. *Vaccine, suppl. Supplement28.S5* (Oct 1, 2010): F73-F76

Rhyon, JC; Nol, P; Quance, C; Gertonson, A; Belfrage, J; Harris, L; Straka, K; Robbe-Austerman, S.; Transmission of Brucellosis from Elk to Cattle and Bison, Greater Yellowstone Area, USA, 2002-2012 *Emerging infectious diseases*, 2013, 19 (12), 1992-1995

Thorne, E.T. and Herriges J. D.; BRUCELLOSIS, WILDLIFE AND CONFLICTS IN THE GREATER YELLOWSTONE AREA. *North American Wildlife and Natural Resources Conference. Transactions*, 1992, 57 (57), 453- 465

Appendix A

The GonaCon Treatment study is four to five years from completion of bison work. We currently have 3 locations comprising 4 pens of approximately 20 acres each. In the summer of 2017, the current owner of one of the facilities will be completing a land trade with the US Forest Service and the Forest Service has indicated we will need to have all animals removed by January 2018, and fences/equipment removed by the following summer (or as soon as possible). We will be losing a valuable irrigated pasture that would have been used for holding offspring of the GonaCon animals, useful for future research, and will reduce our capacity for such research. A brief timeline for the wind down of the GonaCon study is as follows.

There are 4 pens consisting of Treatment and Control #1, and Treatment and Control #2. Pens 1 were started in 2012, while Pens 2 were started in 2014/2015; staggered due to availability of bison from YNP.

Control Pen #1: Will calve in spring of 2017, with final testing/necropsy in December of 2017. This pen will have completed the GonaCon Study. This pen will be cleared, though we will be losing 1 leased pasture at the same time.

GonaCon Treatment Pen #1: Will calve spring 2017, and could be considered for final testing/necropsy IF a majority of the treatment animals are pregnant this year. So far, only 2 of 15 have been pregnant, and the goals of the study are to determine birth statistics and *B. abortus* shedding in treatment animals after they become pregnant. If we need to continue to hold these animals until a) pregnancy occurs or

B) we determine them to be permanently sterile; then we have an undetermined timeframe for the end of this treatment pen.

Control Pen #2: Will complete final calving season in spring of 2020. Will be finished with research and final testing in December 2020.

GonaCon Treatment #2: Will complete final calving season in Spring of 2019, and could be considered for final testing/necropsy IF a majority of the treatment animals are pregnant before that date. Again, given the goals of the research, we need to get treatment animals pregnant before we can evaluate the affectivity of GonaCon at reducing infection/transmission in the herd.

In each year, there will be calves produced in excess of our holding capacity and will need space to hold them for future research, for quarantining them for relocation, or for use in future studies.

If this timeline holds with the goals of the study, we will have 1 open pen available in December of 2017, followed by 1 in December of 2019, and 1 in December of 2020. There are 3 properties available in the area as a possible replacement for the pen we have to vacate in January 2018. If the scope of future research warrants it, we propose to lease one of these three {1) 14 acres, 2) 15-20 acres, and 3) 35 acres}. This would require new lease agreements, construction, and long term needs for other research in order to justify the cost. We pay now approximately \$1000/acre for annual leases on the 3 properties currently in use.

Current and Potential Bison Facilities – Gardiner Basin, Montana

December, 2016

Current Facilities

Currently, Veterinary Services (VS) operates three separate bison research operations near the northern entrance of Yellowstone National Park in the Gardiner Basin. All three facilities are leased from private land-owners, of which one, Slip-N-Slide, will be removed from VS lease near the end of 2017 as part of a land swap with the U.S. Forest Service. These three facilities are currently sufficient to prevent exposure between wildlife outside of the pens and bison being held inside the pens. They are not currently sufficient to act as an Approved Bison Quarantine Facility (ABQF) due to limited size and lack of individual test group pens at each facility. Capacities for these three pens is described in Table 1.

Table 1. Current VS Bison Facilities near Yellowstone

| Local Facility Name | Number of Acres | Capacity for Adult Bison |
|---------------------|-----------------|--------------------------|
| Slip N Slide | 20 | 18 |
| Rigler | 25 | 25 |
| Brogan's | 50 | 50 |

Potential Facilities for Bison and/or Elk Research or Quarantine

Three new possible pasture leases exist just north of the Gardiner Entrance to Yellowstone National Park on the Royal Teton Ranch (RTR), owned by the Church Universal and Triumphant. Two of the three pastures are located near the RTR headquarters and referred to as Trestle Ranch South End and Trestle Ranch North End. The third pasture is more remote from the headquarters and is referred to as Aldridge Lake. See attached maps.

Costs were estimated to set up each of the three locations into facilities that could operate as either research and/or quarantine facilities with perimeter fencing and internal test-group pens to satisfy facility needs for an ABQF. The North End pasture would only be developed if the South End pasture was developed, due to costs related to bringing electricity and water. Aldridge Lake could be developed independently of either Trestle Ranch pasture.

Costs were also estimated for ongoing annual operating costs assuming the animals were undergoing quarantine testing protocols in an ABQF. A summary of cost estimates is in Table 2. Detailed Cost estimates are in Table 3 and detailed ongoing operational costs are detailed in Table 4.

If only one facility were to be developed to replace the lost facility at Slip N Slide, VS staff prefers the Trestle Ranch South End for continued research. If VS will be establishing an ABQF, the Trestle Ranch South End is preferred for the ABQF with Aldridge Lake replacing Slip N Slide for research. If larger facilities are deemed necessary for either research and/or an ABQF, then the Trestle Ranch North End could be developed easily now or in the future since it is contiguous with the South End.

Table 2. Summary of estimated costs to develop and operate potential pastures.

| | Trestle Ranch South End | Trestle Ranch North End ^a | Aldridge Lake | Total |
|---|-------------------------|--------------------------------------|----------------|--------------------|
| Facility Set Up Cost, One Time | 338,454 | 405,531 | 353,444 | \$1,097,429 |
| Ongoing Annual Costs | 229,377 | 298,892 | 131,513 | \$659,782 |
| Total Estimated Costs - First Year | 567,831 | 704,423 | 484,957 | \$1,757,211 |

a: Trestle Ranch North End only occurs if Trestle Ranch South is developed, it would not be feasible to develop the North End independently.

Detailed Cost Estimate

Pasture 1: South End Trestle Ranch: Approximately 100 acres; 1.4 miles in perimeter fence; 1 mile in interior fences; 5 pens; 1 handling facility/load out. Should accommodate about 60 head. Preference for research activities in elk or bison; could be used as an ABQF.

Pasture 2: North End Trestle Ranch (contiguous to South End): Approximately 160 acres; 2.44 miles in perimeter fence; 1.2 miles in interior fence; 5 pens; 1 handling facility/load out. Should accommodate 90-100 head. Preference for research activities in elk or bison; could be used as an ABQF.

Pasture 3: Aldridge Lake: Approximately 40 acres; 1.3 miles in perimeter fence; 0.75 miles in interior fence; 3 pens; 1 handling facility/load out. Should accommodate 40 head. Suitable for research only due to facility location, not suitable for an ABQF.

Table 3. Detailed cost estimate to develop each pasture, including labor & installation

| Facility Set Up Cost, One Time | Trestle Ranch South End | Trestle Ranch North End | Aldridge Lake |
|------------------------------------|-------------------------|-------------------------|----------------|
| Perimeter Fencing | \$125,664 | \$219,011 | \$116,144 |
| Interior Fencing ^a | \$52,790 | \$66,520 | \$19,800 |
| Concrete Pad/Chute-house | \$15,000 | \$15,000 | \$15,000 |
| Corral construction | \$25,000 | \$25,000 | \$25,000 |
| Road Building | \$10,000 | \$10,000 | \$5,000 |
| New chute ^b | -- | \$45,000 | \$45,000 |
| Waterers ^c | \$7,500 | \$7,500 | \$5,000 |
| Water Lines for automatic waterers | \$15,000 | \$25,000 | \$10,000 |
| Frost Free Hydrants | \$7,500 | \$7,500 | \$5,000 |
| Install well | -- | -- | \$25,000 |
| Lab trailer w/heat | \$15,000 | \$0 | \$7,500 |
| Heavy Equipment ^d | -- | -- | \$75,000 |
| Electricity Install | \$10,000 | \$20,000 | \$5,000 |
| Facility Design Consultant | \$10,000 | \$10,000 | \$10,000 |
| Set Up Total | 338,454 | 405,531 | 353,444 |

a. Double fence, could be single if not doing quarantine

b. One chute from Slip and Slide can be transferred.

c. Frost free tanks and infrastructure

d. One set of heavy equipment can be transferred from Slip N Slide.

Table 4. Detailed cost estimate for annual operation, each pasture

| Ongoing Annual Expenses | Trestle Ranch South End | Trestle Ranch North End | Aldridge Lake |
|--|--------------------------------|--------------------------------|----------------------|
| Acres | 100 | 160 | 40 |
| # of head | 60 | 90 | 33 |
| Lease price per acre, historical | 1,000 | 1,000 | 1,000 |
| Annual Lease | \$100,000 | \$160,000 | \$40,000 |
| Diagnostics (\$38/head/year) | 2,280 | 3,420 | 1,254 |
| Necropsies (\$250/each incl. transportation) | \$750 | \$1,125 | \$413 |
| Hay/feed/supplements | 22,000 | 35,000 | 18,000 |
| Utilities | \$2,500 | \$2,500 | \$1,000 |
| Chemical Immobilization | 12,000 | 20,000 | 5,000 |
| Supplies | \$40,000 | \$64,000 | \$16,000 |
| Personnel - Maintenance (FTE) ^a | 0.5 | -- | 0.5 |
| Maintenance Personnel Salary (\$37/hr) | \$37,000 | -- | \$37,000 |
| Personnel - AHT calving (FTE) | 0.3 | 0.3 | 0.3 |
| AHT Personnel Salary, GS9 | \$12,847 | \$12,847 | \$12,847 |
| Estimated operational costs, annual | \$229,377 | \$298,892 | \$131,513 |

a. Additional labor to support new facilities, some efforts will be transferred over from Slip N Slide. Labor can be shared across both Trestle pastures.

From: Bill.Commins@nps.gov
To: [Rhyan, Jack C - APHIS](#)
Subject: NPS Permit Application Received
Date: Tuesday, December 20, 2011 11:15:19 AM
Attachments: [APP_67573.pdf](#)

The following application for a NPS Permit was submitted
to the Park Research Coordinator at Yellowstone NP

APPLICATION NUMBER:67573

INVESTIGATOR:Jack Rhyan

STUDY TITLE:

Evaluation of sterilization by use of GonaConTM, an immunocontraceptive vaccine, and ovariectomy as means of decreasing the potential for transmission of *Brucella abortus* in bison

You are encouraged to contact the research coordinator at Yellowstone NP if you do not receive feedback about your permit application status within the next 30 days.

Park research coordinator contact information for Yellowstone NP

Christie Hendrix

YELL_Research@nps.gov

phone:307-344-2234

fax:307-344-2211

From: Rick.Wallen@nps.gov
To: [Rhyan, Jack C \(APHIS\)](#)
Cc: [Frey, Rebecca K \(APHIS\)](#)
Subject: Permit for immunocontraception experiment
Date: Tuesday, May 17, 2011 9:09:20 AM
Attachments: [email Superintendent to Bison Mgmt Team. Signed Document.pdf](#)

(See attached file: email Superintendent to Bison Mgmt Team. Signed Document.pdf)

the permit is attached in the pdf. It went in to our administrative record as a memorandum but the permit is attached for your records. RW

Memorandum

May 13, 2011

To: Files

From: Superintendent, Yellowstone National Park

Through: Bison Management Team, Yellowstone Environmental Compliance

Subject: Adequacy of National Environmental Policy Act Documentation - APHIS
Immunocontraception Research Project- Request to NPS to consign bison

lem
5/13/11
PJM
5-13-11

The Record of Decision for the Interagency Bison Management Plan (IBMP) was signed in December 2000 to coordinate bison management between the State of Montana and Yellowstone National Park. Five agencies signed or adopted this agreement to work cooperatively within an adaptive management framework to implement the IBMP—the U.S. Department of Agriculture's Animal and Plant Health Inspection Service and Forest Service; the Department of the Interior's National Park Service; and the State of Montana's Department of Fish, Wildlife, and Parks and Department of Livestock.

Description of the Proposed Action(s) and Any Applicable Mitigation Measures

An IBMP managing partner (APHIS) has developed a research proposal to evaluate the effectiveness of a contraceptive vaccine to reduce or eliminate shedding of *Brucella* bacteria during the time period that an animal is actively infected with brucellosis. The research project will be conducted at APHIS leased facilities in the Gardiner Basin outside the National Park. The research project requires 80 to 100 bison of both sero negative and sero positive brucellosis status.

Applicable National Environmental Policy Act (NEPA) Documents and Other Related Documents that Cover the Proposed Action

U.S. Department of the Interior, National Park Service (USDI) and United States Department of Agriculture, Forest Service, Animal and Plant Health Inspection Service (USDA). 2000. Final environmental impact statement for the interagency bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C.

USDI and USDA. 2000. Record of decision for final environmental impact statement and bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C.

USDI, USDA, and the State of Montana. 2008. Adaptive adjustments to the interagency bison management plan. National Park Service, Yellowstone National Park, Wyoming. <www.ibmp.info>.

NEPA Adequacy Criteria

1. Is the management action a feature of, or essentially similar to, an action or alternative analyzed in the existing NEPA document(s)? Is the project within the same analysis area, or if the project location is different, are the geographic and resource conditions sufficiently similar to those analyzed in the existing NEPA document(s)? If there are differences, can you explain why they are not substantial?

Consignment to research projects is an option in IBMP operations.

The management direction consists of an adaptive management program that includes intensive monitoring and coordination, as well as research projects with specified resultant management actions responding to the research results. (ROD p. 8)

When hazing becomes ineffective, the agencies will capture the bison. The agencies will test all captured bison and send seropositives to slaughter or for use in jointly approved research. (ROD p. 12)

... the agencies also may use bison from capture operations for approved research. (ROD p. 14)

2. Is the existing analysis valid in light of any new information or circumstances (such as, new scientific information about bison, recent endangered species listings)? Can you reasonably conclude that new information and new circumstances would not substantially change the analysis of the new proposed action (including any new mitigation measures)?

The proposed action is exactly as it was described in 2000 FEIS and ROD.

3. Are the direct, indirect, and cumulative effects that would result from implementation of the action(s) similar (both quantitatively and qualitatively) to those analyzed in the existing NEPA document?

Environmental Consequences of removing bison from the population were disclosed in 2000 FEIS. (Chapter 4)

Reproductive potential of the population is high enough that recovery of abundance will be quick when less than 100 bison are removed. FEIS model predicted removal of about 250 to 300 bison annually (FEIS pp 429 to 431)

4. Are the public involvement and interagency review associated with existing NEPA document(s) adequate for the current proposed action?

Yes, The proposed action is exactly as it was described in 2000 FEIS.

5. Has the proposed adjustment been discussed with stakeholders? The proposed research project was vetted in public meetings during the negotiations conducted to develop and approve adaptive management adjustments in 2008.

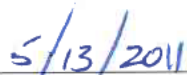
6. Does the proposed action alter the conclusions of the no impairment analysis in the original NEPA decision document? No.

Conclusion

☐ Based on the review documented above, I conclude that the proposed action(s) conform to the 2000 Final Environmental Impact Statement and Record of Decision for the Interagency Bison Management Plan, which fully cover the proposed action(s) and constitute compliance by the National Park Service with the requirements of the NEPA. There would be no impairment to the resources and values of Yellowstone National Park from implementation of the proposed action(s).




Superintendent, Yellowstone National Park



Date

Permit

Page 1 of 4

| | |
|--|--|
| <p>SCIENTIFIC RESEARCH AND COLLECTING PERMIT</p> <p>Grants permission in accordance with the attached general and special conditions</p>  <p>United States Department of the Interior National Park Service</p> <p>Yellowstone NP</p> | <p>Study#: YELL-05892</p> <p>Permit#: YELL-2011-SCI-5892</p> <p>Start Date: May 10, 2011</p> <p>Expiration Date: Dec 31, 2011</p> <p>Coop Agreement#:</p> <p>Optional Park Code:</p> |
|--|--|

| <p>Name of principal investigator:</p> <p>Name: Jack Rhyan Phone: (970)266-6140 email: Jack.C.Rhyan@aphis.usda.gov</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------|---------------------------------|-----------|--------------|--------------|------------------|--|--|---------------|--|--|-------------|--|--|---------------|--------------|------------------------------|-------------|--|----------------------------|--------------|--------------|-------------------------------|-------------|--------------|---------------------------------|
| <p>Name of institution represented:</p> <p>USDA/APHIS</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Additional investigator(s):</p> <table border="1"><thead><tr><th>Full Name</th><th>Office Phone</th><th>Office Email</th></tr></thead><tbody><tr><td>Kathy Fagerstone</td><td></td><td></td></tr><tr><td>Lowell Miller</td><td></td><td></td></tr><tr><td>Luke Wagner</td><td></td><td></td></tr><tr><td>Matt McCollum</td><td>970 266 6233</td><td>Matt.McCollum@aphis.usda.gov</td></tr><tr><td>Pauline Nol</td><td></td><td>Pauline.Nol@aphis.usda.gov</td></tr><tr><td>Rebecca Frey</td><td>406 697 9991</td><td>Rebecca.K.Frey@aphis.usda.gov</td></tr><tr><td>Ryan Clarke</td><td>406 388 5162</td><td>Patrick.R.Clarke@aphis.usda.gov</td></tr></tbody></table> | | | Full Name | Office Phone | Office Email | Kathy Fagerstone | | | Lowell Miller | | | Luke Wagner | | | Matt McCollum | 970 266 6233 | Matt.McCollum@aphis.usda.gov | Pauline Nol | | Pauline.Nol@aphis.usda.gov | Rebecca Frey | 406 697 9991 | Rebecca.K.Frey@aphis.usda.gov | Ryan Clarke | 406 388 5162 | Patrick.R.Clarke@aphis.usda.gov |
| Full Name | Office Phone | Office Email | | | | | | | | | | | | | | | | | | | | | | | | |
| Kathy Fagerstone | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lowell Miller | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Luke Wagner | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Matt McCollum | 970 266 6233 | Matt.McCollum@aphis.usda.gov | | | | | | | | | | | | | | | | | | | | | | | | |
| Pauline Nol | | Pauline.Nol@aphis.usda.gov | | | | | | | | | | | | | | | | | | | | | | | | |
| Rebecca Frey | 406 697 9991 | Rebecca.K.Frey@aphis.usda.gov | | | | | | | | | | | | | | | | | | | | | | | | |
| Ryan Clarke | 406 388 5162 | Patrick.R.Clarke@aphis.usda.gov | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Project title:</p> <p>Evaluation of sterilization by use of GonaCon™, an immunocontraceptive vaccine, and ovariectomy as means of decreasing the potential for transmission of Brucella abortus in bison</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Purpose of study:</p> <ol style="list-style-type: none">1) Determine whether immunocontraception and/or ovariectomy procedures can prevent the shedding of Brucella abortus bacteria in young recently infected bison.2) Determine if immunocontraception with gonacon vaccine can prevent shedding of Brucella abortus bacteria throughout the infection cycle and whether recovery from the contraceptive treatment and the brucellosis infection can be completed without any further shedding of the bacteria during subsequent pregnancies.3) Determine whether behavioral changes occur during the breeding season when females are treated with two types of pregnancy prevention procedures. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Subject/Discipline:</p> <p>Animal Communities / Wildlife</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Locations authorized:</p> <p>M-Stephens Creek bison capture facility</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Transportation method to research site(s):</p> <p>vehicle access to Stephens Creek</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Collection of the following specimens or materials, quantities, and any limitations on collecting:</p> <p>80-100 live female bison and 8 bull bison may be transferred from NPS Stephens Creek capture facility to USDA-APHIS Corwin Springs quarantine facility.</p> <p>When the Yellowstone bison are no longer needed for the purposes of the APHIS directed experiment, the animals should be subsequently consigned based on their brucellosis status. Brucellosis sero positive bison should be consigned to a terminal quarantine location, to an educational display, or if no such options are available then directly to slaughter. Brucellosis sero negative Yellowstone bison should be consigned to a quarantine location for further diagnostics, directly to a managed for public trust conservation program to supplement population genetic diversity, to an introduction program to establish a new conservation</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |

5/12/2011

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Permit

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population of wild bison, or if no such opportunities exist, to private not for profit bison conservation program. If none of these opportunities can be accommodated then a last choice would be to offer brucellosis free bison to any private party that requests transfer of ownership. Disease free bison should not be killed as a convenient method to move the animals out of USDA facilities. The Interagency Bison Management Plan partners routinely remove bison from the population and rely on natural reproductive capabilities of the population to provide replacements for the animals lost through consignment, thus APHIS should not expect to return these study animals to the park at the end of the experimental procedures. The recipient organization and recipient scientist agree that the live bison are to be used solely for teaching and academic research purposes, are to be used only at the recipient organization's facilities and only under the direction of the recipient scientist or others working under his supervision, and will not be transferred to anyone else without notification of Yellowstone National Park.

Name of repository for specimens or sample materials if applicable:

Repository Type: Will be destroyed through analysis or discarded after analysis

Objects Collected:

Blood and lymph nodes on brucellosis sero positive reactors Blood on brucellosis sero negative reactors

Specific conditions or restrictions (also see attached conditions):

CONDITIONS SUBJECT TO PERMIT #5892

If you are unable to obtain all animals in year one of the study, you may obtain additional animals in prior years, so long as you do not exceed 108 total animals. Permission to receive additional animals will require renewal of this research permit and completion of annual reports. The NPS will send a renewal notification each December-you will be required to submit requested paperwork by March 31 of each calendar year or one month prior to anticipated bison transport, whichever comes earlier.

Please coordinate directly with Rick Wallen, NPS bison ecologist (307-344-2207), on the transport and removal of bison from Stephens Creek capture facility.

CONDITIONS SUBJECT TO ALL YELLOWSTONE NATIONAL PARK PERMITS

1. You are responsible for the research-related activities of your staff. Please ensure that field staff adhere to all conditions of your permit. Field staff must possess a copy of your permit at all times while in the field.
2. You are required to notify the district ranger in charge of your work area/s ONE WEEK in advance of your trip. The following website has been established to facilitate this process: <http://www.greateryellowstonescience.org/yell/research/checkin>. Once working in the park, report all emergencies by calling 911.
3. Unless otherwise authorized on your permit, you must carry out all of your activities out of public view. If you have obtained special permission to work in public view, it will be noted on your permit-specific conditions. Please consult these conditions for further guidance.
4. If you collect specimens that are to be permanently retained, regardless of where they are kept, they must be accessioned and cataloged into the National Park Service's catalog system, and must bear National Park Service accession and catalog numbers. For assistance, contact the Curator's Office at (307) 344-2267.
5. All equipment left in the field including plot markers must be specifically authorized in advance. Label all equipment with your name, phone number, and the words "Research Study #XXXX." If you are authorized to place equipment or plot markers in Yellowstone, you will be required to GPS their locations.
6. All collars on wildlife must be camouflaged to blend in with the animal. The antennas on the collars must also be as invisible as possible. All collars must be removed at the completion of the study by either blow-off capabilities or cotton (rot-away) spacers.
7. Specific authorization must be obtained in advance before using chemicals or hazardous materials in Yellowstone. For specific information regarding the transport, use, and disposal of chemicals or hazardous materials, please contact the Research Permit Office.
8. Your research permit does not authorize you to enter closed or restricted areas in Yellowstone. Examples of restricted areas include most service roads, bear management areas, thermal areas, some bird nesting areas, wolf den sites, and trout spawning areas.
9. Cultural resources must not be adversely impacted by your research activities. Ground disturbance (e.g., digging) must be specifically authorized in advance. Report any archeological findings (artifacts, historical trash, rock cairns) to the Research Permit Office.
10. If your research requires flying in the park, you must request authorization in advance. You must also comply with FAA and Yellowstone National Park flight regulations. Please contact the Research Permit Office for details.
11. The Permittee agrees to notify the Superintendent of Yellowstone National Park of every subject discovery or invention that relates in any respect to research results derived from use of any research specimens or other materials collected from Yellowstone National Park, or that may be patentable or otherwise protected under the intellectual property (IP) laws of the United States or other jurisdiction. Notification must occur within sixty (60) days of the time that an inventor or other agent of the Permittee reports such a subject discovery or invention to the person(s) responsible for patent or other proprietary rights matters in the Permittee's organization, and in no case not less than sixty (60) days before a patent application is filed. Additionally, the Permittee agrees to notify the Superintendent of Yellowstone National Park within thirty (30) days of filing any patent application or other IP claim in the United States or other country that relates in any respect to research results or other discoveries or inventions derived from use of any research specimens or other materials collected from Yellowstone National Park. For purposes of this paragraph, the term "subject discovery or invention" means any discovery or invention related to or derived from research specimens or other materials

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collected from Yellowstone National Park. All invention disclosures shall be marked as confidential under 35 U.S.C. Section 205.
12. Your permit does not authorize the bearer or those that accompany them to conduct commercial filming activities. Commercial film permits must be obtained from the Public Affairs Office (307-344-2013).

13. EACH YEAR, INVESTIGATORS ARE REQUIRED TO SUBMIT COPIES OF JOURNAL ARTICLES, THESES, AND DISSERTATIONS THAT ARE DERIVED FROM THE RESULTS OF YELLOWSTONE RESEARCH. THE PARK REQUESTS THAT YOU SUBMIT ARTICLES IN PDF FORMAT AND THAT ONE BOUND COPY OF EACH DISSERTATION/THESIS IS SUBMITTED.

CONDITIONS SUBJECT TO ALL NATIONAL PARK SERVICE RESEARCH PERMITS

1. Authority - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.

2. Responsibility - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.

3. False information - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.

4. Assignment - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.

5. Revocation - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.

6. Collection of specimens (including materials) - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.

- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.

- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol/formalin, tanned and mounted, dried and boxed, etc.), and current location.

- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.

- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park-specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.

- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.

- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for scientific or educational purposes only, and may not be used for commercial or other revenue-generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement (CRADA) or other approved benefit-sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent (20%) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. Reports - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and/or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service.

8. Confidentiality - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. Methods of travel - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

5/12/2011

005327

From: [Clarke, Patrick R. - APHIS](#)
To: [Herriott, Donald E - APHIS](#)
Cc: [Frey, Rebecca K - APHIS](#); [McCollum, Matthew P - APHIS](#); [Rhyan, Jack C - APHIS](#)
Subject: RE: APHIS plan for YNP held Bison
Date: Tuesday, January 24, 2017 3:36:05 PM
Attachments: [APHIS\(MT\) Plan for YNP bison V1 1-24-17.docx](#)

Don,

Here is the draft V1 of what we propose to handle the transfer.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Frey, Rebecca K - APHIS
Sent: Tuesday, January 24, 2017 3:00 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Subject: RE: APHIS plan for YNP held Bison

Made a couple small changes.....did not use track changes!

REBECCA FREY

Wildlife Biologist
USDA APHIS VS
Montana
406-333-4425

From: Clarke, Patrick R. - APHIS
Sent: Tuesday, January 24, 2017 2:41 PM
To: McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Cc: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>
Subject: APHIS plan for YNP held Bison

Mathew,
Here you go, bro.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

1-24-2017

APHIS Plan for YNP Held Bison

- All YNP held females are shipped to slaughter directly from Stephens Creek (15 bison).
- There are 25 male bison in the held group: 20 yearlings (BD: ~ 5/2015) and 5 two-year olds (BD: ~ 5/2014). These 25 will be transferred to the APHIS Corwin Springs Research Facility.
- All bison transferred to the APHIS Corwin Springs Research Facility must test negative and have permanent official ID applied prior to transfer.
 - One male (yearling) is sero-suspect on last test and must be seronegative to be included in transfer.
- All 33 surplus animals now held at APHIS Corwin Springs Research Facility plus 10-11 yearling males transferred from the YNP will be transferred to APHIS NWRC Research Facility (44 head total). The potential transfer date of bison between the two APHIS facilities could be as soon as the end of February 2017. This transfer will unencumber any uncertainties about the legality of APHIS transferring MT origin research bison to another out-of-state research facility.
- The 10-11 males will be held in quarantine at NWRC for transfer to the Ft Peck Tribe upon graduation
- At Corwin Springs 14 YNP bison will be held in quarantine (5 two-year olds males and 9 yearling males) for transfer to the Ft Peck Tribe upon graduation. The Ft Peck Tribe has the potential to receive 25+ bison (combined) upon graduation from both facilities.

Other considerations:

- APHIS is asking a per diem of \$5.21 head/ per day at both facilities to offset maintenance and animal care costs. This is based on a CSU research facility animal husbandry per diem standard.
- The APHIS Corwin Springs Research Facility will need two new gates installed as well as some fencing repaired as a consequence of holding quarantine bison. These gates will be necessary to maintain biosecurity between the quarantine group and the infected GonaCon Study bison.
- MT DOL will pay all serology/necropsy costs for bison transferred from YNP and held at the APHIS Corwin Springs Research Facility.
- Who has volunteered to build and administer a long term facility to be constructed adjacent to YNP (RTR land?) prior to Stephens Creek operations in 2018?
 - As an IBMP partner in this deal can the Forest Service be compelled to modify the Shooting Star land swap? A special use permit issued by the FS for the Slip 'N' Slide pasture will enable the GonaCon Study to continue uninterrupted and make more local private land available for any long term quarantine facility.

From: [Clarke, Patrick R. - APHIS](#)
To: [Nol, Pauline - APHIS](#); [McCollum, Matthew P - APHIS](#); [Rhyan, Jack C - APHIS](#); [Frey, Rebecca K - APHIS](#)
Subject: RE: GnRH bison
Date: Tuesday, February 07, 2017 10:45:12 AM

I like it.

Let's not forget we can be looking at latency with some of these animals since we know the complete clinical history of their dams.

I have not heard anything else from Don about the "future research" proposals other than they probably won't decide until the new administration settles in

Cheers,
The other Rhyan

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Nol, Pauline - APHIS
Sent: Monday, February 06, 2017 9:42 AM
To: McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: GnRH bison

Hi, I've done a few first pass edits. I think that these bison can also be used for further research on detection/diagnostic techniques and open up opportunities for future collaborations.
Take or leave as you think appropriate.

Question: Has the proposal for future research/quarantine at Corwin Springs been sent up the ladder...and looked at?
P

From: McCollum, Matthew P - APHIS
Sent: Monday, February 06, 2017 9:06 AM
To: Nol, Pauline - APHIS <Pauline.Nol@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: GnRH bison

Here is a start on the email for our folks. What I'm trying to do is show what negative effects sending the bison to slaughter will bring us. Look it over and let me know what you think. If you

think we should not take any particular tact, let me know, but right now, I think the stops need to be pulled out.

Thanks,

Matt

Suelee and Beth,

Here is a breakdown of the bison in question and what we plan to do with them in future. We don't have enough room at the facility in Corwin springs to complete everything and also having the animals here in fort Collins is much more conducive to use being able to use them for further research.

All bison:

WiLDIT uses: Used for development of drydart technology. Seeing if we can deliver vaccines/ immobilization drugs/ antibiotics using dry darts.

CSU collaborator uses: basic assisted repro techniques that are just not known for bison.

Brucella positive bison:

WiLDIT uses: All or a subset of offspring that remain or become seropositive for *B. abortus* after weaning will be maintained and monitored through their first parturition.

CSU collaborator uses: Use of Assisted repro techniques as a disease mitigation strategy including clean-up of semen from B+ bulls for use in Artificial Insemination, Embryo transfer from positive cows to negative surrogates.

Brucella negative females.

CSU collaborator uses: Demonstrate the use of AI using semen of B+ bulls.

Brucella negative bison: As part of the collection permit that we used to originally acquire the bison and the IACUC approved study protocol we have in place, we are obligated as follows. (both are attached)

From the permit:

Brucellosis negative Yellowstone bison should be consigned to a quarantine location for

further diagnostics, directly to a managed for public conservation program to supplement population genetic diversity, to an introduction program to establish a new conservation population of wild bison, or if no such opportunities exist, to private not for profit bison conservation program. If none of these opportunities can be accommodated then a last choice would be to offer brucellosis free bison to any private party that requests transfer of ownership. Disease free bison should not be killed as a convenient method to move the animals out of USDA facilities.

From our study protocol: "Adults and offspring that remain negative for brucellosis on serology and culture and satisfy the bison quarantine requirements as published in the UM&R will be used for bison conservation."

Because of the commitments laid out in our research permit and our study protocols, we have made partnerships to place the resultant bison. Experience from the Quarantine Feasibility Study showed that finding places to actually put the animals can be problematic. Much time and effort has gone into developing these partnerships. Affected entities include but are not limited to: The Laramie Foothills Bison Conservation Herd (Colorado State University, the City of Fort Collins, and Larimer county), a variety of native American tribes including The Crow Nation, the Chickasaw Nation, and The Shoshone Nation; The American Prairie Reserve, USDA FS Midewin National Tallgrass Prairie, MN Zoo, Bronx zoo, Wildlife Conservation Society.

The Laramie Foothills Bison Conservation Herd is unique in that we are partners on the project and as part of that, we are assured access to the animals for continued Brucella monitoring which add an extra level of comfort. All the female bison that go through the quarantine process will be placed there and can continue to be monitored.

We realize that conservation of bison is not the thrust of our mission, but the commitment has been made and should be followed through. We said we'd do it in order to get the bison for research and to get the approvals to conduct the research, we can't just send them to slaughter now because it is convenient. Public perception could really go downhill for us if we do this.

These bison are irreplaceable. In theory, we should be able to get more from YNP, but in practice, with the vitriolic atmosphere around the GYA, there is little hope of getting any more animals from Yellowstone for research- which is contrary to the IBMP agreement that dictates slaughter be used only as a last resort, not a first choice.

We are not privy to the higher level discussions, all we know is what we have heard third hand: the state was willing to send the research bison to us and APHIS is who said slaughter was the way to go.

This puts our CSU collaborator in a bad spot. She does not want to act against us since we have worked so long together and we have a good partnership, at the same time, she does not want us to go ahead with the slaughter of animals she could have access to further her research. The same goes for the WILDIT group and our SPRS colleagues. We don't want to go against our own organization, but our input was solicited, we gave it, and what came back was nothing like we had talked about and really puts a damper on continued research on brucellosis.

Our Corwin Springs facilities are limited for space. Our plan was to remove animals to Fort Collins to alleviate that issue. Removing animals to slaughter and replacing them with new animals does nothing to help with crowding and the resultant safety issues involved.

Best,

Matt

Matt McCollum

Wildlife Biologist
Wildlife Livestock Disease Investigations Team (WiLDIT)
USDA-APHIS-VS-STAS
National Wildlife Research Center
4101 LaPorte Ave.
Fort Collins, CO 80521
(970)266-6233 Office
(b) (6) Mobile

From: [Clarke, Patrick R. - APHIS](#)
To: [Herriott, Donald E - APHIS](#)
Cc: [Frey, Rebecca K - APHIS](#); [Rhyan, Jack C - APHIS](#); [McCollum, Matthew P - APHIS](#); [Nol, Pauline - APHIS](#); [Ahola, Sara C - APHIS](#)
Subject: RE: Montana Future Research plan
Date: Monday, January 09, 2017 5:35:47 PM
Attachments: [FUTURE RESEARCH 1-06-17 V4 FINAL.docx](#)

Sorry, I realized this morning that the version I sent you yesterday was still marked up. This is the clean FINAL versionreally

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Clarke, Patrick R. - APHIS
Sent: Sunday, January 08, 2017 3:15 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Cc: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; 'Rhyan, Jack C - APHIS (Jack.C.Rhyan@aphis.usda.gov)' <Jack.C.Rhyan@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>; 'Pauline Nol' <pauline.nol@aphis.usda.gov>; Ahola, Sara C - APHIS <Sara.C.Ahola@aphis.usda.gov>
Subject: Montana Future Research plan

Don,

I know you are meeting with Burke this week on GYA issues so I wanted to get this final version of the Future Research plan to you. Also attached the cost analysis that Sara had worked on.

We are working bison all this week so we're going to be hard to get a hold of if you have any questions, but I will be checking my phone whenever I get to a spot that has reception.

Ryan

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

FUTURE RESEARCH (Montana Facility)

Investigators:

USDA, APHIS, VS: Jack Rhyan, Ryan Clarke, Rebecca Frey, Pauline Nol, Matt McCollum

Background:

APHIS-VS leases three double-fenced bio-secure pastures (SNS, Riglers, and Brogans) in Montana approximately 7 miles north of the town of Gardiner. The lease for one of these three properties (SNS) will be vacated in January of 2018. There are three other properties in the vicinity that are being proposed as new leases. (Trestle Ranch North, Trestle Ranch South, and Aldridge Lake).

—Bovine brucellosis, a zoonotic bacterial disease caused by *Brucella abortus*, is transmitted among animals, including cattle, bison (Bison bison) and elk (*Cervus canadensis*), primarily through contact with infected aborted fetuses, placentas, parturient fluids, or post-parturient uterine discharge. Additionally, the organism is shed in the milk from infected dams and can be transmitted to calves through suckling. Following infection, females often abort. Subsequent pregnancies may result in abortion or the birth of weak or normal calves and may result in shedding of the organism. Transmission of disease in cattle, bison and elk therefore is primarily dependent on the occurrence of pregnancy and abortion or calving of infected animals.

Herds of Yellowstone National Park (YNP) bison and elk persist as the last known reservoir populations chronically infected with brucellosis (Herman et al., 2014; Rhyan et al., 2013), a contagious disease that APHIS is striving to eliminate. Between 2002 and present, there have been 23 herds detected in the Greater Yellowstone Area (GYA) with brucellosis. Of these, 19 were beef cattle herds, and 4 were bison herds. In all these herds elk have been identified as the transmission vector for *Brucella abortus*. As more elk are exposed to Brucella in the region, the potential for the disease to move to new areas and the risk of livestock contracting the disease may become higher. (Brennan, 2015)

Elk Research:

Currently, elk are the primary concern for disease transmission to livestock. Minimal live animal research has been done on the transmission of *Brucella abortus* from infected elk to cattle. There are gaps in the research record that need to be addressed in order for wildlife management/ animal health agencies to make the best decisions with regard to the control of *Brucella abortus* in the GYA. Three studies are proposed below that will increase our understanding of disease transmission within elk herds, disease transmission from elk to cattle, and the potential of remote vaccine delivery systems for elk.

Study A: *B. abortus* transmission in elk

Study A Major objectives:

To investigate the basics of brucellosis transmission in elk:

- Frequency of abortions/stillbirths/ weak calves over several pregnancies for seropositive elk cows vs sero-negative elk cows
- Titer fluctuation as linked to age, pregnancy status, reproductive history, reproductive success.
- Characterize shedding of *B. abortus* by sero-positive elk cows following abortions/stillbirths/normal parturition

Study A Minor objectives:

- a. Evaluate latency of *B. abortus* in elk
- b. Evaluate the ability of the fluorescence polarization assay (FPA) to measure *B. abortus* antibody in the whole blood of elk.

Facility:

We intend to use the present USDA/APHIS/VS Brogan facility at Corwin Springs, Montana which presently houses bison enrolled in the GonaCon study. If the Trestle Ranch South property becomes available before this study begins it is our preferred facility for this study over Brogans. As the GonaCon Study comes to a close, the Brogans facility will transition to hold elk. Brogans was originally an elk game farm and still retains much of the basic infrastructure used for elk. The swinging gate/tub system would need to be reconverted to restrain individual elk. The corral complex would need to be rehabilitated and a suitable chute for elk would need to be installed.

Animal Source(s): 1) MTFWP -elk
2) Game farm elk

Study A Duration: Once appropriate pens are available, the study will last through four calving cycles. Proposed enrollment in June 2018 with conclusion in Fall 2022.

Study A Plan:

Two pastures will each house separate elk study groups: Group 1 will consist of 20 seropositive elk heifers on one pasture. Group 2 will consist of 10-15 seronegative elk heifers in the second pasture. Four young seronegative elk bulls will be maintained separately except during breeding season. These animals will be monitored by serology. Each pasture will be followed through four calving seasons. Each cow will be tested on a schedule for the shedding of *B. abortus* (swabs) and *B. abortus* antibodies (serum and whole blood). Newborn calves will be tested (swabs, blood) and testing will continue into adulthood. During the study selected individuals will be sacrificed and their tissues will be cultured for *B. abortus*. At the conclusion of the study, all remaining individuals will be sacrificed and cultured.

Whole blood will assayed using the FPA. Results will be evaluated and compared with regard to age, sero-status, and culture results. Swabs will be tested by culture

{Internal Note: If we have room, we could separate out 5 elk cow/calf pairs (both dam/ female calf are seropositive), isolate, and follow until calf has own calf. (latency)}

Study B: Assess effectiveness of oral bait vaccines in elk

Study B Background:

One strategy to combat *B. abortus* in the GYA would be the development of a safe and effective vaccine for use in elk. Regardless of what form that vaccine would be manufactured in (powder, liquid, aerosol), delivery methods that are safe, effective, and customized for the remote delivery of the vaccine to large populations of wild ruminants will have to be developed. Vaccine formulations and delivery mechanisms need to provide effective field performance, safety, cost-effectiveness, and environmental compliance (Ballesteros et al., 2007)

Study B Major Objective:

To assess oral/aerosol delivery systems for the delivery *B. abortus* vaccine to elk
Develop and test an effective and safe vaccine delivery system/unit suitable for the delivery of
brucellosis vaccine to elk

- a. Investigate other delivery methods as they become available

Facility and Animal sources: same as for study A

Study B Duration: Once elk have been enrolled and the appropriate pens are available, the study will last through three calving cycles. Proposed enrollment in June 2018 with conclusion in Fall 2022.

Study B Plan:

Working with APHIS-NWRC and other knowledgeable parties in the private or academic sectors, various candidates for vaccine delivery will be developed and evaluated. Different formulations of delivery units will be subjected to field trials using the elk in this study. The baits will be evaluated with regard to palatability, stability, cost, and safety. This study will be an initial step in bait development and most likely will run its course in parallel with the elk transmission study. Effects in non-target species will not be evaluated.

Study C: Investigate vaccination protocols in cattle heifers and demonstrate elk-to-cattle transmission**Study C Background:**

Transmission from infected elk in captive herds to susceptible cattle occurred when the two species were in close contact and pregnant elk gave birth or aborted (Thorne and Herriges 1992). There is still some disbelief in the stakeholder public that elk to cattle transmission actually occurs. Our study would reinforce the mechanism of elk to cattle transmission documented by Thorne only in this rendition using natural transmission of field strain *B. abortus* under conditions closer to local field conditions.

A recent cattle study has shown that RB51 revaccination promotes an increase in the immune response by heifer calves with some of the parameters assessed being even higher in animals prime-vaccinated with RB51 compared to animals prime-vaccinated with S19. In this study we will use both live and killed RB51 in two different vaccination regimes. These results strengthen the argument in favor of use of RB51 revaccination of cattle in regions where brucellosis is present. (Dorneles et al., 2015).

Study C Major Objective:

To investigate the reproductive success of vaccinated cattle heifers after exposure to brucellosis in elk using three different vaccination protocols

Facility: Trestle Ranch South. If the Trestle Ranch Facility is being used for Bison Quarantine this study will be housed at the Aldridge Lake Facility

Animal sources: elk as for study A
cattle: market

Study C Duration: Once appropriate pens are available, the study will last through one calving cycle. Proposed enrollment in September 2018 with conclusion in Fall 2019.

Study C Plan:

Thirty vaccinated cattle heifers (8 month old) will come in with twenty, 17-month-old seropositive bred elk in a pen. The vaccinated cattle heifers will be divided into three groups of 10 heifers each (SQ, BR, and M). The SQ (Injection) group will be vaccinated SQ at 7 months (September 30) with a full dose of ML RB51 (1.0-3.4 x 10¹⁰). The BR group will be vaccinated at 7 months (September 30) with a full dose of ML RB51 (1.0-3.4 x 10¹⁰) given SQ and at 13 months of age (March 30) with a full dose of ML RB51 (1.0-3.4 x 10¹⁰) given SQ. The M group will be vaccinated at 7 months (September 30) with a full dose of ML RB51 (1.0-3.4 x 10¹⁰) given SQ and at 13 months of age (March 30) with a dose of killed RB51 (1.0-3.4 x 10¹⁰) given intra-nasally. At 15 months of age the cattle heifers will be sero-tested and bred by a utility bull. Elk females that abort or calve will be immobilized and tested (blood, swabs, discharge). At the conclusion of the cattle calving season the cattle/calves and elk will be assessed for reproductive success, sero-status, shedding of *Brucella*, etc. After final assessment cattle will be removed from the elk pens and sold for salvage.

| | bred | abort | delivery |
|---------------|------------------|------------------|-----------------|
| elk | Sept 15 | Feb-May | June 1 |
| cattle | June 1 | Nov-March | March 1 |
| bison | August 15 | Jan-April | May 15 |

Bison Research:

Progress is being made in the GonaCon study in bison, but many questions remain surrounding the onset of puberty in bison, latency in bison, and titers. Also, some disbelief remains in the public opinion that bison can transmit *B. abortus* to cattle. Two studies are proposed below to address these questions.

Study D: Investigate the onset of bison puberty, *B. abortus* titers, and latency in bison heifers.

Study D Background:

There is not much information backed by scientific data on the onset of puberty in female bison: most literature sites a rough range based on age and weight. In cattle, puberty is considered to have occurred when plasma progesterone concentrations of 2 ng/ml were present in 2 out of 3 consecutive samples.

Our Bison Quarantine Feasibility Study seemed to indicate a relationship between the onset of puberty and the appearance of a measureable titer (*B. abortus* antibodies) in several exposed bison that had previously tested negative on a regular basis since enrollment/exposure.

Investigation of the linkage of puberty onset and antibody development is important as its results

will be informative concerning latent brucellosis infection in bison and will provide knowledge needed concerning potential streamlining of any future quarantine program.

Study D Major Objective:

- a.) In exposed bison moved into isolation, to investigate the relationships between brucellosis titers, the onset of puberty in bison and the ability to culture *B. abortus*.
- b.) Investigate latency in bison heifers

Facility: This study will be take place at the APHIS WILDIT pens at Colorado State University, Ft Collins, CO.

Animal Source(s): 1) Excess from GonaCon study
2) Excess from WILDIT
3) DOL traps
4) YNP trap

Study D Duration: Once appropriate pens are available, the study will last through one bison calving cycle. Proposed enrollment in May 2018 with conclusion in Fall 2020

Study D Plan:

Twenty sero-negative bison heifers (12 months old and exposed at birth) would be kept in a pasture near a working facility. The chute would be equipped with a scale. We would measure progesterone levels\ab titers\weight every 30 days until the heifers were 24 months of age. Vaginal swabs will be taken to assess shedding. Those bison that show a titer by 24 months of age, will be killed and cultured. As long as there is no shedding in the group, remaining exposed females that do not show a titer by the onset of by 24 months, will be bred and kept through parturition and watched for latency. The use of GonaCon study heifer calves will provide knowledge of the clinical history of the dam which is critical in investigating latency.

Study E: Transmission of *B. abortus* from exposed bison to cattle

Study E Background:

There is still considerable skepticism among the stakeholder public regarding the concept of bison to cattle transmission under GYA landscapes/conditions. This small study will possibly settle this transmission question once and for all. In this study we look at transmission between exposed bison and vaccinated vs unvaccinated cattle.

Study E Major Objective:

- A) To determine if seropositive exposed YNP bison transmit brucellosis to vaccinated cattle heifers
- B) To investigate the reproductive success of vaccinated cattle heifers after exposure to brucellosis in bison using two different vaccination protocols

Commented [NP-A1]: Three?

Facility: This study will take place at the Rigler Property once the GonaCon Study has been completed. The alternate property will be a pen at the Brogan property.

Animal Source(s): **bison:** as above for study D
cattle: market

Study E Duration: Once appropriate pens are available, the study will last through one calving cycle (bison and cattle). Proposed enrollment in October 2020 with conclusion in Fall 2022.

Study E Plan:

In January a female bison group (mixed ages, early/mid-pregnancy, containing at least 2-3 high-titer pregnant bison heifers) will be placed in a large pasture with 30 vaccinated cattle yearlings (~20 months old- born June). The vaccinated cattle heifers will be divided into three groups of 10 heifers each (SQ, BR, and M). The SQ (Injection) group will be vaccinated SQ at 7 months (September 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$). The BR group will be vaccinated at 7 months (September 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$) given SQ and at 13 months of age (March 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$) given SQ. The M group will be vaccinated at 7 months (September 30) with a full dose of ML RB51 ($1.0-3.4 \times 10^{10}$) given SQ and at 13 months of age (March 30) with a dose of killed RB51 ($1.0-3.4 \times 10^{10}$) given intra-nasally. At 15 months of age the cattle heifers will be sero-tested and bred by a utility bull. Cattle females that have an abnormal birthing event will be immobilized and tested (blood, swabs, discharge). Bison females that abort or calve will be immobilized and tested (blood, swabs, discharge). Thirty days after all bison have calved, all open animals in the pasture will be tested: open bison will either be immobilized or go through the chute while all cattle will be tested/cultured (blood, swabs, tissue) at slaughter (sold for salvage).

Priority of projects: #1- Study A
#2- Study C
#3- Study D
#4- Study B
#5- Study E

{Internal Note: For Study E above, we can breed the cattle heifers and assess abortion or we can just kill and culture the heifers after they seroconvert.}

{Internal Note: I would like to help test the new Univ of Wyoming PCR at some point.....not sure where.....will have to talk to the WY people more}

References:

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In Recent patents on drug delivery & Formulation, 2007, 1 (3), 230-235

Brennan A. Landscape-scale analysis of livestock brucellosis. 2015 Final Report #14-9200-0376.v2
Report prepared by, Institute on Ecosystems, Montana State University, Bozeman, MT 59715

Dorneles, E.M.; Lima, G.K.; Teixeira-Carvalho, A.; Araujo, M.S.; Martins-Filho, O.A.; Sriranganathan, N.; Al Qublan, H.; Heinemann, M.B.; Lage, A.P. Immune response of calves vaccinated with *Brucella abortus* S19 or RB51 and revaccinated with RB51.

Herman, J.A., Piaggio, A.J., Halbert, N.D., Rhyan, J.C. and M.D. Salman. 2014. Genetic analysis of a Bison bison herd derived from the Yellowstone National Park population. *Wildlife Biology* 20(6): 335-343.

Olsen, SC. Brucellosis in the United States: Role and significance of wildlife reservoirs. *Vaccine*, suppl. Supplement28.S5 (Oct 1, 2010): F73-F76

Rhyan, JC; Nol, P; Quance, C; Gertonson, A; Belfrage, J; Harris, L; Straka, K; Robbe-Austerman, S.; Transmission of Brucellosis from Elk to Cattle and Bison, Greater Yellowstone Area, USA, 2002-2012 *Emerging infectious diseases*, 2013, 19 (12), 1992-1995

Thorne, E.T. and Herriges J. D.; BRUCELLOSIS, WILDLIFE AND CONFLICTS IN THE GREATER YELLOWSTONE AREA. *North American Wildlife and Natural Resources Conference. Transactions*, 1992, 57 (57), 453- 465

Appendix A

The GonaCon Treatment study is four to five years from completion of bison work. We currently have 3 locations comprising 4 pens of approximately 20 acres each. In the summer of 2017, the current owner of one of the facilities will be completing a land trade with the US Forest Service and the Forest Service has indicated we will need to have all animals removed by January 2018, and fences/equipment removed by the following summer (or as soon as possible). We will be losing a valuable irrigated pasture that would have been used for holding offspring of the GonaCon animals, useful for future research, and will reduce our capacity for such research. A brief timeline for the wind down of the GonaCon study is as follows.

There are 4 pens consisting of Treatment and Control #1, and Treatment and Control #2. Pens 1 were started in 2012, while Pens 2 were started in 2014/2015; staggered due to availability of bison from YNP.

Control Pen #1: Will calve in spring of 2017, with final testing/necropsy in December of 2017. This pen will have completed the GonaCon Study. This pen will be cleared, though we will be losing 1 leased pasture at the same time.

GonaCon Treatment Pen #1: Will calve spring 2017, and could be considered for final testing/necropsy IF a majority of the treatment animals are pregnant this year. So far, only 2 of 15 have been pregnant, and the goals of the study are to determine birth statistics and B. abortus shedding in treatment animals after they become pregnant. If we need to continue to hold these animals until a) pregnancy occurs or B) we determine them to be permanently sterile; then we have an undetermined timeframe for the end of this treatment pen.

Control Pen #2: Will complete final calving season in spring of 2020. Will be finished with research and final testing in December 2020.

GonaCon Treatment #2: Will complete final calving season in Spring of 2019, and could be considered for final testing/necropsy IF a majority of the treatment animals are pregnant before that date. Again, given the goals of the research, we need to get treatment animals pregnant before we can evaluate the affectivity of GonaCon at reducing infection/transmission in the herd. In each year, there will be calves produced in excess of our holding capacity and will need space to hold them for future research, for quarantining them for relocation, or for use in future studies.

If this timeline holds with the goals of the study, we will have 1 open pen available in December of 2017, followed by 1 in December of 2019, and 1 in December of 2020. There are 3 properties available in the area as a possible replacement for the pen we have to vacate in January 2018. If the scope of future research warrants it, we propose to lease one of these three {1) 14 acres, 2) 15-20 acres, and 3) 35 acres}. This would require new lease agreements, construction, and long term needs for other research in order to justify the cost. We pay now approximately \$1000/acre for annual leases on the 3 properties currently in use.

From: [Frey, Rebecca K - APHIS](#)
To: [Rhyan, Jack C - APHIS](#)
Subject: Re: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke
Date: Friday, September 08, 2017 10:03:39 AM

Uh, actually no. We were calving like mad, didn't find it right away. Not sure exactly how long it lived. I was in (b) (6) when it was born.

Sent from my iPhone

> On Sep 8, 2017, at 10:00 AM, Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov> wrote:

>

> Was there a post mortem on the calf? Cultures? (I'm sure there was because you guys are good!)

> Jack

>

> -----Original Message-----

> From: Frey, Rebecca K - APHIS

> Sent: Friday, September 08, 2017 9:58 AM

> To: Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>

> Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

>

> Actually, calf died a few days after birth.....not sure what happened, I think she was a bad momma

>

> Rebecca Frey

> Wildlife Biologist

> USDA APHIS VS

> Montana

> 406-333-4425

>

> -----Original Message-----

> From: Rhyan, Jack C - APHIS

> Sent: Thursday, September 07, 2017 9:25 AM

> To: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>

> Cc: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>

> Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

>

> Better yet. Calf okay?

>

> -----Original Message-----

> From: Frey, Rebecca K - APHIS

> Sent: Thursday, September 07, 2017 7:48 AM

> To: Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Clarke, Patrick R. - APHIS

> <Patrick.R.Clarke@aphis.usda.gov>

> Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

>

> Not an abortion, live birth

>

> Rebecca Frey

> Wildlife Biologist

> USDA APHIS VS

> Montana

> 406-333-4425

>

> -----Original Message-----

> From: Rhyan, Jack C - APHIS

> Sent: Wednesday, September 06, 2017 4:49 PM
> To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>
> Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke
>
> Wow! That is her 4th bruc positive abortion in a row! A regular "Brucella Mary."
> J
>
> -----Original Message-----
> From: Clarke, Patrick R. - APHIS
> Sent: Wednesday, September 06, 2017 4:18 PM
> To: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>
> Subject: FW: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke
>
> Hooray for G14....we have a shedder.
>
> P. Ryan Clarke, DVM, MPH
> USDA, APHIS, VS, SPRS
> District 5 Epidemiologist-GYA
> Bozeman, Montana
> 406-388-5162
>
> -----Original Message-----
> From: APHIS-NVSL Case Coordinator - APHIS
> Sent: Wednesday, September 06, 2017 3:42 PM
> To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
> Subject: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke
>
> Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

From: [Frey, Rebecca K - APHIS](#)
To: [Rhyan, Jack C - APHIS](#)
Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke
Date: Friday, September 08, 2017 9:58:32 AM

Actually, calf died a few days after birth.....not sure what happened, I think she was a bad momma

Rebecca Frey
Wildlife Biologist
USDA APHIS VS
Montana
406-333-4425

-----Original Message-----

From: Rhyan, Jack C - APHIS
Sent: Thursday, September 07, 2017 9:25 AM
To: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>
Cc: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

Better yet. Calf okay?

-----Original Message-----

From: Frey, Rebecca K - APHIS
Sent: Thursday, September 07, 2017 7:48 AM
To: Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

Not an abortion, live birth

Rebecca Frey
Wildlife Biologist
USDA APHIS VS
Montana
406-333-4425

-----Original Message-----

From: Rhyan, Jack C - APHIS
Sent: Wednesday, September 06, 2017 4:49 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>
Subject: RE: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

Wow! That is her 4th bruc positive abortion in a row! A regular "Brucella Mary."
J

-----Original Message-----

From: Clarke, Patrick R. - APHIS
Sent: Wednesday, September 06, 2017 4:18 PM
To: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>
Subject: FW: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

Hooray for G14....we have a shedder.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

-----Original Message-----

From: APHIS-NVSL Case Coordinator - APHIS
Sent: Wednesday, September 06, 2017 3:42 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

Partial Report on 17-016797 For Dr. Patrick Ryan Clarke

From: [Clarke, Patrick R. - APHIS](#)
To: [Healey, Burke L - APHIS](#); [Herriott, Donald E - APHIS](#)
Cc: [Ahola, Sara C - APHIS](#); [Hull, Langston D - APHIS](#); [Linfield, Thomas F - APHIS](#); [Rhyen, Jack C - APHIS](#); [Frey, Rebecca K - APHIS](#); [McCollum, Matthew P - APHIS](#)
Subject: RE: APHIS plan for YNP held Bison
Date: Thursday, January 26, 2017 8:04:42 AM
Attachments: [APHIS\(MT\) Plan for YNP bison V3 1-25-17 with annex.docx](#)

Burke and Don,

I have added the costs and the probable timelines as an annex. I left the timelines off the first version because I didn't want us to get pinned down on graduation dates (delivery dates).

My hope for what we (APHIS) get from this deal is three- fold:

- a.) To lock down APHIS's right to transport research bison between our facilities (transport through Montana)
- b.) To re- emphasize that quarantine must be carried out at a ABQF or an established research facility meeting ABQF standards.
- c.) That the first priority for GonaCon bison is to be used for APHIS research purposes and to meet our research goals.

It is regrettable that someone put the label "surplus" on the GonaCon bison going to NWRC. We should stop referring to them as surplus. I think while this deal is in the "negotiation" stage that we say we are willing to modify both our facilities to quarantine YNP males and females. We offer to take the seven YNP yearling females (in addition to the 25 YNP males)through Quarantine instead of giving them GonaCon females.....Marty plan calls for slaughtering all YNP females. We say that the primary use of GonaCon bison (including females) transported to NWRC from Montana will be to supplement our ongoing established research. Bison surplus to our use may be diverted to quarantine.

Note that the costs (monetary and time) for graduating females is substantially more than for males which is another reason why we left females out of the previous version.

Ryan

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Healey, Burke L - APHIS
Sent: Tuesday, January 24, 2017 5:16 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Cc: Ahola, Sara C - APHIS <Sara.C.Ahola@aphis.usda.gov>; Hull, Langston D - APHIS <Langston.D.Hull@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Linfield, Thomas F - APHIS <Thomas.F.Linfield@aphis.usda.gov>

Subject: RE: APHIS plan for YNP held Bison

Thanks Don. This looks like a good start to a possible solution. I didn't see, but may have missed it, the females listed as going thru quarantine anywhere. I saw it mentioned 25+ bulls completing quarantine and going to Ft Peck. As I remembered from the call last week and Marty's note of Friday, MT DOL expected to clear quarantine with some females for Ft Peck.

One other item we need is the projected time frame to clear the quarantine for all bison being considered. I realize that may be difficult but a thoughtful projection should be included so we have something to use along with the daily per diem charges for the bison in estimating the cost. The overall costs will be invaluable for the 3 parties Marty suggests will be participating in the cost share to make this proposal work.

I appreciate Marty's rough draft of the concept but we will need something far more substantive and formal to allow us to make a presentation to the new Sect of Ag before we will be allowed to make any commitments.

Thanks,
Burke

From: Herriott, Donald E - APHIS

Sent: Tuesday, January 24, 2017 4:42 PM

To: Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>

Cc: Ahola, Sara C - APHIS <Sara.C.Ahola@aphis.usda.gov>; Hull, Langston D - APHIS <Langston.D.Hull@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Linfield, Thomas F - APHIS <Thomas.F.Linfield@aphis.usda.gov>

Subject: Fwd: APHIS plan for YNP held Bison

Burke,

Here is the plan we are open to discuss as an option.

As we stew on this, I will call Marty and notify him we are not able to release a timely statement. I will notify Wenk we are working on bison options.

Don

Sent from my iPad

Begin forwarded message:

From: "Clarke, Patrick R. - APHIS" <Patrick.R.Clarke@aphis.usda.gov>

Date: January 24, 2017 at 3:36:01 PM MST

To: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>

Cc: "Frey, Rebecca K - APHIS" <Rebecca.K.Frey@aphis.usda.gov>, "McCollum, Matthew P - APHIS" <Matt.McCollum@aphis.usda.gov>, "Rhyen, Jack C - APHIS"

<Jack.C.Rhyan@aphis.usda.gov>

Subject: RE: APHIS plan for YNP held Bison

Don,

Here is the draft V1 of what we propose to handle the transfer.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Frey, Rebecca K - APHIS

Sent: Tuesday, January 24, 2017 3:00 PM

To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>

Subject: RE: APHIS plan for YNP held Bison

Made a couple small changes.....did not use track changes!

REBECCA FREY

Wildlife Biologist

USDA APHIS VS

Montana

406-333-4425

From: Clarke, Patrick R. - APHIS

Sent: Tuesday, January 24, 2017 2:41 PM

To: McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>

Cc: Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>

Subject: APHIS plan for YNP held Bison

Mathew,

Here you go, bro.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

1-24-2017

APHIS Plan for YNP Held Bison

- All YNP held females are shipped to slaughter directly from Stephens Creek (15 bison).
- All 33 bison held at the APHIS Corwin Springs Research Facility must be shipped to CO prior to the transfer of the YNP bison in order to make room available at the Corwin Springs facility.
- There are 25 male bison in the held group: 20 yearlings (BD: ~ 5/2015) and 5 two-year olds (BD: ~ 5/2014). These 25 will be transferred to the APHIS Corwin Springs Research Facility.
- All bison transferred to the APHIS Corwin Springs Research Facility must test negative and have permanent official ID applied prior to transfer.
 - One male (yearling) is sero-suspect on last test and must be seronegative to be included in transfer.
- All 33 surplus animals now held at APHIS Corwin Springs Research Facility plus 10-11 yearling males transferred from the YNP will be transferred to APHIS NWRC Research Facility (44 head total). The potential transfer date of bison between the two APHIS facilities could be as soon as the end of February 2017. This transfer will unencumber any uncertainties about the legality of APHIS transferring MT origin research bison to another out-of-state research facility.
- The 10-11 males will be held in quarantine at NWRC for transfer to the Ft Peck Tribe upon graduation
- At Corwin Springs 14 YNP bison will be held in quarantine (5 two-year olds males and 9 yearling males) for transfer to the Ft Peck Tribe upon graduation. The Ft Peck Tribe has the potential to receive 25+ bison (combined) upon graduation from both facilities.

Other considerations:

- APHIS is asking a per diem of \$5.21 head/ per day at both facilities to offset maintenance and animal care costs. This is based on a CSU research facility animal husbandry per diem standard.
- The APHIS Corwin Springs Research Facility will need two new gates installed as well as some fencing repaired as a consequence of holding quarantine bison. These gates will be necessary to maintain biosecurity between the quarantine group and the infected GonaCon Study bison.
- MT DOL will pay all serology/necropsy costs for bison transferred from YNP and held at the APHIS Corwin Springs Research Facility.
- Who has volunteered to build and administer a long term facility to be constructed adjacent to YNP (RTR land?) prior to Stephens Creek operations in 2018?
 - As an IBMP partner in this deal can the Forest Service be compelled to modify the Shooting Star land swap? A special use permit issued by the FS for the Slip 'N' Slide pasture will enable the GonaCon Study to continue uninterrupted and make more local private land available for any long term quarantine facility.

Formatted: Font color: Red

Annex:

The 5 two year old YNP male bison held at Corwin Springs for Quarantine would be eligible for release 12 months from their initial negative entry test. Example: with three negative tests on February 15th, 2017, October 15th, 2017, and February 15th, 2018. Cost: 370 days X \$5.21 per diem = \$1928 each = \$9640 total per diem

The 9 yearling YNP males held at Corwin Springs for Quarantine would be eligible for release ~18 months from their initial negative entry test. Example: with three negative tests on February 15th, 2017, October 15th, 2017, and June 15th, 2018. Cost: 548 days X \$5.21 per diem = \$ 2855 each = \$25965 total per diem

The 11 yearling YNP males transported to and held at NWRC for Quarantine would be eligible for release ~18 months from their initial negative entry test. Example: with three negative tests on February 15th, 2017, October 15th, 2017, and February 15th, 2018. Cost: 548 days X \$5.21 per diem = \$ 2855 each= \$31735 total per diem. This does not include the transportation costs for a round trip of APHIS personnel/vehicles from Ft Collins.

The seven yearling YNP females transported to and held at NWRC for Quarantine would be eligible for release ~23 months from their initial negative entry test. Example: with three negative tests on February 15th, 2017, June 30th 15th, 2018, and January 15th, 2019. Cost: 700 days X \$5.21 per diem = \$ 3647 each = \$ 25529 total per diem. This does not include the transportation costs for a round trip of APHIS personnel/vehicles from Ft Collins. There are also many other costs associated with pushing a young female through the Quarantine program (as opposed to a male): darting, extra serology, culture costs, VITs, telemetry, etc = ~ \$500 per head without factoring in the extra personnel hours. Note: This assumes that the yearlings are all past puberty and will not seroconvert.

From: [Clarke, Patrick R. - APHIS](#)
To: [Thomas, LeeAnn - APHIS](#)
Cc: [Healey, Burke L - APHIS](#); [Brown, Elizabeth M - APHIS](#); [Herriott, Donald E - APHIS](#); [Rhyan, Jack C - APHIS](#)
Subject: RE: Bison questions
Date: Friday, January 27, 2017 4:41:39 PM

Will do.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Thomas, LeeAnn - APHIS
Sent: Friday, January 27, 2017 2:12 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Cc: Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>; Brown, Elizabeth M - APHIS <Elizabeth.M.Brown@aphis.usda.gov>; Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>
Subject: FW: Bison questions

Ryan,

The Administrator's Office has asked Burke if there are any locations that would be willing to sell surplus bison to the Ft. Peck tribe (see attached e-mail string – Message from Jere to Jack). Would you check/Jack check with the locations on the list and get back to us on Monday COB?

Thanks much,
Lee Ann (Acting ADA for Burke)

Begin forwarded message:

From: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>
Date: January 27, 2017 at 6:50:38 AM MST
To: "Healey, Burke L - APHIS" <Burke.L.Healey@aphis.usda.gov>
Subject: Fwd: Bison questions

It's in the attached

Sent from my iPhone

Begin forwarded message:

From: "Clarke, Patrick R. - APHIS" <Patrick.R.Clarke@aphis.usda.gov>
Date: January 26, 2017 at 12:43:09 PM MST
To: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>

Subject: RE: Bison questions

Here it is.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 12:40 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Bison questions

Huh?

We have sent animals or germplasm to these places.

Are we still getting a list?

From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 12:27 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Subject: RE: Bison questions

Been talking to Matt.....we are not including future destinations specifically.....just where the animals are presently (or were)

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 12:15 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Bison questions

Thanks

I was hoping jack or matt were around because they've shipped to MN and Brooklyn at least.

From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 12:10 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Subject: RE: Bison questions

Working on the genetics...will have something for you in 10-15 minutes

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
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From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 11:24 AM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Cc: Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Subject: RE: Bison questions

So we can say:

All the graduates of the BQFS have done to the Ft Peck and Ft Belknap Tribes . Off spring off BQFS animals are held by the Ft Peck Tribe. the Ft Belknap Tribe, and Turner Enterprises, Inc.

Other individual animals have gone to Tall Grass Prairie? etc.....
Matt?

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From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 11:12 AM
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Cc: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>; Brown, Elizabeth M - APHIS <Elizabeth.M.Brown@aphis.usda.gov>

Subject: RE: Bison questions

Hi Jack,

I have attached the 2000 ROD here. You can find a wealth of documents at our IBMPinfo website (<http://ibmp.info/>)

Hopefully Jack Rhyan or Matt are available to provide the list of facilities receiving YNP Bison genetics. The outstanding collaboration with CSU has provided an opportunity to conserve YNP genetics to zoos and other facilities across the US. In fact, just a year ago Fall we turned out YNP bison offspring on Larimer county open space producing red calves on the landscape last spring.

From: Shere, Jack A - APHIS

Sent: Thursday, January 26, 2017 10:55 AM

To: Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>

Cc: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>

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Thanks to all of you for your help on this. Can I get this quickly as possible today please for a meeting this afternoon at 3:00 pm Eastern time.

Thank you again,

Jack A. Shere, DVM PhD
Deputy Administrator
USDA, APHIS, Veterinary Services
1400 Independence Avenue, SW
Room 317-E Whitten Building
Washington, DC 20250

Phone : 202-799-7146

From: [Clarke, Patrick R. - APHIS](#)
To: [Herriott, Donald E - APHIS](#)
Cc: [Rhyan, Jack C - APHIS](#); [Frey, Rebecca K - APHIS](#); [McCollum, Matthew P - APHIS](#)
Subject: RE: Bison questions
Date: Thursday, January 26, 2017 11:24:27 AM

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All the graduates of the BQFS have done to the Ft Peck and Ft Belknap Tribes . Off spring off BQFS animals are held by the Ft Peck Tribe. the Ft Belknap Tribe, and Turner Enterprises, Inc. Other individual animals have gone to Tall Grass Prairie? etc..... Matt?

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Phone : 202-799-7146

From: [Clarke, Patrick R. - APHIS](#)
To: [Shere, Jack A - APHIS](#); [Healey, Burke L - APHIS](#)
Cc: [Herriott, Donald E - APHIS](#); [Rhyan, Jack C - APHIS](#); [Frey, Rebecca K - APHIS](#)
Subject: RE: Bison questions
Date: Thursday, January 26, 2017 11:17:47 AM
Attachments: [IBMP_Federal ROD.pdf](#)

Jack,

Here's the ROD. Working on where the genetics have gone (bison).....

P. Ryan Clarke, DVM, MPH
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District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

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Room 317-E Whitten Building
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Phone : 202-799-7146

RECORD OF DECISION

For

**FINAL ENVIRONMENTAL IMPACT STATEMENT AND BISON
MANAGEMENT PLAN FOR THE STATE OF MONTANA AND
YELLOWSTONE NATIONAL PARK**

December 20, 2000

U.S. Department of the Interior
National Park Service

U.S. Department of Agriculture
U.S. Forest Service
Animal and Plant Health Inspection Service

RECORD OF DECISION
for
FINAL ENVIRONMENTAL IMPACT STATEMENT AND
BISON MANAGEMENT PLAN FOR
THE STATE OF MONTANA AND YELLOWSTONE NATIONAL PARK

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I. Introduction

This Record of Decision is the culmination of a planning process in excess of ten years regarding the management of bison that leave Yellowstone National Park and enter the Gallatin National Forest and private lands within the State of Montana. The Draft Environmental Impact Statement (DEIS) was a product of the cooperative efforts of the Department of the Interior (National Park Service), the U.S. Department of Agriculture (Forest Service and Animal and Plant Health Inspection Service), and the State of Montana (Department of Livestock and Department of Fish, Wildlife, and Parks). The Final EIS was a product of the cooperative efforts of the Department of the Interior (National Park Service) and the U.S. Department of Agriculture (U.S. Forest Service and Animal and Plant Health Inspection Service). The State of Montana has issued a separate final EIS under Montana law and has adopted and incorporated by reference the federal agencies' final EIS

Early European travelers to the Yellowstone area observed bison before and after the creation of Yellowstone National Park. As with bison outside the park, market hunting and poaching nearly eliminated bison inside the park. By 1901, only 25 bison remained in the park, down from a population of nearly 600 twenty years earlier. The park managers responded by augmenting the herd with bison from two captive herds and managing the animals strictly to protect them from predators, poachers, and the consequences of living in the occasionally harsh natural environment of Yellowstone National Park. Over the next 70 years, the herd size fluctuated, largely due to management removals to maintain the bison population at various levels. In the late 1960s, NPS decided to end the direct management of the herd to allow natural forces to affect and determine the herd size. Since then, the herd has increased from nearly 400 to a high of over 4,000. Presently the herd population is about 3,000 bison, due in large part to actions by NPS and the State of Montana to control the bison when they roam outside the park and due to winterkill inside the park.

Early park managers recognized disease in the bison as a management concern. They found exotic/non-indigenous diseases in the bison herd early in the 20th century, including brucellosis that likely was transmitted to the bison from cattle. Although brucellosis apparently is not a threat to the long-term survival of the Yellowstone bison, the risk that bison leaving the park may transmit the disease to cattle on neighboring lands has been an issue for several decades and led to this planning process and decision.

Brucellosis in bison and cattle is a contagious bacterial disease caused by *Brucella abortus*. Transmission of brucellosis generally occurs through the ingestion of bacteria shed from infected animals in birth materials at the time of calving or abortion. Presently, health authorities know of no feasible treatment or cure for animals infected with *Brucella abortus*. Some animals exposed to the bacterium react differently than others, some develop infections, and others may be resistant. Although research continues on how the bacterium is transmitted among wild ungulates, it is believed that the greatest risk arises from exposure and ingestion of contaminated material from the reproductive tract of females. Brucellosis also occurs in elk in the Greater Yellowstone Area. The National Academy of Sciences (1998) assessed elk transmission risk relative to that of bison. Unlike bison, elk tend to exhibit a "hiding" strategy during the calving period, separating themselves from the herd to calve. Elk also are meticulous at cleaning up afterbirth and soil and vegetation from calving sites. Both of these behaviors tend to reduce the opportunity for transmission of brucellosis among elk that are not artificially concentrated on feedgrounds (NAS 1998). This has probably contributed to the relatively low seroprevalence rate in the northern Yellowstone elk herd. This low seroprevalence rate of both the northern and the Madison-Firehole herds, despite occasional seasonal concentrations that result in densities similar to those found on winter feeding grounds (Ferrari 1999), suggests that the risk of transmission from those elk to cattle is lower than that of bison (NAS 1998).

In the United States, the first state-federal cooperative efforts towards the eradication of brucellosis caused by *Brucella abortus* began in 1934. In 1934 and 1935, the brucellosis reactor rate in adult cattle tested was 11.5%. The magnitude of the brucellosis program in terms of economics to the cattle industry and human health prompted Congress in 1954 to appropriate funds for a coordinated effort to eradicate brucellosis in cattle. The National Brucellosis Eradication Program was designed as a cooperative effort among the federal government, the states, and the livestock producers. Shortly after the initiation of this program, almost 124,000 brucellosis affected herds were disclosed. It is estimated that this identified only one-third to one half of the actual brucellosis affected herds, since surveillance activities were not at an optimal level in 1954. Since the inception of the National Brucellosis

Eradication Program, billions of dollars have been spent from federal, state, and industry funds to eliminate the disease. The nation is now near completion of the eradication of brucellosis from livestock, and thus further emphasis is being placed on the need to ensure that transmission of brucellosis from bison to cattle does not occur. As of November 30, 2000, only two brucellosis affected cattle herds remained under quarantine, one each in Texas and Florida.

Lands adjacent to Yellowstone National Park include national forest system lands where cattle graze under federal permits and private lands where cattle use also occurs. When bison occasionally migrate from the park, usually in the winter, the risk of transmission of brucellosis from bison to cattle increases. Without agency actions to minimize the risk, transmission could occur.

Public controversy over bison management in Yellowstone National Park and the State of Montana has existed for many years. In the mid-1980s the Fund for Animals filed the first of several lawsuits directed at bison management. Even though the state and federal agencies successfully defended their actions at that time, they recognized that the apparent conflicts in agency mandates could best be met by a coordinated, joint bison management plan.

In 1990 the National Park Service, the U.S. Forest Service, and the Montana Department of Fish, Wildlife, and Parks formally recognized the need to cooperatively prepare a long-range bison management plan. At that time, those agencies published in the *Federal Register* a "Notice of Intent" to prepare an environmental impact statement examining options for such plan. In 1992, those agencies and the Montana Department of Livestock and U.S. Department of Agriculture, Animal and Plant Health Inspection Service signed a "Memorandum of Understanding" to work together in developing a plan to meet their varying and sometimes contradictory objectives.

From 1990 through 1995, during the development of the long-range plan and environmental impact statement, the parties individually or jointly prepared three interim bison management plans and environmental assessments. In general, these three interim plans provided for agency personnel from Montana and the National Park Service to shoot bison moving from Yellowstone National Park into Montana in order to achieve the objectives of protecting private property, providing for human safety, and maintaining Montana's brucellosis class-free status.

In 1995 the State of Montana sued the National Park Service and APHIS, complaining both of NPS management of bison and the possibility that APHIS would change the state's brucellosis class-free status. To resolve that case, the parties signed a settlement agreement that provided a schedule for the completion of the long-term bison management plan and environmental impact statement. The settlement agreement also incorporated the 1992 Memorandum of Understanding and expressly recognized that the termination provision of the Memorandum of Understanding would continue to apply. The settlement agreement also required that, if a party were to withdraw from the Memorandum of Understanding process, it must provide a written explanation of the reasons for the withdrawal. Finally, the settlement agreement provided that the court would dismiss the suit upon the issuance of the records of decision or if a party terminated the Memorandum of Understanding, whichever occurred first.

Following the settlement of the lawsuit, the National Park Service and the State of Montana issued the fourth interim plan in 1996, which provided for the capture of bison in Yellowstone National Park near the north boundary in the Stephens Creek area and shipment of captured bison to slaughter. The plan provided that the agencies would not remove bison that entered the Eagle Creek/Bear Creek area northeast of Gardiner, Montana, as those lands are wildlife winter range of the Gallatin National Forest and not grazing areas for domestic cattle. The plan also provided for the capture of bison outside Yellowstone in the West Yellowstone area, and the shipment to slaughter of seropositive bison and seronegative pregnant females. Finally, the plan called for the release of seronegative nonpregnant bison on the Gallatin National Forest in the Horse Butte area. In 1997 the federal agencies modified the fourth interim plan to provide for NPS to hold up to 125 bison captured in the Stephens Creek area for later release into the park and called for more tolerance of untested, low risk bison outside the park.

The fourth interim bison management plan included the capture and testing of bison in capture facilities within Yellowstone National Park and on the Gallatin National Forest, and subsequent slaughter of seropositive and pregnant bison. Two lawsuits challenged the legal basis for the agency implementation of that interim plan. The U.S. District Court for the District of Montana held that the actions of the National Park Service under the interim plan, as modified, were within the authority and discretion of the agency. The Ninth Circuit Court of Appeals affirmed that decision.

On June 16, 1998, the agencies released the Draft Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park. Following the receipt and analysis of public comments on the DEIS, the federal agencies developed a strategy for bison management and disease oversight that they presented to the state as a possible modified preferred alternative for the final environmental impact statement. The new strategy would allow greater tolerance for bison outside the park under stringent conditions that would continue to control the risk of transmission of brucellosis from bison to cattle. The strategy would also provide for a larger bison population than the preferred alternative in the DEIS.

The federal and state agencies discussed aspects of the strategy for several months. The parties could not reach an agreement or understanding on several critical issues including the ages and classes of bison to be vaccinated, the criteria used to decide when bison would be allowed outside the park, and how to use spatial and temporal separation in an adaptive management approach to managing the risk of transmission of brucellosis. Eventually, the federal agencies and the governor of Montana agreed that the agency discussions had reached an impasse.

In December 1999, the federal agencies wrote to the governor of Montana advising that they were withdrawing from the Memorandum of Understanding. This action terminated the Memorandum of Understanding and triggered the dismissal of the 1995 lawsuit. The state objected to the federal agencies' request to dismiss the case. In February, 2000, the court agreed with the position of the federal agencies that they could withdraw from the Memorandum of Understanding and cause the dismissal of the suit. The federal and state agencies agreed, however, that before the court would formally dismiss the suit, the agencies would attempt to resolve their differences with the use of a court-appointed mediator. That mediation occurred in the spring, summer, and fall of 2000, and led to a slightly altered version of the modified preferred alternative now referred to in this document as the Joint Management Plan.

This decision initiates the long-term management of the Yellowstone bison. The next steps are to continue research and take conservative but progressive steps toward cooperative management of the bison while protecting Montana's brucellosis class-free status. In recognition of the complexities of cooperative bison management, the federal and state agencies will work together on the research projects and the monitoring of the bison in each of the three steps described in the Joint Management Plan.

II. Decision

The Joint Management Plan results from mediated negotiations between the federal agencies and the state agencies following the decision of the federal district court that the federal agencies could terminate the MOU. The mediation was informed by the draft and final environmental impact statements, the public comments submitted on both documents, other relevant documents in the administrative record, and lengthy negotiations with the State of Montana. Additionally, the parties continued the mediation until they had an opportunity to review comments submitted on the FEIS.

When bison leave Yellowstone National Park and enter Montana, the management responsibilities and authorities change. Within the boundaries of Yellowstone National Park, the Secretary of the Interior has exclusive jurisdiction to manage the park's natural resources, including the bison. Outside the park the State of Montana has the management authority over the bison. When the bison are on national forest system lands, the U.S. Forest Service has responsibilities under federal laws to provide habitat for the bison, a native species. Federal law requires APHIS to control and prevent the spread of communicable and contagious diseases of livestock. Because of these mandates, the agencies recognize that a coordinated, cooperative management regime would provide consistency and reliability to the process. Even so, the agencies recognized that their diverse mandates would fuel public discourse and criticism of agency action. By necessity, due to limited authorities, each agency had to reconcile their goals, such as providing for a free-ranging bison herd, with other goals such as reducing the risk of transmission of brucellosis from bison to cattle.

To achieve a cooperative plan, the federal agencies, especially APHIS and the National Park Service, had to reconcile agency policies to reach a plan that was technically sound, legally defensible, and publicly acceptable. The National Park Service will continue to capture, test, and possibly hold bison in a facility seen by many persons as inappropriate for managing wildlife in a national park. The National Park Service also will vaccinate wildlife, an activity previously reserved in Yellowstone National Park for species listed under the Endangered Species Act. Finally, the National Park Service also will take actions to limit the population of the bison for disease risk management purposes.

APHIS recognizes that although this is not a plan to eradicate brucellosis, it is a means to manage bison and cattle to minimize the risk of brucellosis transmission from bison to cattle. Furthermore, these management actions demonstrate a long-term commitment by the agencies to work towards the eventual elimination of brucellosis in free-ranging bison in Yellowstone National Park. APHIS will continue to take and encourage actions to prevent the transmission of brucellosis from bison to cattle. APHIS has agreed that Montana's tolerance of bison from Yellowstone according to the provisions of the Joint Management Plan would not be grounds for a change in the state's brucellosis class-free status. APHIS also has agreed to assist Montana in consulting with other states should they threaten or impose sanctions against Montana cattle based on implementation of this Joint Management Plan.

The U.S. Forest Service, Gallatin National Forest, manages lands and interest in lands newly acquired north of Reese Creek adjacent to Yellowstone National Park. These acquired lands and conservation easement lands benefit wildlife generally, including bison, and reduce the complexity of managing wildlife habitats north of the park. The federal agencies anticipate future discussions with the Royal Teton Ranch to develop a bison management plan for the Royal Teton Ranch that is consistent with the decision in this document.

In this Record of Decision we jointly adopt the modified preferred alternative of the FEIS, as modified by the Joint Management Plan, as set out on pages 21 to 35 of this document. The National Park Service, U.S. Forest Service, and Animal and Plant Health Inspection Service will apply this decision to management to reduce the risk of transmission of brucellosis from bison to cattle and to conserve free-ranging bison. The Joint Management Plan will apply to Yellowstone National Park and those areas of Montana shown on the attached map, including lands within the Gallatin National Forest and private lands in which the United States holds a conservation easement. See Figure 1, West and North Boundary Management Zones. These federal agencies will work with agencies of the State of Montana in implementing this decision, as set out in the Joint Management Plan. We determine that, if appropriate,

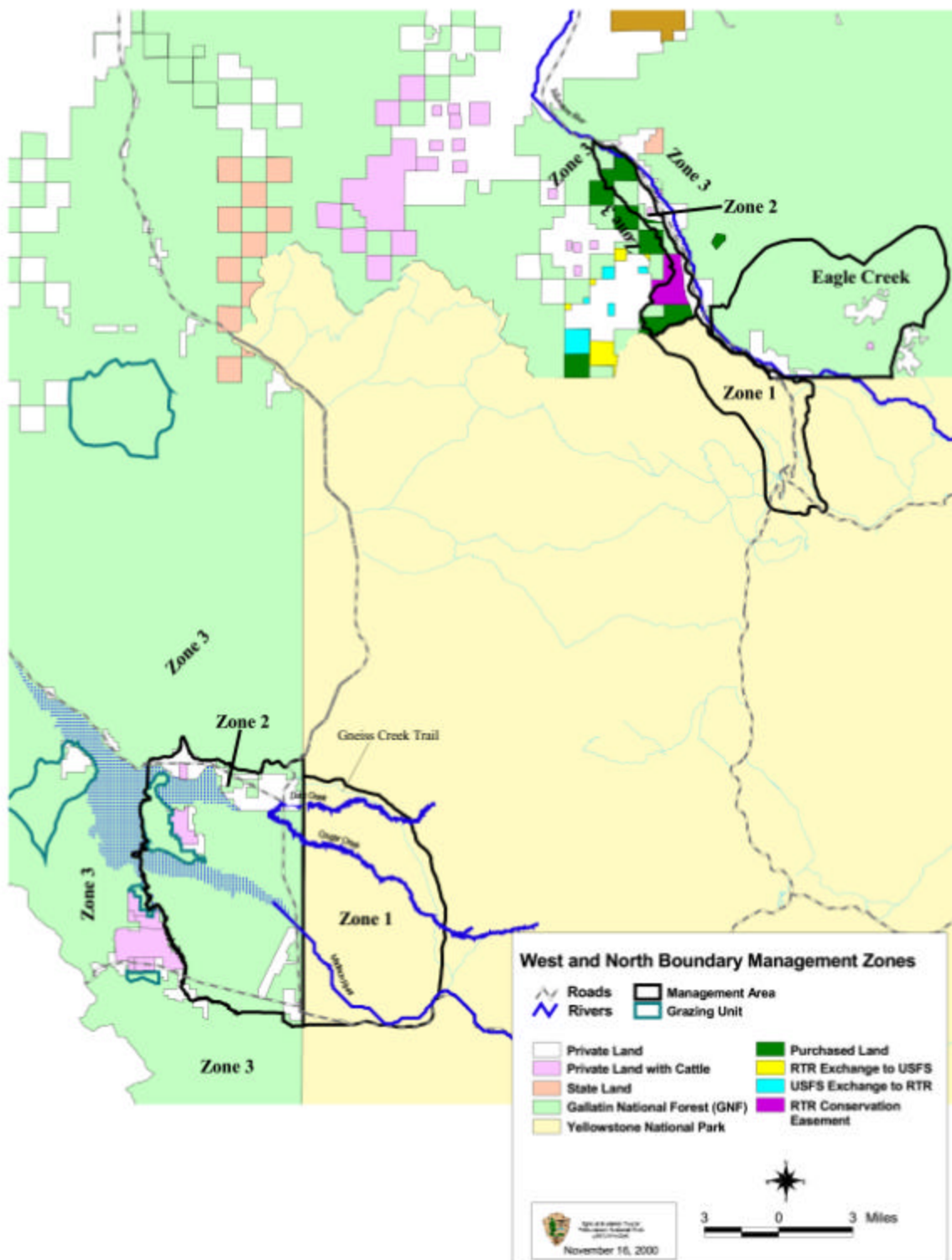


Figure 1

the federal agencies will take the necessary steps to withdraw support for the actions of the State of Montana, should the state trigger such withdrawal as set out in the Joint Management Plan.

The management direction consists of an adaptive management program that includes intensive monitoring and coordination, as well as research projects with specified resultant management actions responding to the research results. The strategy is based on the modified preferred alternative, except for minor alterations noted in this document. We understand that the EIS team carefully considered the alterations to the modified preferred alternative to determine if any of them would have environmental or socioeconomic impacts different from those analyzed for the eight alternatives in the final EIS, and found that all impacts would be within the range of those analyzed. Specifically, APHIS has reviewed the strategy and determined that the adaptive management approach, which encompasses the spatial and temporal separation, is a viable approach in reducing the risk of transmission.

The Joint Management Plan meets the goals of the state and federal agencies identified in the draft and final environmental impact statements. Those goals included specific commitments relating to the size of the bison herd, both within and outside Yellowstone National Park; a clearly defined boundary line beyond which the agencies will not tolerate bison; provide for public safety and the protection of private property; agency actions showing a commitment toward the eventual elimination of brucellosis in bison; protection of livestock from the risk of brucellosis; actions to help protect the brucellosis class-free status of Montana; and maintenance of a viable population of wild bison in Yellowstone National Park from biological, genetic, and ecological terms. The plan is based on factual information, which recognizes that the scientific database is changing. Finally, the plan recognizes the need for coordinated management of natural and cultural values that are the responsibilities of the cooperating agencies.

A. Statutory Basis for the Joint Management of Yellowstone Bison

The major federal laws that apply to federal agency actions in the Joint Management Plan are the National Park Service Organic Act and General Authorities Act, the Yellowstone Enabling Act, the National Forest Management Act, the Forest Service Organic Act, the Multiple-Use Sustained-Yield Act, the Federal Land Policy and Management Act, the Department of Agriculture Organic Act, the Animal Industry Act, the Animal Disease Control Cooperative Act, the Cattle Contagious Diseases Act, the Act of July 2, 1962, the Endangered Species Act, and the National Environmental Policy Act. These statutes provide our agencies broad discretion to exercise our expertise to manage the lands, programs, and wildlife, as applicable, under our administrative authority in a manner deemed best to meet the purposes Congress has delineated.

The management actions we adopt here comply with the requirements of federal law, including those statutes listed above. They are based on the best available scientific information and are ecologically sound. They will provide for the conservation of bison in Yellowstone National Park and provide protection for the economic interest and viability of the livestock industry in the State of Montana. Moreover, they include a commitment by the federal and state agencies to work together on meeting these objectives.

Cooperative management of Yellowstone bison requires an ecosystem approach. The federal agencies recognize the importance of cooperating with each other and the involved Montana agencies in the long-term management of free roaming bison in and around Yellowstone National Park. Federal law provides the Secretary of the Interior with exclusive jurisdiction within the boundaries of Yellowstone National Park. Even so, NPS appreciates the importance of the efforts of APHIS in its National Brucellosis Eradication Program. The agencies are committed to working toward the eventual elimination of brucellosis in bison and other wildlife (see FEIS, vol. 1, p. 44). The National Brucellosis Eradication Program is a cooperative state-federal program based on cooperation between APHIS, state agencies in charge of livestock disease programs, and the livestock industry. The agencies recognize, however, that actions taken under this plan will necessarily differ significantly from actions taken to eradicate the disease in livestock. However, APHIS supports the step-by-step implementation of the Joint Management Plan, as well as the disease control measures, such as vaccination, that are included in the Joint Management Plan. The Forest Service administers national forests for multiple purposes, including providing habitat for wildlife and grazing allotments for cattle. The Forest Service recognizes that the State of Montana has primary management

responsibilities for livestock disease and wildlife on national forest as well as private lands surrounding Yellowstone National Park.

The Department of Agriculture Organic Act, the Animal Industry Act, the Animal Disease Control Cooperative Act, the Cattle Contagious Diseases Act, and the Act of July 2, 1962, establish the Department of Agriculture as the agency responsible for establishing a means for the suppression and extirpation of contagious disease of livestock. These laws authorize the Department of Agriculture to suppress and prevent the spread of any contagious and infectious disease of livestock by instituting activities, such as establishing and maintaining quarantines, permitting and regulating the movement of livestock, and seizing, quarantining, and disposing of livestock as appropriate. Additionally, these laws authorize the Department of Agriculture to cooperate with others in efforts to control and eradicate such diseases.

Under the Forest Service Organic Act, the Secretary of Agriculture is given general authority to regulate the use and occupancy of the national forests so as to achieve the objectives for which they were reserved. The Multiple-Use Sustained-Yield Act of 1960 broadened the purposes for which national forests were established and are managed to include outdoor recreation, range, timber, watershed, and wildlife and fish purposes. That act also established the concepts of multiple use and sustained yield as the guiding principle underlying national forest management. Multiple use means the management of all the various renewable surface resources of the national forests in the combination that best meets the needs of the American people. Sustained yield means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land. The Forest Service achieves these objectives for each national forest through the development and implementation of a Land and Resource Management Plan ("Forest Plan").

In the Endangered Species Act, Congress recognizes that species of fish, wildlife, and plants facing extinction are of aesthetic, ecological, educational, historical, recreational, and scientific value to the United States and its people. The purposes of this act are to provide for the conservation of ecosystems upon which threatened and endangered species depend, to provide a program for the conservation of such species, and to take appropriate steps to achieve the purposes of international treaties and conventions aimed at protecting these species. Under the ESA, all federal agencies must use their authorities in furtherance of the purposes of the act by carrying out programs for the conservation of endangered and threatened species. Additionally, each federal agency must consult with the Secretary of the Interior and insure that any agency action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat.

Interrelated provisions of the NPS Organic Act and the NPS General Authorities Act of 1970, as amended, provide the most important statutory directive for the National Park Service. The Organic Act requires the Secretary of the Interior to manage park resources and values in a manner that will leave them unimpaired for future generations. The General Authorities Act prohibits the Secretary from managing units of the National Park System in derogation of the values and purposes for which the various areas have been established, except as Congress may directly and specifically provide. The National Park Service considers these two mandates (no impairment and no derogation) as defining a single standard for the management of the National Park System

Recently the director of the National Park Service issued guidance interpreting the National Park Service Organic Act (16 U.S.C. 1), and the 1978 amendments to the General Authorities Act (16 U.S.C. 1a-1). These are the fundamental provisions of law with which NPS managers must comply when authorizing activities to occur within areas of the National Park System. Generally, these two provisions direct the Secretary of the Interior to manage parks for conservation purposes and public enjoyment without impairment. The mandate to conserve park resources and values is separate from the prohibition on impairment. The conservation mandate, thus, applies even when there is no risk that park resources or values may be impaired. Although park managers must seek ways to avoid or minimize adverse impacts on park resources and values, they have discretion to allow impacts when necessary and appropriate to fulfill the purposes of a park. This discretion exists, however, only so long as the impact does not constitute an impairment of the affected resources and values. Finally, the purpose of providing enjoyment of park resources and values to the people of the United States ensures enjoyment of park resources and values by all people of the United States. This includes people who directly experience parks and those who appreciate them from afar. It also includes deriving benefit and inspiration from parks.

Congress has provided that when there is a conflict between conserving park resources and values and providing for the enjoyment of them, conservation is predominant. Additionally, although Congress has provided the secretary with limited discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The NPS, thus, must manage park resources and values to allow them to continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

An impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. The manager must consider several factors to determine if an impact is an impairment. Those factors include: severity, duration, timing, direct and indirect effects of the impact, and cumulative effects of the impact together with other impacts. Any impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation creating the park.
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park.
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result, which cannot reasonably be further mitigated, of an action necessary to preserve or restore the integrity of park resources or values. NPS decision-makers must consider the impacts of a proposed action and determine, in writing, whether that activity will lead to an impairment of park resources and values. If there is an impairment, the decision-maker cannot approve the action.

When Congress created Yellowstone National Park in 1872, it set apart the area as a "public park or pleasure ground for the benefit and enjoyment of the people." (16 USC 21) Congress also declared that the park would be under the "exclusive control" of the secretary of the Interior. Congress charged the secretary with "providing for the preservation, from injury or spoliation...the natural curiosities, or wonders, within the park, and their retention in their natural condition." The secretary also must provide against the "wanton destruction of the fish and game found within the park." In 1894 Congress provided additional protection to wildlife within the park, largely in response to continued poaching of bison. In what is often referred to as the original Lacey Act, Congress prohibited within the boundaries of the park "[a]ll hunting, or the killing, wounding, or capturing at any time of any bird or wild animal, except dangerous animals, when it is necessary to prevent them from destroying human life or inflicting an injury."

Finally, the National Environmental Policy Act, while not imposing substantive duties on the agencies, supports a planning approach that incorporates an ecosystem perspective.

B. Joint Management Plan

The Joint Management Plan provides for various actions in Yellowstone National Park, the Gallatin National Forest, and private lands on the north and west boundaries of Yellowstone National Park, phased in as the agencies reach identified goals in bison management and research. This plan is very similar to but a slightly altered version of the "Modified Preferred Alternative" presented in the final EIS. Although features of the selected alternative may be different than the modified preferred alternative, the environmental impacts are within the impacts in the range of eight alternatives fully considered and analyzed in the final EIS. The full plan is set out in this document at pages 21 to 35.

Like the modified preferred alternative, the Joint Management Plan employs an adaptive management approach that allows the agencies to gain experience and knowledge before proceeding to the next management step, particularly with regard to managing bison on winter range outside Yellowstone National Park. The Joint Management Plan uses many tools to address the risk of transmission of brucellosis, but primarily relies on the spatial and temporal

separation of bison from an affected herd and cattle. The agencies will not allow bison to intermingle with cattle. Additionally, in the spring the agencies will haze bison back into the park, at or near the time when bison historically can return to the park based on snow and weather conditions, or capture or shoot them if hazing is unsuccessful. The Joint Management Plan includes capture, test, and slaughter of seropositive bison at both the Reese Creek and West Yellowstone areas in steps one and two, and the use of hazing, capture, test and slaughter operations, or quarantine, if available, of all bison that might remain outside the park in these areas after specified haze-back dates.

The agencies will control the risk of transmission to cattle outside the boundary areas by limiting the number of bison in the boundary areas through intensive monitoring and zone management. The agencies will increase the intensity of management as bison move toward the edges of management Zone 2 (Figure 1).

The agencies will use hazing, capture facilities, or shooting, if necessary, to prevent bison from leaving management Zone 2, enforce zone management, and ensure the removal of all bison from management Zone 2 in the spring, to maintain temporal separation as described in the Joint Management Plan, *infra*. The agencies also will defer cattle grazing on the Gallatin National Forest for the summer until after bison are hazed back into the park in the spring. Additionally, the agencies will use vaccination of bison and cattle to reduce risk even further and to work toward the eventual elimination of brucellosis in bison.

These actions will ensure that sufficient time (initially approximately 45 days or less depending on research results) passes so that the *B. abortus* bacteria are unlikely to have survived when cattle return to graze in the summer. Research in Wyoming on *B. abortus* Strain RB51 bacteria (used as a surrogate for field strain *Brucella abortus* in the research) and data on field strain *B. abortus* in Yellowstone National Park indicate the bacteria are highly unlikely to survive after an approximate 45-day period (or less depending on research results) due to heat, ultraviolet light, and a number of other factors. The release of untested bison outside the park (i.e., Step Three) in the Joint Management Plan, however, relies on research sufficient to allow the agencies to determine an adequate temporal separation period. The research would address the viability and persistence of the bacteria in environments to the west and north of the park. Such release also relies on the initiation of a vaccination program for bison in the park with a safe and effective vaccine and a safe and effective remote delivery system.

As with the modified preferred alternative, the agencies will use radiotelemetry to monitor seronegative pregnant bison outside the park in steps one and two to evaluate the risk and develop appropriate mitigation measures if needed. While the agencies collect data, they also will use telemetry to provide an added measure of security in the event that any of these bison either abort or give birth outside the park. In steps one and two, the agencies could remove telemetered females giving birth to live calves or aborting fetuses outside the park.

As with other alternatives, the agencies will vaccinate vaccination-eligible bison, including remote vaccination of those bison inside the park. Except for Eagle Creek/Bear Creek, Cabin Creek Recreation and Wildlife Management Area, and the Monument Mountain Unit of the Lee Metcalf Wilderness, the agencies will manage bison allowed to leave the park in zones (Figure 1). The management in these zones will become more intense as bison approach the boundary areas of the zones. The agencies also may provide for more intensive monitoring of cattle, including testing, calfhood vaccination, and possible adult vaccination in and near these zones.

As with most other alternatives analyzed in the FEIS, untested bison would be allowed to occupy the Eagle Creek/Bear Creek area, Cabin Creek Recreation and Wildlife Management Area, and the Monument Mountain Unit of the Lee Metcalf Wilderness year-round without agency interference because these areas do not have cattle grazing within them or nearby.

The Joint Management Plan has three adaptive management steps each for the north and west boundary areas.

Step One

In the north boundary area NPS would continue to monitor bison from approximately November 1 to April 30 within Yellowstone National Park and use hazing within the park to prevent bison movement north onto private and Gallatin National Forest lands in the Reese Creek area. If hazing is unsuccessful, the NPS will operate the Stephens

Creek capture facility and capture all bison attempting to exit the park in the area. The agencies will test all captured bison, send seropositives to slaughter, and temporarily hold all seronegatives (up to 125 animals) for release back into the park in the spring. The agencies will vaccinate with a safe vaccine all vaccination eligible bison that they capture. Agency personnel will remove bison outside the park that they cannot haze back into the park or capture. Recently, the U.S. Departments of the Interior and Agriculture purchased some of the lands and acquired easements on other lands north of this boundary. The Gallatin National Forest now manages the purchased lands and easements. Step Two would begin when a pre-existing private cattle lease on the RTR lands terminates (anticipated in the winter of 2002/2003).

In the western boundary area, Step One provides that the agencies will allow seronegative bison outside the park under certain conditions identified below. After cattle leave management Zone 2 in the fall, the agencies will haze bison exiting the park into the West Yellowstone area back into the park. When hazing becomes ineffective, the agencies will capture the bison. The agencies will test all captured bison and send seropositives to slaughter or for use in jointly approved research. The agencies will release all seronegatives up to the specified tolerance level of 100 bison. The agencies will allow seronegative pregnant bison in management Zone 2 under conditions described in the Joint Management Plan. During Step One, agency personnel will make every attempt to capture and test the bison that leave the park. The agencies will vaccinate all captured vaccination-eligible bison with a safe vaccine as determined by the agencies according to criteria established by the Greater Yellowstone Interagency Brucellosis Committee. The agencies will allow the seronegative bison as well as other bison that agency personnel cannot capture but that are tolerated to remain outside the park until May 15. To ensure temporal separation after May 15, the bison that agency personnel cannot haze or capture will be subject to lethal removal. The agencies also would manage all bison in the West Yellowstone area in zones, with progressively more intense management as bison move toward the edge of management Zone 2.

In addition to bison vaccination, the State of Montana would encourage voluntary vaccination of vaccination-eligible cattle that may graze in areas outside the park that bison may occupy during the winter. If within one year of the initiation of the Joint Management Plan, 100% voluntary vaccination of vaccination-eligible cattle in areas outside the park that may be occupied by bison were not achieved, the State would make such vaccination mandatory. The Animal and Plant Health Inspection Service would reimburse the direct cost of the vaccination.

The impacts of Step One are similar to those described in alternative 1 (the no-action alternative, or continuation of the interim plan), except that the agencies may release and closely monitor seronegative, pregnant bison in the west boundary area, rather than ship them to slaughter as under the interim plan, and vaccination-eligible bison captured outside the park will be vaccinated.

Step Two

Step Two in the north boundary area begins when cattle no longer graze during the winter on the Royal Teton Ranch adjacent to the Reese Creek boundary of the park. The agencies expect this to occur when a preexisting private cattle lease expires in 2002. The agencies will allow seronegative bison to occupy these lands during the winter under certain conditions. Initially, the agencies will allow up to 25 seronegative bison outside the park in the northern boundary area. When the agencies are confident they can manage these bison, they will tolerate up to 50 bison outside the park in the Reese Creek area. Again, when the agencies agree they have adequate information and ability to manage 50 bison in this boundary area, the number will increase, this time up to 100 bison. This increase could take place in a single winter, or be spread over a number of winters, depending on the experience gained by managing bison outside the boundary of the park, weather, and the number of bison that chose to emigrate in any given winter. The agencies will allow the seronegative bison as well as other bison that agency personnel cannot capture but that are tolerated to remain outside the park until April 15. The number and distribution of bison on the north side, as well as most impacts associated with these factors (such as viewing, cultural significance of the herd, impacts to grizzly bears, livestock operations, etc.) could at times be similar to those described for alternative 3. Population control would limit impacts in some cases, so that they would be less beneficial (such as for viewing or grizzly bears) or less adverse (livestock operations) than for alternative 3.

Step Two in the west boundary area will be the same as Step One, with one exception. The agencies anticipate the availability of a safe and effective system to remotely deliver a safe vaccine for vaccination-eligible bison. If a safe

vaccine were available, the agencies will use this delivery system to remotely vaccinate any untested calves, yearlings, or other vaccination-eligible bison that the agencies could not capture in the west boundary area.

Step Three

The third step of the alternative begins when certain conditions, described below, have been met. These conditions include research on the viability and persistence of *B. abortus* in the environments particular to the western and northern boundary areas sufficient to allow the agencies to determine an adequate temporal separation period, experience in managing bison within the areas they are allowed to occupy, and the initiation of a vaccination program for all vaccination-eligible bison in the herd. In the West Yellowstone area, the agencies presume Step Three will begin in the winter of 2003/2004. In the Reese Creek area, they expect to begin this step in the winter of 2005/2006. Because the data and experience collected during the first two steps would provide the agencies the tools and knowledge to manage bison outside the park, Step Three would allow bison to leave the park and enter management zones without the agencies first testing them. The agencies, therefore, would allow untested bison up to a tolerance level of 100 in both the northern and western boundary areas to freely range in both the western and northern boundary areas, and manage them as described above.

In the spring, the agencies would haze all bison remaining in the Reese Creek or western boundary areas back into the park. The agencies would use capture facilities in Stephens Creek and the West Yellowstone area to maintain the bison population at 3,000, to enforce tolerance levels of bison in either the Reese Creek and West Yellowstone boundary areas, and to ensure no bison remain outside the park after the respective haze-back dates.

If the agencies believe it would serve in better managing bison, a quarantine facility would be constructed and operated. If so, the agencies, with APHIS as lead agency, would undertake a NEPA process to determine the design, location, and operation procedures of a bison quarantine facility. The agencies anticipate they will decide on whether to pursue a quarantine facility when the management plan reaches Step Three in both management areas.

Impacts to the size and distribution of the bison herd from implementing this set of management prescriptions would be more beneficial than those associated with phase 2 of alternative 7, but less positive than phase 2 of alternative 2.

Other Management Provisions and Contingency Plans

The Joint Management Plan addresses the perceived risk of state sanctions through the commitment of APHIS to consult with states threatening sanctions to convince such states that sanctions are unwarranted. In addition, APHIS and Montana would conduct additional monitoring of cattle herds that graze in areas that bison may occupy during the winter, including regular testing of test-eligible cattle and possible adult vaccination of these cattle herds. APHIS also will do the following: a) make funding available to certify individual cattle herds, which graze in areas that bison may occupy in winter, as brucellosis-free; and b) pay the direct costs of any additional testing of any cattle that might be recommended by APHIS and the state veterinarian. The state veterinarian, in consultation with APHIS, may require the testing of test-eligible cattle on lands within two miles of management Zone 2 in both the northern and western boundary areas, or on lands in management Zone 3 if bison have been present despite the provisions of the Joint Management Plan precluding bison from occupying such areas. APHIS also will provide funds for voluntary testing of cattle within two miles of management Zone 2 in the northern and western boundary areas.

In the unlikely event of a disclosure of a brucellosis-affected cattle herd in a management area or a brucellosis-affected cattle herd outside the management area but for which APHIS and the state veterinarian concur that the source is traced back to a management area, the agencies will implement modified management measures pending the completion of an epidemiological investigation to determine the source of infection. The modified management measures are described in detail in the Joint Management Plan, *infra*.

In addition, the agencies have agreed to temporarily modify elements of this plan to mitigate lethal removal of bison due to exigent circumstances arising from severe winter conditions. These mitigation measures also are described in the Joint Management Plan, *infra*.

C. Application of this Decision

1. Application to the National Park Service

The Final EIS, pages 752-753 describes the management plans specific to Yellowstone National Park that would need modification with the adoption of the Joint Management Plan. This decision amends the park's Master Plan (1974), Statement for Management (1986), and Resource Management Plan (1995) and replaces the Interim Bison Management Plan.

2. Application to the U.S. Forest Service

The FEIS, vol. 1, pp. 753-754 describes the acts, regulations, and plans that provide authority and direction relative to the management of bison on the Gallatin National Forest. The principal role of the Forest Service in implementing the Joint Management Plan is to provide habitat for bison. Cooperating with various agencies of the federal and state governments in performing their respective roles in bison management and animal health management is consistent with this role. The Gallatin National Forest Land and Resource Management Plan (1987) provides habitat management emphasis for the geographic area of the Joint Management Plan, predominantly within management areas for wilderness and wildlife emphasis. No decision by the Gallatin National Forest, USDA Forest Service, is required to implement the Forest Service roles of providing habitat and cooperating with other agencies in the management of bison and disease. The 1987 Land and Resource Management Plan for the Gallatin National Forest is sufficient to guide proposed actions and activities in facilitating implementation of the Joint Management Plan.

3. Application to APHIS

For more than sixty years APHIS and its predecessor agencies have had a national program to eradicate brucellosis from the nation's livestock. Billions of dollars have been spent in this cooperative federal, state, and industry eradication effort. The implementation of the Joint Management Plan requires the cooperating agencies to take steps to ensure that brucellosis is not transmitted from bison in an affected herd to brucellosis-free cattle. More importantly, although not a plan for the eradication of brucellosis, the management activities of the Joint Management Plan demonstrate a commitment to the eventual elimination of the disease in the bison of Yellowstone National Park. This commitment and the management activities that support the commitment further the efforts of APHIS in eradicating brucellosis. In this regard, APHIS does not need to promulgate any new regulations to implement the Joint Management Plan.

4. Application to Contracts, Permits, and Special Use Authorizations

None of the federal agencies need to revise any existing contracts, permits, or special use authorizations to implement this decision.

5. Application to Research Activities

This decision affects and has relevance to ongoing and future research. The agencies would use the information from these research efforts to modify parts of the final plan, as appropriate. Notably, in Step 1 of the final plan, the agencies will conduct research regarding the viability of *Brucella abortus* bacteria in the environment in the northern and western boundary areas and will conduct research regarding the rate of fetal disappearance in the same areas. The results of the research will allow the agencies to further refine their ability to adjust the temporal separation between cattle and bison. In the final plan, the agencies also may use bison from capture operations for approved research. Several additional ongoing research topics include, but are not limited to, tests of the safety of vaccines in non-target and endangered species (p. 98, FEIS, vol. 1), testing and development of a safe and effective vaccine for bison (pp. 99-100, FEIS, vol. 1), studies on the epidemiology and pathogenesis of *Brucella abortus* in bison, and *Brucella*-specific blood tests for determining the exposure to *Brucella abortus* and presence of the

bacteria (pp.100-102 and Appendix D, FEIS, vol. 1). Regarding research on vaccines and remote vaccine delivery systems, the agencies will vaccinate only vaccination-eligible bison with safe vaccines and will vaccinate bison remotely following research and development of a safe and effective vaccine and a safe and effective remote vaccine delivery system.

6. Relationship to Other Plans and Proposals

Winter Use management in Yellowstone National Park: While Yellowstone National Park has been involved with the long-term bison management plan it also has been developing a winter use plan jointly with Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway. NPS issued the decision on the winter use plan on November 22, 2000. The winter use planning effort considered seven alternatives, some of which would have eliminated motorized visitor activities in parts of Yellowstone National Park, primarily in areas of important winter wildlife habitat. Under the selected alternative the National Park Service will continue to groom roads to allow motorized access on all presently open routes, shifting from primarily snowmobile access to exclusive snowcoach use. The implementation of the winter use plan decision will not affect this decision as bison management actions, except for remote vaccination, occur at or beyond park boundaries and not in the interior of Yellowstone National Park. The remote vaccination program will not require plowed roads or the closing of any winter routes presently open to park visitors. The winter use activities, thus, will not interfere with the joint bison management efforts.

Presently the National Park Service and the U.S. Fish and Wildlife Service are planning to develop a management plan for the elk and bison in Jackson Hole, Wyoming. APHIS has agreed to participate in this process. Possible partners in that planning process include the U.S. Forest Service and the State of Wyoming. That process should have little, if any, effect on this bison management plan.

We are aware that on November 15, 2000, the State of Montana issued its final EIS on the interagency bison management plan. The state FEIS incorporated by reference and adopted volumes 1, 2, and 3 of the federal FEIS. The state FEIS sets out and analyzes the Joint Management Plan as it existed at one point during the federal-state mediation. One important difference is the state's intent possibly to request the Montana legislature to authorize the Montana Fish, Wildlife and Parks Commission to establish regulations for the public hunting of bison. If approved, the state would administer regulated public hunting outside the park to accomplish bison controls outlined in the Joint Management Plan and to provide recreation on public lands. The state also stated that in addition to controlling the size of the bison population, they may also use hunting to maintain the distribution of bison within Zone 2 in the western boundary area and to prevent movements of bison from public land to private lands or beyond the boundaries of Zone 2. Additionally, if authorized, state employees, including staff of the Department of Fish, Wildlife and Parks and Department of Livestock, as well as the state veterinarian, would develop the bison hunting strategies. The state FEIS does not provide for consultation on the hunting program with the federal agencies involved with the Joint Management Plan. The state FEIS does recognize that additional compliance with the Montana Environmental Policy Act may be required. Until the federal agencies review actual bison hunting proposals, we cannot opine as to the necessity of additional NEPA compliance to implement a public hunt as part of the Joint Management Plan.

7. Relationship to Other Lands

This decision is limited to lands under the control or authority of the NPS, USFS, and State of Montana as described in Paragraphs 27 and 32 of the Joint Management Plan, *infra*, and those management zones shown in Figure 1.

III. The Alternatives

A. Alternatives Considered

The range of reasonable alternatives was defined by the purpose of the action, as described in the federal FEIS, incorporated and adopted by the Montana FEIS, which maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in Montana. Additionally, the agencies agreed that their cooperation is required to fully manage the herd and the risk of transmission of brucellosis from bison to domestic cattle in Montana. Given these two factors, the parties also identified nine specific objectives they believed each alternative had to meet before they could consider it a reasonable alternative. Those objectives are set out on pp. 42-45, FEIS, vol. 1.

The final EIS fully examined eight alternatives, and presented a summary comparison of two agency alternatives and five alternatives suggested by public commentors (FEIS, vol. 1, pages 77-265). The agencies concluded that some of the alternatives suggested by public comments did not fully meet the objectives and none of them had major differences in environmental effects, as defined by the National Environmental Policy Act, from those alternatives that were analyzed in the DEIS and FEIS. Following are summaries of the eight alternatives fully developed and analyzed in the FEIS.

Alternative 1: No Action – Continuation of the Current Interim Bison Management Plan (FEIS pp. 103-112)

Adopting this alternative would continue current bison management as set forth in the 1996 *Interim Bison Management Plan* as defined by National Environmental Policy Act guiding regulations (40 CFR 1502.14). The interim plan relies on strict border enforcement to keep bison and cattle separate and does not provide for the quarantine of bison. Bison are prevented from crossing the northern park boundary at Reese Creek because the adjacent land is private. The National Park Service would ship all seropositive bison captured at the Stephens Creek facility to slaughter.

The agencies allow bison in the Eagle Creek/Bear Creek area of the Gallatin National Forest north and east of Reese Creek. The Department of Livestock, with help from the agencies, maintains a boundary at Little Trail Creek/Maiden Basin hydrographic divide in the Eagle Creek/Bear Creek area. With the permission of the landowner, the agencies remove bison moving north of this boundary and approaching private land in the Gardiner area.

In the West Yellowstone area, the Gallatin National Forest is adjacent to the park. During the winter months up to 50–100 seronegative nonpregnant bison in the West Yellowstone area are able to overwinter successfully outside the park without coming in contact with cattle. The agencies remove seropositive, untested, or any pregnant bison. The agencies exclude bison from the West Yellowstone area from May through October to prevent contact with cattle that occupy the region. The agencies would haze bison located outside the park in the west boundary area back into the park in the spring, 30 to 60 days before cattle occupy private lands in the area. The exact number of days, between 30 and 60, would be at the discretion of the state veterinarian. The agencies would shoot those bison that they could not haze back into the park. In addition, a handful of bison (usually single bulls) use the Cabin Creek/Lee Metcalf area on the west, or Hellroaring and Slough drainages to the north and east of Eagle Creek/Bear Creek. The agencies would haze or shoot those few bison that move beyond the borders of either of these large tracts of public land.

The federal agencies adjusted the interim plan in 1997 to reduce the number of bison shot or shipped to slaughter. The adjustments included an increased emphasis on hazing bison back into the park, holding bison up to the capacity of the Stephens Creek capture facility until weather conditions moderate, and allowing low-risk bison that evade capture in the West Yellowstone area to remain for 30 to 60 days before cattle enter the area.

Alternative 2: Minimal Management – Environmentally Preferred Alternative (FEIS pp. 113-122)

The purpose of this alternative is to restore as near-natural conditions as possible for bison, including a small portion of their historic nomadic migration patterns. This alternative provides the largest area outside Yellowstone National Park over which bison would be able to range (e.g., the Special Management Areas or SMAs). Alternative 2 is considered the environmentally preferred alternative, and is most responsive to the portion of the purpose statement that reads “maintain a wild, free-ranging population of bison.” For further discussion of the environmentally preferred alternative, please see pp. 21, *infra*.

Each alternative, including alternative 2, describes many changes, such as land acquisition, changes in cattle operations, and development of a safe and effective bison vaccine. Each of these involves some unknowns, as well as time, to implement. Until these changes were in place, therefore, this alternative would keep in effect the relevant management tools in the interim plan. The description below assumes these changes have been made. Additionally, since completion of the *Draft Environmental Impact Statement*, the federal Departments of the Interior and Agriculture purchased lands and a conservation easement totaling 6,131 acres between the Reese Creek boundary and Yankee Jim Canyon. The purchased lands are now part of the Gallatin National Forest and available for use by wildlife. The agencies intend that bison would be able to use the purchased and conservation easement lands for winter range when a preexisting private cattle lease currently in operation on adjacent private lands expires in 2002.

In this alternative, the primary means to minimize the risk of disease transmission would be changes in cattle operations in the SMAs. This alternative would provide for lethal control of bison only in cases where human safety was in immediate danger, on private property at the request of the landowner, or outside the SMA border. The agencies would not capture or slaughter bison. A key tool available to restore natural conditions and help control bison distribution would be the closure (e.g., discontinuing grooming) of winter groomed roads in Yellowstone National Park that the animals now use to traverse the park. Bison have “discovered” these pathways from the interior to both the northern and western boundaries of the park and can use them routinely during the winter to access areas they would otherwise have more difficulty reaching. It is hypothesized that the energetic cost of traveling long distances on groomed roads is low, and they in effect allow bison to access other foraging areas, leave the interior, and move to boundary areas. Alternative 2 would be the only alternative to propose changes in winter operations in some segments of park roads to control bison distribution, although other alternatives include research on the use of roads and potential barriers to bison travel (alternative 3), and plowing to access capture facilities (alternatives 5 and 6).

The agencies would maintain boundary lines through hazing and shooting. Landowners could request bison on their property be removed, or could shoot them with permission of the Montana Department of Livestock. Cattle operators on private lands inside designated SMAs might be offered incentives to remove susceptible (breeding) cattle, or grazing rights, easements, or property in bison winter range might be purchased from willing sellers to remove cattle altogether. In addition, public grazing allotments might be modified to accommodate bison.

Alternative 3: Management with Emphasis on Public Hunting (FEIS pp. 123-136)

Alternative 3 would rely on hunting of bison to regulate population numbers and distribution of bison outside the park, and on separation of bison in time and space to preclude contact of bison with cattle. Where hunting was infeasible or inappropriate, the agencies would capture and ship seropositive bison to slaughter and seronegative bison to quarantine to maintain separation and manage the risk of disease transmission. As in other alternatives, the agencies would vaccinate bison when a safe and effective vaccine was developed to further reduce this risk. This alternative would have both a distinct short-term (phase 1) and a long-term (phase 2) management strategy.

In the short term, the agencies would maintain the separation of cattle and bison on the northern (Reese Creek) boundary through capture at Stephens Creek and the shipment of seropositives to slaughter and seronegatives to quarantine (or slaughter until the quarantine facility was built). A quarantine facility would give the agencies flexibility in the disposition of seronegative bison they now do not have.

Bison that completed the entire quarantine procedure would be shipped live to requesting tribes or organizations, or used to repopulate herds on public lands. The alternative does not include the location, design, and operation of a quarantine facility, and an appropriate range of alternatives with different features would be evaluated before one

was built. Additional NEPA and other compliance would be required to build such a facility on federal land or use federal money. Until the time a quarantine facility was constructed, the agencies would send to slaughter all seronegative bison captured at Stephens Creek.

The Department of Livestock, with help from the agencies, would maintain a boundary at Little Trail Creek/Maiden Basin hydrographic divide similar to alternative 1. With the permission of the landowner, agency personnel would remove bison moving north of this boundary.

Agency personnel would haze bison back into the park in the spring, 30 to 60 days before cattle occupy the area. The exact number of days, between 30 and 60, would be at the discretion of the state veterinarian. Agency personnel would shoot those bison that they could not haze back into the park. As in alternatives 1 and 4, the agencies also would maintain a boundary at the north end of the Cabin Creek Recreation and Wildlife Management Area/Monument Mountain Unit of the Lee Metcalf Wilderness. Hunting would be used in both the Eagle Creek/Bear Creek and western SMAs to help control population numbers and distribution. Research on the degree to which the winter grooming of park roads contributed to migration out of the park would continue, and the park would change road-grooming practices in the long term if research showed they were warranted. These changes would be implemented through amendments to the park's winter use plan and appropriate NEPA documentation.

In the long term, alternative 3 would call for acquisition of bison winter range through purchase of grazing rights, easements, or property from willing sellers, alterations in cattle allotments, and/or changes in livestock operations to remove susceptible cattle. This acquired winter range would be designated as the Reese Creek SMA, and would include lands on the west side of the Yellowstone River between Reese Creek and Yankee Jim Canyon. Since the release of the *Draft Environmental Impact Statement*, the United States has acquired these lands. The agencies anticipate the lands would be available for use by bison when a preexisting private cattle lease on adjacent private land expires in 2002. The Department of Livestock, with help from the federal agencies, would maintain a boundary at Yankee Jim Canyon, and hunting in the Reese Creek SMA would be used to help control population size and distribution of the bison herd. The National Park Service would dismantle the Stephens Creek capture facility and move it between the park boundary and Yankee Jim Canyon to help maintain this boundary during phase 2, when bison would be allowed to use the Reese Creek SMA.

Under this alternative, the agencies would request the 2001 Montana Legislature to authorize a fair-chase hunt for bison. The agencies then would use public hunting as the primary tool to control population sizes in the new Reese Creek SMA. The agencies also would allow hunting in the Eagle Creek/Bear Creek area and western SMA. Also, this alternative would consider modifications in grazing allotments, acquisition or easement of private land, or conversion from cow-calf to steer or spayed heifer production in the West Yellowstone area to further reduce the risk of bison commingling with susceptible cattle.

Alternative 4: Interim Plan with Limited Public Hunting and Quarantine (FEIS pp. 137-145)

The interim plan (no action, or alternative 1) has served to ensure spatial separation of the bison herd from domestic cattle on the northern and western borders of Montana. However, it has given agencies few options when harsh winters force more than the average number of bison toward the boundaries of Yellowstone National Park. For this reason, alternative 4 includes a quarantine facility to preserve all seronegative bison captured at Stephens Creek and seronegative pregnant bison captured in the western SMA. Bison completing the quarantine protocol would be released to tribes, requesting organizations, or to repopulate herds on public lands. The agencies have not determined the location of the facility, and locating it on federal land or using federal money would require subsequent NEPA analysis, including public input.

The agencies also would use hunting, should the Montana Legislature approve it, as another tool to help agencies control population numbers and distribution. A limited hunt, primarily for recreation, would be allowed in the West Yellowstone and Eagle Creek/Bear Creek areas. Except for these differences, alternative 4 would be identical to the interim management plan, alternative 1.

Alternative 5: Aggressive Brucellosis Control within Yellowstone National Park through Capture, Test, and Removal (FEIS pp. 146-152)

This alternative would implement an aggressive three-year capture, test, and slaughter program for all bison in the park, including those in its interior. Agency personnel would release in the park the bison testing negative and ship the seropositives to slaughter. If a safe and effective vaccine were available, the agencies also would vaccinate the seronegative bison. The agencies would not allow bison outside the park anywhere in Montana, and agencies would maintain northern and western boundaries. Agency personnel would haze bison at these boundaries, if possible, but shoot them if they were unresponsive to hazing. The agencies would erect capture facilities in nine areas in the park. In the later stages of this program agency personnel would shoot all untested bison. When subsequent testing indicated brucellosis had been eradicated from the bison population, the agencies would prepare a new bison management plan.

Alternative 6: Aggressive Brucellosis Control within Yellowstone National Park through Vaccination (FEIS pp. 153-161)

This alternative, like alternative 5, would pursue the aggressive reduction of brucellosis from the Yellowstone bison herd. However, the agencies first would vaccinate the entire bison herd (when a safe and effective vaccine was available), primarily through remote means. The agencies also would capture and test bison as they attempted to exit at park boundary locations. When tests showed the incidence of exposure to *B. abortus* had stabilized as a result of vaccination, (estimated to occur in 10 years) the herd-wide capture, test, and slaughter of seropositive bison outlined in alternative 5 would begin.

Unlike alternative 5, the agencies would allow bison in the Eagle Creek/Bear Creek and western SMAs, although the majority of bison in the western SMA would be tested and seronegatives released. The National Park Service would construct and operate a capture facility at Seven-Mile Bridge inside the park on the west side. Nearly all bison migrating toward the West Yellowstone area cross through this narrow area. The existing facilities (at Duck Creek and the Madison River) would be dismantled, although a small, backup capture facility near Horse Butte might be maintained.

Alternative 7: Manage for Specific Bison Population Range (FEIS pp. 162-176)

This alternative, the preferred alternative in the DEIS, departs from all other alternatives in that the agencies would focus on a range of bison population numbers, and would put in place specific management scenarios as the population approached either end of that range. This range would be from 1,700 to 2,500 bison. Agency controls would decrease as the bison population approached 1,700 and would cease at 1,700 bison in certain areas. The agencies would implement additional measures to remove increasing numbers of bison near the 2,500 mark if bison left the park or SMAs described in this alternative. Because bison removals occur at or outside the park boundary, the bison population could at times exceed 2,500 inside the park.

In the long term, the agencies might acquire access to additional winter range in the Gardiner Valley on the west side of the Yellowstone River through purchase of grazing rights, easements, or property from willing sellers. Since the release of the DEIS, the United States has acquired some of these lands. The agencies anticipate some of these lands would be available for use by bison when a current private cattle lease on adjacent private land expires in 2002. This tract would be designated a SMA subject to the approval of the State of Montana as specified by Montana law. NPS could dismantle the capture facility now located at Stephens Creek and move it to an appropriate location in the SMA. The U.S. Forest Service has modified grazing permits for the allotments near the park such that the Montana state veterinarian may request a change in the date that livestock return to federal allotments, depending on how long bison have been out of the park in the west boundary area. No other modifications in grazing allotments, property acquisitions, or easements in the western SMA would occur.

Although alternative 7 is distinct, it has elements similar to other alternatives. Capture and slaughter of seropositives would be the primary means of managing risk, as it is in alternatives 1, 4, 5, and 6. The agencies would ship most seronegative bison to quarantine, as described in alternative 4. Also like alternative 4, the agencies would allow low levels of hunting in one or more of the SMAs outside the park. As in alternative 3, alternative 7 has a long-term phase that proposes the acquisition of winter range north of the park boundary. However, as described above, this

alternative is much more specific in defining population size and management tools to keep it at that size. It is also true that alternatives 1 through 6 are unique, as each emphasizes a particular strategy to manage bison or combination of strategies not analyzed in alternative 7.

Modified Preferred Alternative (FEIS pp. 177-195)

The modified preferred alternative employs an adaptive management approach that allows the agencies to gain experience and knowledge before proceeding to the next management step, particularly with regard to managing bison on winter range outside Yellowstone National Park. The alternative uses many tools to address the risk of transmission, but primarily relies on strict enforcement of spatial and temporal separation of bison from an affected herd and cattle.

Until the expiration of a preexisting private cattle lease on adjacent private land north of the park's Reese Creek boundary, Step One would follow the interim plan in the northern boundary area. In the western boundary area the agencies would release seronegative pregnant bison along with other seronegative bison (up to a designated 100-bison tolerance level). When the lease expires, Step Two of the plan should begin. The agencies then would release seronegative bison into the boundary area north of Reese Creek, up to a designated 100-bison tolerance level. Step Three would begin after a minimum of two years of experience managing bison outside the park in both the northern (or Reese Creek) and western boundary areas. Additionally, the agencies would need to meet certain criteria, including the initiation of a vaccination program. This step would allow untested bison (up to the 100-bison tolerance level) to occupy the two boundary areas. Vaccination of vaccination-eligible bison throughout the park would begin when a safe and effective vaccine and remote delivery system become available.

The agencies would maintain the spatial and temporal separation by monitoring both boundary areas 7 days a week. As bison move further from the park, management would become more intensive. Agency personnel would haze all bison outside the park in these areas back into the park in the spring, approximately 45 days before cattle return to these same lands. As an additional risk management measure, the agencies would maintain a population target for the whole herd of 3,000 bison. This is the number above which the NAS (1998) report indicates bison are most likely to respond to heavy snow or ice by attempting to migrate to the lower elevation lands outside the park in the western and northern boundary areas. The agencies would remove to quarantine, seronegative bison attempting to leave the park and not amenable to hazing when either the population exceeds 3,000 or tolerance levels outside the park have been met or exceeded. If the quarantine facility were full or otherwise unavailable, the agencies would send the bison to slaughter. If the bison population is low, the National Park Service would hold bison, up to the capacity of the Stephens Creek capture facility, until weather moderates or until spring green-up begins. The NPS then would release the bison back into the park. Additional risk mitigation measures under the modified preferred alternative included the following:

- Vaccination of cattle in the area would be required if 100% voluntary vaccination were not achieved.
- APHIS and Montana would conduct additional monitoring of cattle herds grazed in the impact area, including testing of test-eligible cattle and possible adult vaccination of these cattle herds.
- The agencies would fit seronegative pregnant females allowed into the boundary areas with radiotelemetry monitoring devices (in Step One in the West Yellowstone area and in Step Two in the Reese Creek area) so that agencies can monitor the birth site for bacteria if bison give birth or abort while outside the park.
- To minimize lethal control, agencies would maximize the use of hazing to keep bison off private lands, to keep them from exiting the park, and to return them to the park if exiting would mean their removal to slaughter or quarantine.

Other Alternatives

The final environmental impact statement (pp. 56-63) sets out several alternatives that the agencies rejected from in depth analysis. The alternatives include fencing the perimeters of the park to physically prevent bison from leaving Yellowstone National Park, providing feed to bison to keep them within Yellowstone National Park, relocating bison to other public lands, using birth control to control the size of the bison population, sterilizing bison to prevent

the transmission of brucellosis, depopulating the entire herd and replacing it with brucellosis-free bison, using native predators to control the bison population, controlling or eradicating brucellosis in elk, requiring cattle producers to change their operations, allowing natural forces to control the size and movements of the bison herd, and restoring bison to the Great Plains. We agree with the judgment of the EIS team to reject a full analysis of these alternatives. Most of them would not have met the goals of the planning process. Others would have had environmental impacts too significant to be within the reasonable range of alternatives.

Additionally, as disclosed in the final EIS (See vol. 2 “Alternatives” section, and Table 13, pp. 237-243 in vol. 1 of the FEIS) public comments recommended several additional alternatives. We agree with the EIS team that these alternatives either repackaged features of the alternatives presented and analyzed in the draft EIS, or did not meet the goals of the planning process.

Environmentally Preferred Alternative

The environmentally preferred alternative is defined as the alternative(s) that best meets the criteria set out in Section 101 of the National Environmental Policy Act. The Council on Environmental Quality defines the environmentally preferred alternative as the alternative that “...causes the least damage to the biological and physical environment and best protects, preserves and enhances historic, cultural and natural resources.”

As a summary, the public was overwhelmingly in favor of more natural management of the bison herd, with minimal use of actions they felt more appropriate for livestock such as capture, test, slaughter, vaccinating, shooting, corralling, hazing, etc. They also indicated extremely strong support for the management and/or restriction of cattle rather than bison given a choice between the two. The public also supported the acquisition of additional land for bison winter range and/or the use of all public lands in the analysis area for a wild and free-roaming herd of bison. A large number of commentators also expressed opposition to lethal controls, and in particular the slaughter of bison.

Alternative 2 would minimize human intervention, discontinue the use of capture, test and slaughter, focus on managing cattle rather than bison, and result in the largest area of acquired land for winter range. It also would offer the largest benefits to most environmental resources analyzed in the EIS, with alternative 3 offering some benefits to many of these same resources as well. The management emphasis and environmental advantages of alternative 2 are most consistent with the overwhelming majority of public comment. In addition, the benefits to environmental resources as analyzed in the FEIS as well as those analysis of Section 101 criteria indicate alternative 2 as environmentally preferred. Based on this combination of public commentary, FEIS analysis, and adherence to the principles of Section 101 of the National Environmental Policy Act, alternative 2 is identified as the environmentally preferred alternative.

B. The Joint Management Plan

Preamble

Bison are an essential component of Yellowstone National Park because they contribute to the biological, ecological, cultural, and aesthetic purposes of the Park. However, Yellowstone National Park is not a self-contained ecosystem for bison, and periodic migrations into Montana are natural events. Some bison have brucellosis and may transmit it to cattle outside the Park boundaries in Montana if bison migrating from the Park are allowed outside the Park without appropriate management measures. Transmission of brucellosis from Yellowstone bison to cattle in Montana could have not only direct effects on local livestock operators, but also on the cattle industry statewide. Because bison that leave YNP are under the management jurisdiction of the State of Montana, the cooperation of several agencies is required to fully manage the herd and the risk of transmission of brucellosis from bison to Montana domestic cattle.

The parties recognize that the cooperation to address the existence of brucellosis in the bison herd involves the management of wild bison on both private and public lands, which requires different approaches to risk and disease management than standard situations involving brucellosis in domestic cattle or bison. The parties also recognize

that cattle vaccination and management of cattle on public lands is an important element of managing the risk of transmission of brucellosis from bison to cattle. The management of bison under this plan will include actions to protect private property; actions to reduce the risk of transmission of brucellosis from bison to cattle; and, actions to maintain a viable, free-ranging population of Yellowstone bison.

Objectives

This plan is not intended to be a brucellosis eradication plan, but rather is a plan for the management of bison, intended to prevent the transmission of brucellosis from bison to cattle. Nevertheless, it sets forth actions to address brucellosis within the bison herd. To this end, Montana and the United States will work cooperatively towards the implementation of a Joint Bison Management Plan. This Joint Bison Management Plan reaffirms the principle purpose for action described in the Draft and Final Environmental Impact Statements “to maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in Montana.” A series of three adaptive management steps are prescribed in this Joint Bison Management Plan that will minimize the risk of transmission of brucellosis to cattle grazing on public and private lands adjacent to Yellowstone National Park and will, when all criteria are met, provide for the tolerance of a limited number of untested bison on public lands and private lands where permitted adjacent to Yellowstone National Park during winter. Implementation of the Joint Management Plan will not cause APHIS to downgrade Montana’s brucellosis class-free status.

The management actions set forth in this plan which reflect occurrence of certain actions by an expected date are the agencies anticipated time periods in which certain management steps may commence. The actual change in management from one step to another are dependent upon all criteria being met or obtained prior to the particular step being implemented.

Definitions

Adaptive Management: In the context of the bison management plan and the modified preferred alternative, adaptive management means testing and validating with generally accepted scientific and management principles the proposed spatial and temporal separation risk management and other management actions. Under the adaptive management approach, future management actions could be adjusted, based on feedback from implementation of the proposed risk management actions.

Temporal Separation: Separation of cattle and bison in time. Maintaining a specified period between the time bison depart or are hazed from certain lands outside the Park and the time cattle move onto those lands.

Spatial Separation: Prevention of cattle and bison from commingling or from utilizing the same area or adjacent areas at the same time.

Agencies: as used herein means the Department of the Interior - National Park Service (NPS), United States Department of Agriculture - Forest Service (USFS) and/or Animal and Plant Health Inspection Service (APHIS); and the State of Montana Departments of Livestock (MDOL), and Montana Fish Wildlife & Parks (MFWP), unless a state or Federal agency is specifically named herein.

In-Park Vaccination Program: A program for delivery of a safe and effective vaccine to vaccinate eligible bison inside Yellowstone National Park so as to decrease the risk of transmission of brucellosis and diminish the overall seroprevalence of brucellosis in Yellowstone bison. Vaccination eligible bison are expected to initially include calves and yearlings, and will include adult bison if and when the agencies deem a vaccine is safe and effective. The agencies will deem a vaccine safe and effective according to criteria established by the Greater Yellowstone Interagency Brucellosis Committee (“GYIBC”). (GYIBC Protocol attached hereto).

Adaptive Management Steps in the Western Boundary Area

The agencies agree to manage bison in the western boundary area as follows:

1. The West Yellowstone region of the western boundary area is shown on the attached map. See Map, West Boundary Management Zones (Figure 2 to this Joint Plan).
2. In Step 1 (expected winter 2000/2001 through winter 2002/2003), after cattle are removed from Zone 2 in the fall, the agencies will haze bison exiting the Park into the West Yellowstone area back into the park. When hazing becomes ineffective, the agencies will capture bison. The agencies will test all captured bison and send seropositives to slaughter or for use in jointly approved research. All seronegatives up to a specified tolerance level (up to 100 bison) will be released. Seronegative pregnant bison will be allowed to enter Montana under the following conditions:
 - a. Seronegative pregnant bison may not enter Montana until cattle are removed in Zone 2 in the fall. If cattle remain on private lands in the West Yellowstone area within Zone 2 during the fall or winter, a buffer as described in paragraph 2.e. below will be maintained until the cattle are removed from those lands;
 - b. Each seronegative pregnant bison moving out of the park after cattle are removed in the fall and before April 1, will receive a radiotelemetry collar or similar device and vaginal radio telemetry implant during handling at capture facilities and released to allow agencies to monitor bison locations and recapture if needed;
 - c. If a telemetered seronegative bison either aborts or gives birth outside the Park, the site of the abortion or birth will be located. If the abortion / birth site contains the *B. abortus* bacteria, the site will be monitored for research purposes and/or actions will be taken to ensure all *B. abortus* bacteria are gone by the time cattle return to the area in late spring/early summer;
 - d. Telemetered female bison that aborted or calved and had shed the *B. abortus* bacteria will be captured to permit further testing or otherwise removed. If it is unclear whether a telemetered female bison that aborted or calved had shed the *B. abortus* bacteria, then the bison may be captured to permit further testing or otherwise be removed as determined by the Montana State Veterinarian in consultation with APHIS;
 - e. In the first year of the Joint Plan's implementation, all seronegative pregnant bison outside of the park will be removed by the agencies by April 1 and will not be allowed outside the Park again until cattle are removed in the fall. After April 1, all bison outside the Park will be kept away from private lands that will be grazed by cattle a sufficient distance to manage the risk of disease transmission. For each area of private property with cattle, the distance will be set by the State Veterinarian in consultation with APHIS. See Figure 3, Map, Private Land Buffer Zones within Zone 2.
 - f. In the second year of the Joint Plan's implementation, all seronegative pregnant bison outside the Park will be removed by the agencies by April 15. After April 1, all bison outside the Park will be kept away from private lands a sufficient distance (as described in paragraph 2.e.) to manage the risk of disease transmission.
 - g. In the third year of the Joint Plan's implementation, all seronegative pregnant bison outside the Park will be removed by the agencies by May 1. After April 1, all bison will be kept away from private lands a sufficient distance (as described in paragraph 2.f) to manage the risk of disease transmission;
 - h. Both of the time periods outlined in paragraphs f and g may be modified by the joint agreement of the agencies if the persistence and viability research indicates that the dates should be adjusted.
3. During Step 1, the agencies will conduct further research regarding the viability of *B. abortus* bacteria in the environment and will conduct research regarding the rate of fetal disappearance in the area, under the principles of adaptive management. The research will allow the agencies to further refine their ability to adjust the temporal separation between cattle and bison, given prevailing climatic conditions outside the park during the spring. The agencies anticipate that this research will last one to two years. The agencies will jointly determine when there is enough data to apply the findings of such research to management.

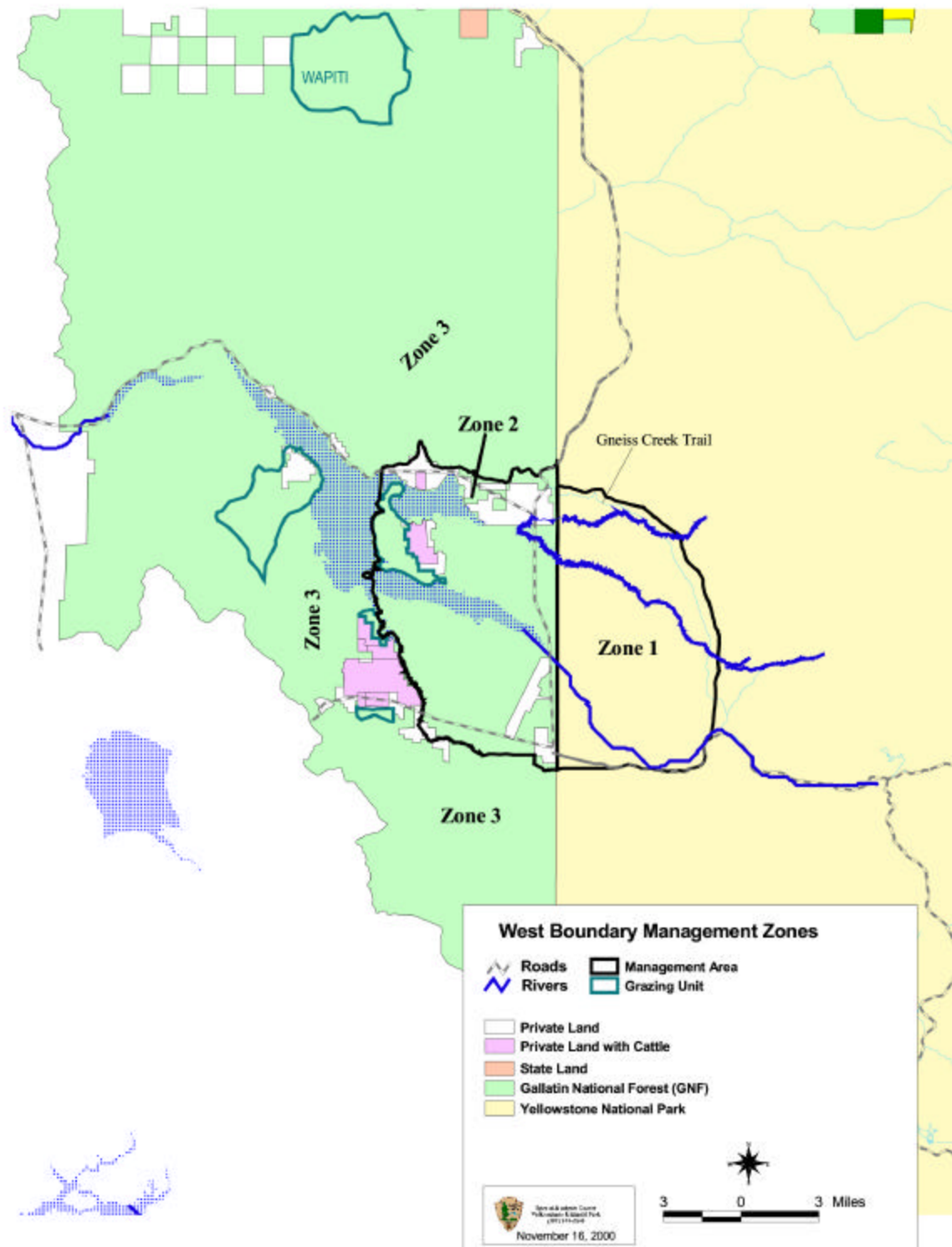


Figure 2

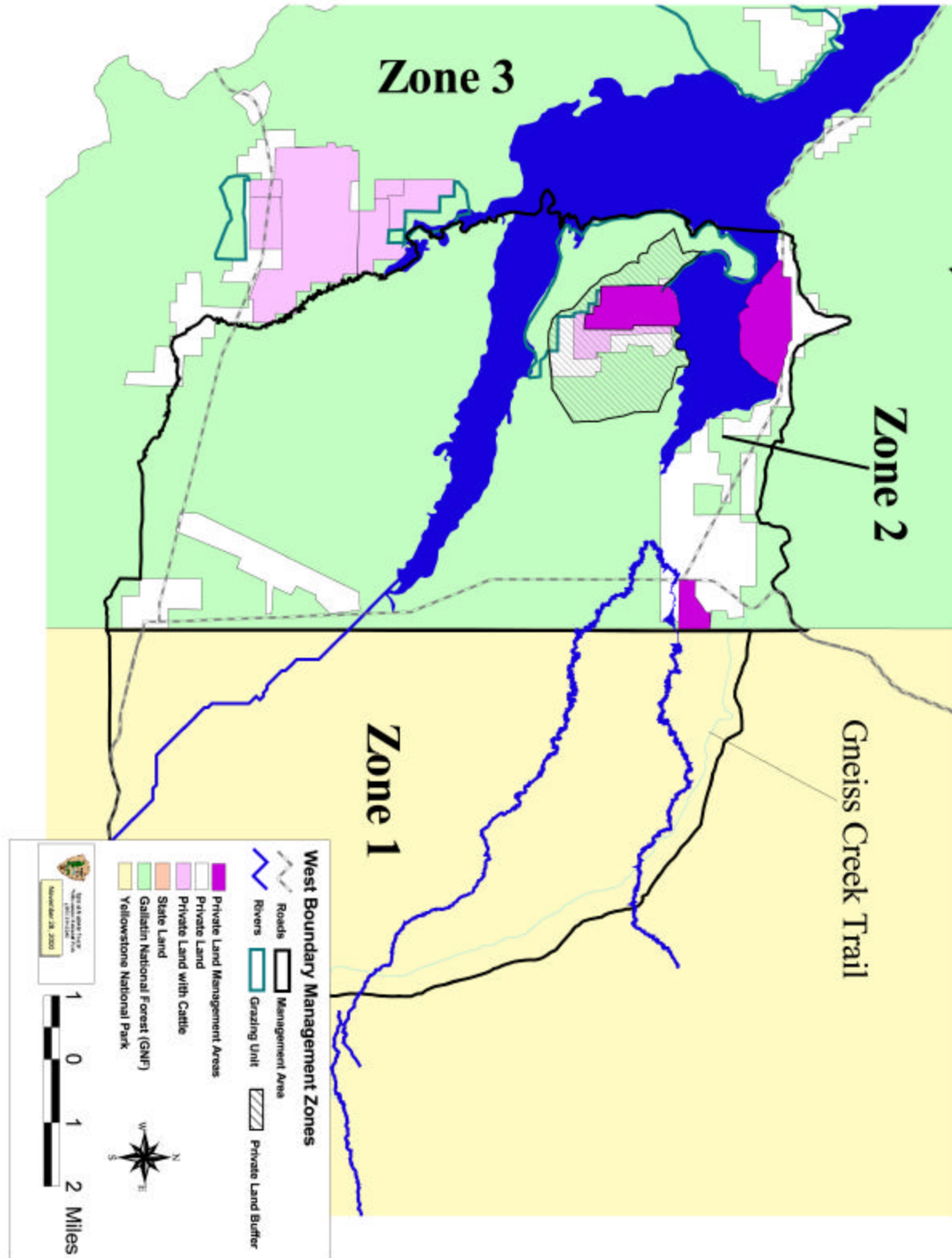


Figure 3

4. During Step 1, every attempt will be made to capture and test bison that leave the Park. Seronegative calves and yearlings that are captured will be vaccinated with a safe vaccine (the safety of the vaccine is determined by the agencies according to criteria established by GYIBC, as attached hereto). Bison that could not be captured but are tolerated will be permitted outside the park until May 15. After May 15, those bison that could not be captured and cannot be hazed will be subject to lethal removal. (See paragraph 13).
5. These management practices will continue in Step 2 (expected winter 2002/2003). In Step 2, which begins when a safe and effective remote delivery mechanism is available, any untested vaccination-eligible bison allowed in the West Yellowstone area will be remotely vaccinated.
6. Step 3 (expected in the winter of 2003/2004), allowing untested bison outside the Park in the western boundary area, will begin when all the following criteria are met:
 - a. Bacterial viability and fetal disappearance research described in paragraph 3 is sufficient to allow agencies to determine an adequate temporal separation period. Based upon the research, the Agencies will recommend the period of temporal separation. The final decision on the duration of temporal separation will be made by the Montana State Veterinarian;
 - b. Initiation of a vaccination program of vaccination-eligible bison inside the park with an effective remote delivery system (see definition);
 - c. Demonstrated ability to enforce the spatial separation during the time that it takes to satisfy criteria a and b above;
 - d. Controlling the number of bison in Zone 2, which shall not exceed 100 bison within Zone 2.

Management of Western Boundary Area

Management actions in the western boundary area will be implemented as follows:

7. In all three steps, bison in the western boundary area will be managed in zones, using topography and progressively more intense management to ensure temporal and spatial separation between bison and cattle. Bison will be hazed back into the park in the spring by May 15, and captured or shot after May 15 to ensure none remain outside the Park in the western boundary area during the applicable temporal separation period.
8. In the western boundary area, although topography is not as restrictive to movement as it is north of the Park, bison moving toward and beyond the proposed Zone Management Areas are highly visible. However, steep terrain and heavy snow depth to the west will help keep bison from crossing onto private lands west of Hebgen Dam.
9. Three zones will be established in the western boundary area. There is an extra buffer area beyond Zone 3 where no cattle are grazed in winter, yet bison are not allowed (see attached map).
10. The zones and actions in each are described below:
 - a. Zone 1- YNP habitat where bison will be subject to hazing in the spring when bison are being moved from Zone 2 back into the Park before May 15. Between May 15 and when cattle are removed from the area in the fall, limited hazing of bison will occur in Zone 1 if needed to maintain spatial separation.
 - b. Zone 2- USFS winter habitat with some private property where bison will be managed for: i) spatial and temporal separation; ii) lethal removal for private property concerns; iii) bison tolerance limits (up to 100); and, iv) bison park population size (3,000). Each of these triggers for management actions is independent (e.g., removing bison to maintain the 100 bison tolerance limit does not depend on the overall bison population size). Management actions within Zone 2 could include tolerating, hazing, capturing and testing, vaccinating and lethally removing bison, or removing for use in jointly approved research as set forth in this plan.
 - c. Zone 3 is the area where bison that leave Zone 2 will be subject to lethal removal.

11. In Step 3, vaccination eligible untested bison that exit the Park will be remotely vaccinated with a safe vaccine unless otherwise determined by the agencies. Vaccination eligible bison that are captured will be vaccinated with a safe vaccine.

12. Consistent with the various risk management actions regarding the tolerance and management of bison on the lands outside the Park, the agencies will maintain temporal and spatial separation of bison and cattle on public and private lands. From April 1 of each year, bison outside the Park will be kept away from private lands a sufficient distance (as defined in paragraph 2.e. above) to manage the risk of disease transmission.

13. In addition to the spatial separation that the zone management approach provides, the agencies will ensure temporal separation in the West Yellowstone area in all phases where it is needed as follows:

a. Bison will be hazed back to the park by the agencies by May 15 (see paragraph 2 and 6 regarding steps leading to application of this provision to seronegative pregnant and untested bison).

b. The beginning date for hazing bison back into the Park will be determined by the agencies which will consider environmental factors such as weather.

c. The temporal separation period will commence on May 15 unless the agencies agree that the temporal separation period will commence at an earlier date.

d. The ultimate decision on the duration of an appropriate temporal separation period is left with the discretion of the Montana State Veterinarian.

e. The temporal separation period will dictate the turn-on date for cattle onto public grazing allotments.

14. To ensure temporal separation after May 15, bison in the West Yellowstone boundary area that cannot be hazed back into the park will be captured and tested. Seropositives will be sent to slaughter, and seronegatives sent to quarantine, if available, and, if not available may be sent to slaughter or be removed for jointly approved research. Bison that cannot be captured will be subject to lethal removal.

Maintaining the Northern Boundary - Reese Creek to Yankee Jim Canyon

15. In Step 1 (expected winter 2000/2001 through winter 2001/2002), while cattle graze Royal Teton Ranch (RTR) lands under a private grazing lease, NPS would continue to monitor bison from approximately November 1 to April 30 within YNP and use hazing within YNP to prevent bison movement north onto private and public lands in the Reese Creek area. If hazing is unsuccessful, the NPS will operate the Stephens Creek capture facility and capture all bison attempting to exit the Park in the area. The agencies will test all captured bison, send seropositives to slaughter, and temporarily hold up to 125 seronegative bison at the Stephens Creek capture facility. Vaccination eligible bison that are captured would be vaccinated with a safe vaccine. Once the capacity of the capture facility is reached, all additional bison attempting to exit YNP would be removed at the Stephens Creek facility (seropositive bison would be sent to slaughter and seronegative bison may be sent to a quarantine facility, if available, and, if not available may be sent to slaughter or be removed for jointly approved research. The seronegative bison held at the facility will not be retested and will be released to the Park in the spring. Bison outside the Park that cannot be hazed back into the Park and evade capture would be subject to lethal removal. Every effort will be made to avoid conducting necessary lethal management actions on RTR ranch lands. The agencies, with the Forest Service as the lead agency, will initiate an evaluation of potential sites for a capture facility in Zone 2. (See Paragraph 19.)

16. During Step 1, the agencies will conduct further research regarding the viability of *Brucella abortus* bacteria in the environment and will conduct research regarding the rate of fetal disappearance in the area, under the principles of adaptive management. The research will allow the agencies to further refine their ability to adjust the temporal separation between cattle and bison, given prevailing climatic conditions outside the park during the spring. The agencies anticipate that this research will last one to two years. The agencies will jointly determine when there is enough data to apply the findings of such research to management.

17. Step 2 begins (expected winter 2002/2003) when cattle no longer graze private lands outside YNP on portions of lands known as the RTR in Zone 2 during the winter.

a. In Step 2, as in Step 1, NPS would continue to monitor bison within YNP. Bison attempting to exit the Park in the Reese Creek area would be captured and tested at the Stephen's Creek capture facility. Seropositive bison would be sent to slaughter and a limited number of seronegative bison, including seronegative pregnant bison (see paragraph 18), will be released. Vaccination eligible bison that are captured would be vaccinated with a safe vaccine. In Step 2, all released bison must remain in Zone 2 west of the Yellowstone River and South of Yankee Jim Canyon on lands controlled by the USFS and RTR.

b. In Step 2, during the first year that bison move to the Reese Creek area, the number of seronegatives that will be released and will be allowed in Zone 2 will not exceed 25 bison. After gaining sufficient experience in successfully managing approximately 25 bison outside the Park in Zone 2, the agencies will tolerate up to 50 bison. Successfully managing the bison outside the Park means that the agencies are able to enforce spatial and temporal separation including near the northern end of Zone 2 at Yankee Jim Canyon as set forth in the attached map. See Map, Northern Boundary Management Zones, Figure 4. After gaining sufficient experience successfully managing approximately 50 bison outside the Park in Zone 2, the agencies will tolerate up to 100 bison. The numbers of bison outside the Park, enumerated in this paragraph, will be the maximum in Montana at any given time on the Northern boundary area. The agencies may adjust these numbers based on the experience gained during Step 2.

c. After the applicable tolerance limit of Zone 2 is reached during Step 2, NPS will attempt to prevent further movement of bison north of YNP. If hazing becomes ineffective, the NPS will operate the Stephens Creek capture facility and capture all additional bison attempting to exit the Park in the Reese Creek area. Bison attempting to exit the Park that cannot be hazed or captured would be subject to lethal removal. The agencies will test all captured bison, send seropositives to slaughter, and temporarily hold up to 125 seronegative bison at the Stephens Creek capture facility. Vaccination eligible bison that are captured would be vaccinated with a safe vaccine. Once the capacity of the capture facility is reached, all additional bison exiting YNP would be removed at the Stephens Creek facility (seropositive bison would be sent to slaughter and seronegative bison may be sent to a quarantine facility, if available, and, if not available, may be sent to slaughter or be removed for jointly approved research). The seronegative bison held at the facility will not be retested and will be released to the Park in the spring.

d. All bison outside YNP in Zone 2 would be hazed back into YNP no later than April 15. Those bison that cannot be hazed will be subject to lethal removal.

18. During Step 2, the following procedures will be followed for seronegative pregnant bison outside the Park in the Reese Creek area:

a. Each seronegative pregnant bison moving out of the park after cattle are removed in the fall, will receive a radiotelemetry collar or similar device and vaginal radio telemetry implant during handling at the Stephens Creek capture facility and released to allow agencies to monitor bison locations and recapture if needed;

b. If a telemetered seronegative bison either aborts or gives birth outside the Park, the site of the abortion or birth will be located. If the abortion / birth site contains the *B. abortus* bacteria, the site will be monitored for research purposes and/or actions will be taken to ensure all *B. abortus* bacteria are gone by the time cattle return to the area in late spring/early summer;

c. Telemetered female bison that aborted or calved and had shed the *B. abortus* bacteria will be captured to permit further testing or otherwise removed. If it is unclear whether a telemetered female bison that aborted or calved had shed the *B. abortus* bacteria, then the bison may be captured to permit further testing or otherwise be removed as determined by the Montana State Veterinarian in consultation with APHIS.

19. During Step 2, the agencies will evaluate the most effective means to enforce the northern boundary between Zone 2 and Zone 3 at Yankee Jim Canyon, including considering the need, design, and location of a capture facility within Zone 2, most likely on Forest Service lands. The agencies will consult with RTR on the location of the capture facility. The purpose of such a facility in Zone 2 would be to enforce spatial separation between Zone 2 and

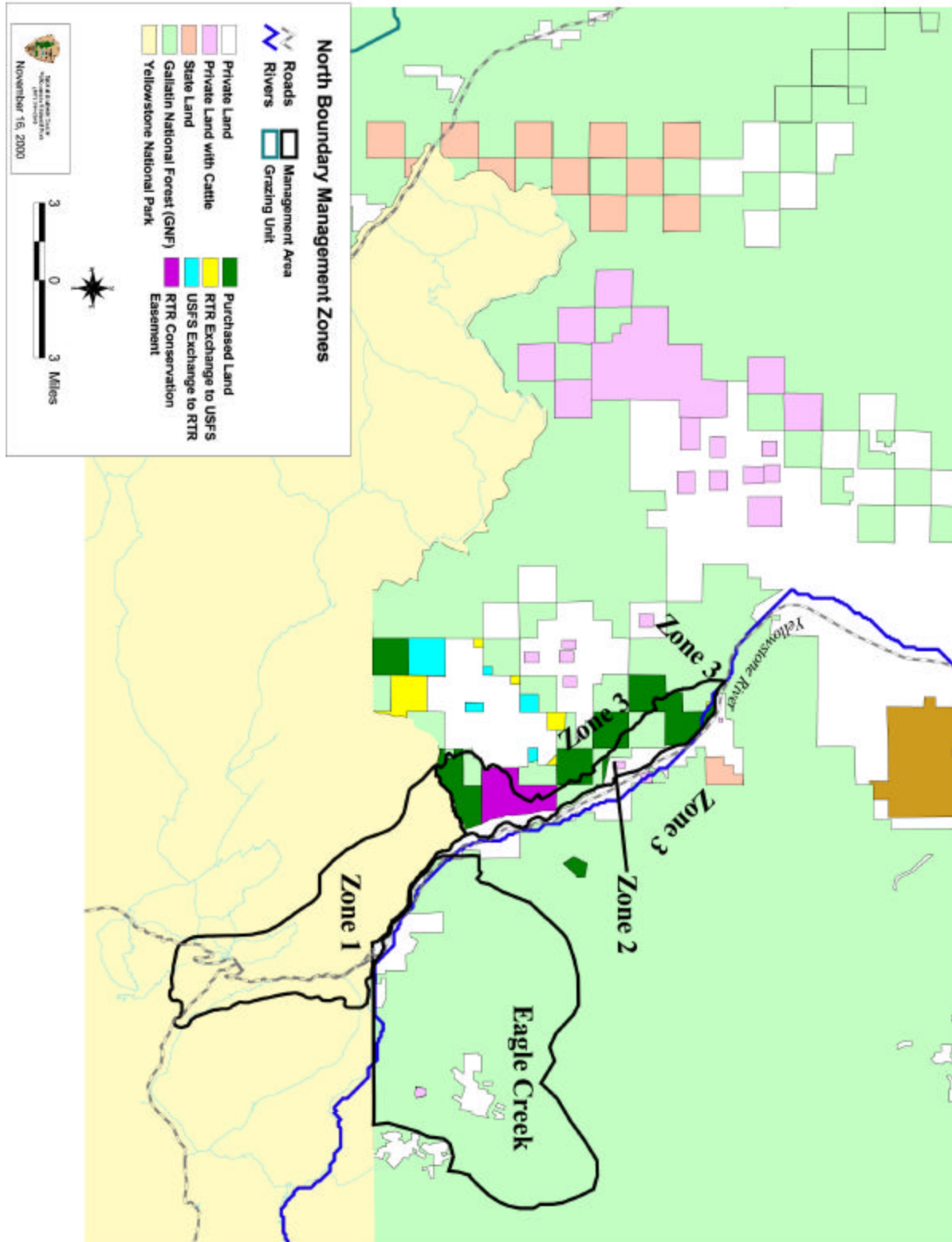


Figure 4

Zone 3 when hazing or other management practices become ineffective or to capture bison over the tolerance limit (initially 25 and eventually presumed to be 100). Captured bison could be moved to Stephens Creek for holding, sent to slaughter, or to a quarantine facility, if available, or removed for jointly approved research. The agencies, with the Forest Service as the lead agency, will complete any necessary NEPA analysis for the capture facility.

20. Step 3 (expected 2005/2006), allowing untested bison outside YNP in the northern boundary area in Zone 2 would begin when the agencies have collected enough information on bison movements and behavior in Zone 2, as well as the agencies ability to monitor and manage bison in the Reese Creek area of the northern boundary area. Step 3 will begin when the following criteria are met.

a. Bacterial viability and fetal disappearance research described in ¶ 17 is sufficient to allow agencies to determine an adequate temporal separation. Based upon the research, the Agencies will recommend the period of temporal separation. The final decision on the duration of temporal separation after April 15 will be made by the Montana State Veterinarian;

b. Initiation of a vaccination program of vaccination-eligible bison outside the park and inside the park with an effective remote delivery system;

c. Demonstrated ability to enforce spatial separation;

d. Demonstrated ability to control the maximum number of bison in Zone 2, which maximum number will be determined pursuant to paragraph 17.b above.

21. In Step 3, NPS would continue to monitor bison within YNP. Limited hazing may be conducted to limit the total number of bison north of YNP. Up to 100 untested bison will be allowed to move into Zone 2 of the Reese Creek area. Vaccination eligible untested bison that exit the Park will be remotely vaccinated with a safe vaccine unless otherwise determined by the agencies. NPS will capture all bison that attempt to leave YNP at the Stephens Creek facility when the tolerance limit of Zone 2 is reached. The agencies will test all captured bison, send seropositives to slaughter, and temporarily hold up to 125 seronegative bison at the Stephens Creek capture facility. Vaccination eligible bison that are captured will be vaccinated with a safe vaccine. Once the capacity of the capture facility is reached, all additional bison exiting YNP in excess of the Zone 2 tolerance limit would be removed at the Stephens Creek facility (seropositive bison would be sent to slaughter and seronegative bison may be sent to a quarantine facility, if available, and, if not available, may be sent to slaughter or be removed for jointly approved research. The seronegative bison held at the Stephens Creek facility will not be retested and will be released to the Park in the spring.

22. In Step 3, all bison outside YNP would be returned to YNP by April 15. All bison in Step 3 must remain in Zone 2 west of the Yellowstone River and South of Yankee Jim Canyon. All bison, which cross the river to the east, or reach the constriction point of Yankee Jim Canyon will be subject to hazing, capture or lethal removal.

23. In the northern boundary area three zones are designated for bison management. See Map, Northern Boundary Management Zones, Figure 4. The zones and actions in each are described below:

a. Zone 1 – YNP winter habitat in the Reese Creek vicinity that bison normally occupy. During Step 1, bison attempting to exit the Park may be subject to hazing, capture, testing and vaccination, or lethal removal. During Step 2, bison attempting to exit the Park may be subject to hazing, capture, testing and vaccination, or lethal removal after the number of seronegative bison released to occupy Zone 2 specified in paragraphs 17 above is reached. During Step 3, bison attempting to exit the Park may be subject to hazing, capture, testing and vaccination, or lethal removal after the number of untested bison in Zone 2 specified in paragraph 21 above is reached.

b. Zone 2 – Area north of park boundary in the Reese Creek area, West of Yellowstone River, and south of Yankee Jim Canyon where bison will be managed for: i) spatial and temporal separation; ii) lethal removal for private property concerns; iii) bison tolerance limits (up to 100); and, iv) bison park population size (3,000). Each of these triggers for management actions is independent (e.g., removing bison to maintain the 100 bison tolerance limit does not depend on the overall bison population size). Management actions within Zone 2 could include tolerating, hazing, capturing and testing, vaccinating, removing bison to quarantine, removing for use in jointly

approved research and lethally removing bison as set forth in this plan. During steps 2 and 3 as bison approach Cinnabar Mountain/Corwin Springs bridge area their behavior and movements will be monitored by the agencies to assure all bison remain west of the Yellowstone River at all times. During Steps 2 and 3 as bison approach the Cutler Lake/Cutler Meadows area they will be increasingly monitored to assure all bison remain west of the Yellowstone River and south of Yankee Jim Canyon. As bison move towards Yankee Jim Canyon they may be hazed or captured to reduce the threat of movement beyond Yankee Jim Canyon. Hazing and capture may include moving bison away from the Yankee Jim Canyon area to reduce the potential for bison to leave Zone 2. See paragraph 24 for further discussion regarding RTR lands within Zone 2.

c. Zone 3 is the area where bison that leave Zone 2 would be subject to lethal removal.

24. RTR Lands: When bison will be allowed to be on RTR lands as set forth herein, it is agreed that active bison management including vaccination shall not routinely take place thereon. When exigencies require management actions, the agencies shall notify RTR of the contemplated action, and seek RTR approval therefore, which shall not be unreasonably withheld. Exigencies include actions to:

(a) Protect life or property;

(b) Address migrations of bison inconsistent with paragraphs 15, 17-20, and 25 outside the Park in the northern boundary area.

(c) Haze bison back into the Park in the spring of each year;

(d) Enforce spatial and temporal separation where necessary.

Lethal removal will not be routinely accomplished on RTR lands and shall require the same permissive procedures as set forth above.

The agencies intend to have as little bison management on RTR lands as possible. Nevertheless, the agencies may be required to take management actions on RTR lands as authorized under Montana or Federal law and the provisions of this plan.

In Step 1, the agencies will cooperate with RTR to develop a Bison Management Plan for the Royal Teton Ranch that is consistent with the provisions of this Joint Bison Management Plan. Should the Joint Bison Management Plan be altered, the agencies will cooperate with RTR to adjust the RTR Plan so that the RTR Plan will remain consistent with the Joint Bison Management Plan. Before the RTR Plan can be implemented, the state and federal agencies must approve the RTR Plan.

Management of the Northern Boundary Area - Eagle Creek / Bear Creek

25. In all steps of this joint plan, agencies would allow untested bison into the Eagle Creek/Bear Creek region of the northern boundary area. Bison in the Eagle Creek/Bear Creek area would be monitored twice per week during the winter. If they approach the Little Trail Creek/Maiden Basin hydrographic divide, they would be monitored daily. The agencies will maintain a boundary at the Little Trail Creek/Maiden Basin hydrographic divide by hazing. Bison crossing the hydrographic divide will be subject to lethal removal.

Livestock Management Provisions

26. In addition to bison vaccination, the State of Montana will encourage voluntary vaccination of vaccination-eligible cattle that may graze in areas outside the Park that bison may occupy in the winter. If by the fall of 2001, 100% voluntary vaccination of vaccination-eligible cattle in areas outside the Park that may be occupied by bison was not achieved, the State will make such vaccination mandatory. The federal government will reimburse the direct cost of the vaccination. The areas subject to the provisions of this paragraph are depicted as Zone 2 in both the north and western boundary areas as shown in Figures 2 and 4. Cattle on lands within two miles of Zone 2 in both the north and western boundary areas may be subject to mandatory vaccination if required by the State veterinarian in

consultation with APHIS. APHIS will also provide funds for voluntary vaccination of cattle within two miles of Zone 2 in the north and western boundary areas.

27. Beyond these steps, APHIS and Montana will conduct additional monitoring of cattle herds that graze in areas that bison may occupy during the winter, which may include regular testing of test-eligible cattle and possible adult vaccination of these cattle herds. APHIS will also do the following: a. make funding available to certify individual cattle herds that graze in areas that bison may occupy in winter, as brucellosis-free; and b. pay the direct costs of any additional testing of any cattle that might be recommended by APHIS and the State Veterinarian pursuant to this Plan. Test eligible cattle within Zone 2 in both the north and western boundary areas as shown in Figures 2 and 4 will be subject to testing. Test eligible cattle on lands within two miles of Zone 2 in both the northern and western boundary areas, or on lands in Zone 3 if bison have been present (despite the provisions of this Plan precluding bison from occupying such areas), may be subject to mandatory testing if required by the State veterinarian in consultation with APHIS. APHIS will also provide funds for voluntary testing of cattle within two miles of Zone 2 in the north and western boundary areas.

Other Management Provisions

28. The population target for the whole herd is 3,000 bison. If the late- winter/early-spring bison population is above the 3,000 target, specific management actions may be undertaken at the Stephens Creek capture facility or outside the Park in the western boundary area to reduce its size. For example, instead of hazing bison remaining in boundary areas back into the park in the spring, they may be removed to quarantine or slaughter.

29. The agencies may agree to modify elements of this plan based on research and/or adaptive management findings. Implementation of management actions by the agencies will be conducted in accordance with this Plan and any memorandum of understanding and/or procedure agreements developed by the agencies, which may provide agency personnel with flexibility to achieve the objectives of the actions set forth in this plan.

30. Absaroka Beartooth Wilderness: Untested bison would be allowed to roam freely into the Absaroka-Beartooth Wilderness north of the park, including the upper portions of Hellroaring and Slough Creek. This is a large area with no cattle, and bison would not be monitored or managed in any way. An exception may include human safety concerns, which would be dealt with on a case by case basis. Because of the high elevation and rugged topography, no more than a few (usually solitary male) bison are expected to occupy these areas.

Cabin Creek/Lee Metcalf/Upper Gallatin: Occasionally bison move north out of the West Yellowstone Basin into the Cabin Creek Recreation and Wildlife management area, the Monument Mountain Unit of the Lee Metcalf Wilderness or into the Upper Gallatin River above the mouth of Taylor Fork. Cattle are not present on these portions of the Gallatin National Forest. There is a cattle grazing allotment in the area of the upper Taylor Fork. Bison would not be allowed on these cattle allotments within the upper Taylor Fork area and would be prevented from crossing the Sage Creek-Wapiti Creek divide. Bison movements would be periodically monitored, and bison crossing outside these areas or entering private lands could be hazed or shot. Bison may attempt to winter in these areas but are expected to return to the park in the spring. Bison may use these areas during all seasons provided they are not approaching the Taylor Fork cattle allotment when cattle are present or causing property damage.

31. Management actions outside the Park will be jointly supported operations conducted by personnel assigned by Montana DOL and MFWP, USFS, APHIS, and NPS. The in-Park vaccination program will be implemented by personnel from NPS. The agencies, and RTR ranch where appropriate, will enter into the appropriate memorandum of understanding to describe specific commitments of personnel to all management actions, delineate operation details for implementation of the plan, and describe reporting requirements for the elements described in the Plan, including those for the implementation of the vaccination program. In addition the agencies will prepare any necessary memorandum of agreement for the funding of all management actions.

Contingency Measures

32. Transmission: Upon disclosure of (1) a brucellosis-affected cattle herd in a management area or (2) a brucellosis-affected cattle herd outside the management areas but for which APHIS and the Montana State Veterinarian concur that the source is traced back to a management area, the agencies will implement modified

management measures pending the completion of an investigation expected to last 60 days or less, during which Montana and APHIS animal health authorities will conduct an epidemiological investigation to determine the source of infection. Disclosure of a brucellosis-affected herd means that an APHIS-approved Designated Brucellosis Epidemiologist has determined that an animal that is part of the herd is infected with field-strain *B. abortus*. The Management Areas for purposes of this provision is defined as Zone 2 plus 5 miles within Montana depending on terrain.

a. Modified Management Measures During Investigation: During the post-disclosure period only seronegative non-pregnant bison will be allowed in Zone 2 up to the prevailing tolerance limit. The agencies will employ non-lethal measures whenever possible to ensure that only seronegative, nonpregnant bison remain outside the Park during the post-disclosure investigation.

Upon the initiation of the post-disclosure investigation period, the agencies will determine whether to apply the modified management measures described above in both the western boundary and Reese Creek northern management areas, or only to the area associated with the brucellosis-affected herd. As warranted by information from the investigation, the agencies can adjust the area(s) outside the park to which the modified management measures are applied. The final decision on the areas outside the park to which the modified management measures will be applied will be made by the Montana State Veterinarian, in consultation with APHIS. The agencies may agree that more or less conservative measures are necessary based on the knowledge and experience gained to date through the adaptive management framework, including but not limited to *Brucella* viability, spatial and temporal separation, and seroconversion rate(s).

b. Investigation results: Post-investigation bison management will depend on the results of the investigation.

i. If the investigation finds that either cattle or elk were the source of infection or that bison were not the source of infection, the agencies will continue with the Joint Bison Management Plan.

ii. If the investigation finds that the (1) Yellowstone bison were the source of the *Brucella abortus* infection or (2) eliminates cattle as a likely source but the source cannot be definitively determined (e.g. source unknown), the agencies will allow only seronegative, nonpregnant bison outside the Park in both the west and north boundary areas. The agencies may agree that the modified management measures are required only in the western boundary area or in the Reese Creek portion of the northern boundary area. They may also agree that more or less conservative measures are required based on the knowledge and experience gained to date through the adaptive management framework, including but not limited to *Brucella* viability, spatial and temporal separation, and seroconversion rate(s).

c. Continuation of Joint Bison Management: If the parties have not agreed to replace the interim modified management measures with a modified joint bison management plan based on risk management within two years of the disclosure, the Joint Bison Management Plan will terminate.

33. Animal Health Authority Sanctions: In the event other jurisdictions impose sanctions on livestock from Montana as a result of the implementation of this plan the following will occur:

a. Montana in conjunction with APHIS will consult with animal health authorities of those jurisdictions and seek removal of any sanctions;

b. If those jurisdictions refuse to remove the sanctions imposed on the movement of livestock, Montana may, in Montana's sole discretion, implement bison management actions necessary to allow for the free marketability of livestock transported from the state;

c. The federal agencies retain the discretion to cease endorsing and participating in activities leading to lethal control measures or other joint actions outside the Park should Montana exercise its rights under paragraph 33.b.

34. If Montana is not tolerating untested bison outside the Park in Zone 2 of the west boundary area by the winter of 2003-04 or by the initiation of a vaccination program of vaccination-eligible bison inside the park, whichever is later, the federal agencies will cease endorsing and participating in activities leading to lethal control measures and

may withdraw from other joint management actions outside the Park, until Montana is tolerating untested bison outside the Park.

If Montana is not tolerating untested bison outside the Park in Zone 2 of the northern boundary area when the conditions for moving to Step 3 in the northern boundary are met, the federal agencies will cease endorsing and participating in activities leading to lethal control measures and may withdraw from other joint management actions outside the Park, until Montana is tolerating untested bison outside the Park.

If, after the in-Park vaccination program has been initiated, it is terminated or if implementation is deemed inadequate by Montana, Montana will cease tolerating untested bison outside the Park and may withdraw from other joint management actions.

Should either the Federal agencies or Montana invoke the provisions of this paragraph bison outside of YNP will be managed by Montana.

35. Should the federal agencies invoke their discretion under paragraph 33.c or 34, the federal agencies will continue to recognize in their issuance of permits or continuation of permits or other agreements that bison management actions outside the Park are under Montana's jurisdiction.

36. a. The agencies may agree to temporarily modify elements of this plan to mitigate total removal of bison due to exigent circumstances arising from severe winter conditions. Based on data from 1996-97, winterkill during severe winters is assumed to be approximately 10% of the early winter bison population and would be in addition to management removals described below. When the bison population declines to 2300 within a single winter, the agencies will meet to evaluate modifications to the prevailing management prescriptions that could reduce the total management removal of bison from the population. When the bison population declines below 2300 within a single winter, the agencies may, on a temporary basis for that winter, increase implementation of non-lethal management measures to provide management flexibility and reduce the total management removal of bison from the population. When the bison population declines below 2100 within a single winter, the agencies will, on a temporary basis for that winter, increase implementation of non-lethal management measures. To determine if the thresholds of 2300 bison and 2100 bison are reached, the following equation will be used: estimated early winter bison population less 10% of early winter bison population less management removals.

b. If modifications to prevailing management prescriptions are implemented within a single winter according to circumstances described in 36.a., the agencies will consider all credible information about the herd status and extent of population decline to determine whether management prescriptions and mitigation measures described above in 36.a. should be continued for the subsequent year(s).

Protocol for Evaluating Safety and Efficacy of a Wildlife Vaccine against Brucellosis in the GYA

Prepared for the Greater Yellowstone Interagency Brucellosis Committee

The purpose of this protocol is to establish guidelines for the development and evaluation of new brucellosis vaccines to be used in free-ranging elk (*Cervus elaphus*) and bison (*Bison bison*) inhabiting the Greater Yellowstone Area. This protocol is not intended to evaluate current vaccination programs being applied to these species. The recommendations for the following criteria regarding efficacy and safety are based on the assumption that any brucellosis vaccine evaluated by these criteria would have defined dosage, route of administration, and age restrictions for any application of the vaccine. The vaccine strain will demonstrate stable characteristics following in vitro and in vivo passage. Efficacy evaluations within the principal species should include animals of minimal recommended age, at the minimally recommended dosage and administered in accordance with recommendations. For safety evaluations within the principal species, animals should be of minimal recommended age, at the maximal recommended dosage, and administered in accordance with recommendations. The assumption is also made that the criteria for approval of a vaccine as safe will be the same in both male and female animals in the targeted population. For the purposes of this paper, the definition of a calf will be a bison or elk of less than 12 months of age. Restrictions on use (e.g., sex, age) may be applied without rejection of the vaccine in total. For example, limit use to females because of adverse reactions in males.

Calfhood Vaccination

Safety

To be defined as safe, a vaccine would not have any clinical effects that would increase predation or decrease survivability. However, adverse clinical effects, such as listlessness, anorexia, depression, and arthritis, that are transient and minimal with no long-term effects on survival may be acceptable. There should be no statistical difference between vaccinates and controls on these factors.

A safe calfhood vaccine will not be shed from a vaccinate prior to parturition. The vaccine strain will not persist to the first calving in 95% or greater of the vaccinated individuals, or persistence of the vaccine strain will not be associated with a significant reduction in the survivability (i.e., no pathology) or the reproductive potential of the individual (i.e. repeated fetal loss, infected calves, or decreased fertility). There should be no statistical difference between vaccinates and controls on these factors.

Efficacy

To be defined as efficacious in females, a vaccine must induce statistically greater protection against fetal loss, infected calves, or infection in pregnant vaccinates after experimental challenge when compared to non-vaccinated animals in the same experiment. Infection is defined as either number of colony-forming units (CFU) per gram of tissue and/or number of infected tissues.

Use of model predictions must indicate that the vaccine, when used alone without other management influence, will reduce the prevalence of brucellosis in the targeted wildlife population.

Experiments will need to be conducted to evaluate the duration of immunity of the vaccine but these experiments will not be required for initiation of use of the vaccine if all other safety and efficacy criteria are met. A vaccine should provide long-term immunity and/or be able to be safely boosted during the life of the animal.

Adult Vaccination

Safety

A safe vaccine will not induce significant reductions in survivability or reproductive efficiency as statistically demonstrated in clinical trials.

A safe vaccine will not cause a significant reduction in recruitment in the population of the target species.

Efficacy

A vaccine will be determined to be efficacious if it induces statistically greater protection in vaccinates against fetal loss, infected calves, or infection after experimental challenge when compared to non-vaccinated animals in the same experiment. In addition, modeling must indicate that the vaccine, when used alone without other management influence, will reduce the prevalence of brucellosis in the targeted wildlife population.

Other

A major advantage of any vaccine would be the ability to differentiate vaccinates from animals infected with Brucella field strains either by a serologic test or by alternative methods.

Nontarget Species

A vaccine candidate cannot cause deleterious effects on the short-term survivability of representative ungulates, rodents, carnivores or avian species under experimental conditions. Candidate species that should be strongly considered for evaluation include: moose, bighorn sheep, antelope, mule deer, coyotes, wolves, ravens, microtus, peromyscus, and ground squirrels. Other species could be added if scientific data supports their inclusion.

-Adopted by the
Greater Yellowstone Interagency Brucellosis Committee
May 1998

C. Rationale for Selecting the Joint Management Plan

The agencies selected the Joint Management Plan because it best fulfilled the purpose and need for action. In the EIS, the agencies agreed the purpose in taking action was to “maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in the state of Montana.” Although the agencies restrict bison movement outside of Yellowstone National Park, in the long-term there should be greater tolerance for more bison than has occurred in these areas in decades. Additionally, both the ongoing research and strict management measures continue to reduce the risk of transmission of brucellosis from bison to cattle, resulting in continued protection of the economic interest and viability of Montana’s livestock industry.

The Joint Management Plan will provide for the tolerance of seronegative pregnant bison outside the park with additional monitoring in steps one and two. The National Park Service has been concerned with the lack of tolerance for this class of bison outside the park in the past because they believe the incremental benefit the continued killing of seronegative pregnant bison might offer in risk reduction did not outweigh the disproportionate reduction in the overall abundance of this segment of the population, as well as their unborn fetuses. APHIS and the state of Montana were concerned with allowing seronegative pregnant bison outside Yellowstone National Park because of the possibility that these animals would seroconvert and subsequently calve or abort while they are out, therefore increasing the risk of transmission to cattle. The concern over the risk posed by seronegative, pregnant bison required a program where bison would be subject to testing or human handling as they left the park. Because human handling of individual bison affects their wild and free-ranging character, the objection to allowing seronegative, pregnant bison (which necessitates testing and handling) would also have a significant effect on the character of the entire herd. Although initially the Joint Management Plan provides extensive handling of bison, such actions will lead to more tolerance for bison outside the boundaries of the park and less handling and manipulation in the long-term. The Joint Management Plan also provides for a vaccination program for bison. The vaccination program contributes to the eventual elimination of brucellosis from the Yellowstone bison herd.

D. Mitigation Measures

Beyond the measures in the Joint Management Plan to reduce the risk of transmission between bison and cattle, the Joint Management Plan includes mitigation aimed at preventing socioeconomic impacts to livestock operators, impacts to the wild and free-ranging nature of the bison herd, cultural and visual impacts, and impacts to wildlife. For example, to prevent socioeconomic impacts to livestock operators, APHIS would do the following:

- Work to convince any state threatening sanctions against the State of Montana for executing the elements of the bison management plan that such sanctions are unwarranted.
- Make funding available to certify eligible individual cattle herds that graze in areas that bison may occupy in winter as brucellosis-free.
- Pay the direct costs of additional testing and vaccination of any cattle that APHIS and Montana recommend due to the implementation of the Joint Management Plan for Montana to maintain its brucellosis class-free status or to assure that transmission of brucellosis has not occurred.

To ensure bison remain as wild and free-ranging as possible within the constraint imposed by all of the mandates of the agencies charged with managing them, the Joint Management Plan would gradually increase tolerance of limited numbers of bison on winter range outside park boundaries. The agencies would move toward allowing untested bison onto winter range to the north and west of the park. The means to accomplish this are described above in the Joint Management Plan, and include:

- Establishing management zones where bison will be tolerated on lands outside the park during the winter.

- Identifying public lands adjacent to the park with no cattle grazing allotments where bison would be allowed to roam freely. The agencies will simply monitor bison presence in these areas. These areas include Eagle Creek/Bear Creek, the Absaroka Beartooth Wilderness, and the Cabin Creek Recreation and Wildlife Management Area/Lee Metcalf Wilderness/Upper Gallatin areas.
- Completing research on the viability of *Brucella abortus* in these environs to further refine temporal separation between bison and cattle.
- The NPS will conduct a remote vaccination program of vaccination-eligible bison within the park to allow a limited number of untested bison on winter range lands outside the park.
- Moving toward Step 3 of the plan, which allows untested bison on winter range in Zone 2 and provides the potential of less capture and handling of bison when tolerance limits for bison in the management zones are not exceeded.
- Allocating personnel to monitor bison within the zones to ensure separation of bison and cattle, and ensure bison do not leave the management zones.
- If the agencies determine bison should be captured and tested, the bison will be handled humanely.
- Based on the early winter bison population and management removals, the final plan provides for the agencies to discuss and implement non-lethal management measures to reduce the total management removal of bison from the population and provide for non-impairment of the population.

Since the agencies would not test bison in Step 3 before they exit the park, the bison would also not be marked, leading to major benefits to those groups and individuals who regard free-ranging bison as culturally important, including positive impacts on those seeking to view bison.

The FEIS provides mitigation to cultural resources related specifically to the bison capture facilities, committing the agencies to complete all required cultural resource surveys and clearances, including cultural landscape inventories, prior to any ground disturbance. This also would apply to any quarantine facility should one be constructed in conjunction with this plan. The final EIS also provides mitigation for visual resources of impacts related to bison capture facilities. Visual quality objectives of the Gallatin National Forest must be evaluated for any facility located within this national forest. Pp. 86-87, 632, vol. 1, FEIS.

Mitigation to Other Wildlife

Positive impacts from the acquisition and use of about 6,000 acres north of the park for winter range would benefit ungulates, particularly pronghorn. A reduction in the use of the Stephens Creek facility during Step 3 of the Joint Management Plan also would benefit other wildlife and reduce disturbance to those wildlife using critical winter range near the capture facility. While tolerance of up to 100 bison each in Zone 2 north and west of the park may provide for additional winterkilled bison for scavengers in areas where they previously were unavailable, conflicts with humans might occur in some areas. Mitigation measures requiring removal of carcasses from areas near human habitation might minimize these potential conflicts.

Mitigation to Endangered Species

The agencies anticipate that the implementation of the Joint Management Plan is not likely to adversely affect any species listed pursuant to the Endangered Species Act. Mitigation measures to reduce potential grizzly bear-human conflicts include the agencies removing bison viscera or carcasses after March 1 from areas on public lands outside the park at or surrounding capture facilities or on public lands outside the park where the potential for human-bear conflicts might occur. Operation of the Horse Butte facility or hazing in that area is not likely to adversely affect bald eagles with implementation of mitigation measures contained in the permit issued by the Forest Service to the State of Montana.

IV. Findings

A. Compliance with Court Orders

There are no court orders covering the issuance of this Record of Decision. In 1995 the United States and the State of Montana entered into a court approved settlement agreement under which they would issue a final environmental impact statement and record of decision for a long-term bison management plan. When the United States withdrew from the memorandum of understanding applicable to the long-term bison management plan, the settlement agreement called for the dismissal of the case. The parties deferred actual dismissal of the case until the conclusion of the mediation.

B. Legal and Regulatory Compliance

1. NEPA

The National Environmental Policy Act requires that federal agencies prepare detailed statements on proposed actions that significantly affect the quality of the human environment. The federal agencies have integrated the NEPA compliance with the bison management planning process.

The requirement to prepare an environmental impact statement is designed to serve two major functions: to provide decision-makers with a detailed accounting of the likely environmental effects of a proposed action prior to its adoption; and to inform the public of, and allow it to comment on, such action. The process leading up to this decision has fulfilled both functions. First, the responsible agencies have compiled and generated an extensive amount of information relevant to the effects of each alternative considered in the DEIS. Second, there has been extensive opportunity for public involvement in the process. NPS sent the DEIS to a lengthy list of those who have shown an interest in the issues affecting the management of the Yellowstone bison. A notice of availability was published in the Federal Register on June 18, 1998, to allow people to request a copy of the DEIS. Copies also were made available in libraries throughout the region. A 120-day comment period for the DEIS commenced on June 16, 1998, and subsequently extended to November 2, 1998, at the request of the public. The agencies hosted twelve public meetings throughout the region and across the United States to allow departmental officials to hear first hand the views of the public on the proposed action. The agencies received 67,520 comment documents containing 212,249 individual comments on the DEIS. The agencies responded to each of the substantive points raised in these comments, and those responses were included in a 433-page appendix to the Final EIS.

We find that this process complied with each of the major elements of the procedural requirements set forth by the Council on Environmental Quality.

2. National Park Service

Under the National Park Service Organic Act and the General Authorities Act, as amended, the National Park Service may not allow the impairment of park resources and values except as authorized specifically by Congress (See Section II and Section V of this ROD regarding the National Park Service Organic Act, General Authorities Act and Director's Order 55; also see FEIS Volume One pp. 47-48 and 750-753 regarding National Park Service Legal and Policy Mandates). In keeping with Director's Order 55, the National Park Service must examine the enabling legislation of Yellowstone National Park when considering if actions will impair park resources and values. In the Yellowstone Enabling Act, the Secretary of the Interior shall make regulations to "provide for the preservation, from injury or spoilation,...,natural curiosities, or wonders within said park, and their retention in their natural condition." The Secretary of the Interior shall also "provide against the wanton destruction of the fish and game found within [Yellowstone] and against their capture or destruction for purposes of profit." The combination of actions provided for in this Record of Decision will not result in the impairment of any Yellowstone National Park resources and values.

The Joint Management Plan recognizes that bison are an essential component of Yellowstone National Park, that the park is not a complete ecosystem for the bison, and that natural movements of bison into Montana occur periodically. The Joint Management Plan and this Record of Decision also recognize the need of the National Park Service to continue to cooperate with the Forest Service, APHIS, and the state of Montana agencies to protect and conserve the bison as a resource for Yellowstone National Park. During the preparation of the plan, the agencies incorporated actions designed to minimize the adverse effects on park resources and values and, where they identified adverse effects, included actions to mitigate those effects where possible. These mitigation efforts include:

- Identifying large geographic areas where bison may range with little or no human intervention.
- Monitoring as an integral part of implementation to assure reliable feedback mechanisms.
- Siting all facilities to comply with the requirements of the National Environmental Policy Act, the Endangered Species Act, the National Historic Preservation Act, and applicable executive orders. Specific criteria are set out in the FEIS, vol. 1, pp. 86-87.
- Following established criteria and evaluation protocols for the use of vaccines to ensure safety in vaccination of eligible bison, safety for non-target species that may be exposed indirectly, and efficacy evaluations prior to use in free-ranging bison within Yellowstone National Park.

The FEIS evaluated and displayed the environmental effects of the actions described in this Record of Decision. The significant environmental effects evaluated for the Modified Preferred Alternative are the same or very similar to those of the Joint Management Plan. The effects on park resources and values evaluated in the FEIS included the following:

- **Impacts on the Bison Population.** Although all alternatives evaluated in the FEIS assessed the impacts of lethal management to the bison population, the Joint Management Plan is very similar to the Modified Preferred Alternative in that it includes non-lethal management, tolerance of bison on some public lands adjacent to the park, and hazing as methods to manage the distribution of bison and management and reduction of the risk of brucellosis transmission from bison to cattle. The Joint Management Plan calls for the vaccination with a safe and effective vaccine of vaccination eligible bison using a safe and effective delivery system according to established criteria and protocols. The vaccination program will reduce seroprevalence of brucellosis in the bison population throughout the life of the plan, which is a major positive benefit. The Joint Management Plan will maintain a wild, free-ranging bison population that is 1% to 15% greater than under the no-action alternative, allowing the bison population to approximate the long-term ecological potential within the park. The cumulative effects from other actions affecting the bison population are negligible (FEIS, vol. 1 pp 389-390). There are no identified irreversible or irretrievable commitments of resources and no loss in long-term availability or productivity of the bison population to achieve short-term gain.
- **Impacts on Public Enjoyment.** The FEIS identified three areas of potential impact to public enjoyment: a) overall visitor use and experience; b) bison viewing; and c) winter recreation. Under the Joint Management Plan there will be no significant change in overall visitor use and experience, negligible to minor impact on bison viewing opportunities, no impacts on winter recreation, and no irreversible or irretrievable commitment of resources affecting recreation. The FEIS identified no cumulative effects on recreation. Additionally, the Joint Management Plan will ensure the presence of bison in Yellowstone National Park and the adjacent area and will provide a benefit to some publics who may not visit the park but appreciate and value the knowledge that the bison population will be maintained as a wild, free-ranging herd in the Yellowstone area.
- **Impacts on Threatened or Endangered Species.** The FEIS and biological assessment considered the bald eagle, Canada lynx, grizzly bear, and gray wolf. Implementation of the Joint Management Plan will have negligible effects on bald eagles, with minor positive effects possible in Step Three. Agency actions under the Joint Management Plan also will have indirect effects on the grizzly bear in limited areas at limited times, including altered distribution of bison carrion, but not necessarily the amount of such carrion. The plan will

have slight but negligible effects on Canada lynx and the gray wolf. The actions under the plan are not likely to adversely affect any of the listed species.

- **Impacts on Other Wildlife Species.** During initial implementation of the Joint Management Plan in steps 1 and 2 when bison would be hazed, captured and tested throughout the winter, there could be the potential for some displacement of pronghorn from winter range in Stephens Creek and Reese Creek areas. However, the park has dismantled some bison hazing fences in the Stephens Creek area for which there was anecdotal evidence that the fencing restricted pronghorn evasion of coyote predation. Recent purchase and conservation easement of additional winter range north of the park might expand the area currently available for pronghorn and might offer moderate benefits in mitigating the effects of operating the Stephens Creek capture facility. During Step 3 when untested bison are allowed north of the park, the reduction in the use of the Stephens Creek capture facility is expected to result in a moderate to major beneficial impact on pronghorn and a minor benefit to other wildlife. The National Park Service has contracted with university researchers to examine pronghorn fawn mortality and habitat use. The National Park Service will evaluate the results of those studies and will determine, based on the information from this research and other information, if actions in the Joint Management Plan are impacting pronghorn and what, if any, adjustments or mitigation might be necessary.
- **Impacts on Cultural Resources.** The Joint Management Plan will mitigate to negligible to minor the potential effects on cultural resources through the construction and operation of facilities through siting and survey criteria. Maintaining a wild, free-ranging bison population in Yellowstone National Park will have a major positive cumulative effect on preserving the herd's cultural significance.
- **Impacts on Visual Resources.** The operation of capture facilities will have minimal impacts to visual resources. The reduction of capture and handling of bison in Step Three may provide a minor benefit to the visual resources for those viewers opposed to such activities. Maintaining a wild, free-ranging bison population that approximates the long-term ecological potential of the herd provides the opportunity for bison to be more widely distributed in their habitat and may provide a minor to moderate positive effect on visual resources for those seeking to view bison.

Neither the DEIS nor the FEIS evaluated specifically whether the bison management actions would impair park resources and values, although the evaluation of the level of effects on park resources and values provides sufficient analysis to draw conclusions about whether impairment will occur. As explained above and based on the impact analysis in the DEIS and FEIS, there is no indication that the actions set out in the Joint Management Plan will cause the impairment of any park resources and values. The National Park Service recognizes that with this cooperative Joint Management Plan, it is better able to preserve bison and is in keeping with the Yellowstone enabling act.

3. Forest Service Laws and Regulations

The proposed activities on national forest lands are consistent with the existing Land and Resource Management Plan.

4. APHIS Laws and Regulations

The actions in the Joint Management Plan will reduce the risk of transmission of brucellosis from free-ranging bison to cattle in Montana through implementation of spatial and temporal separation. The plan, thus, is consistent with furthering the APHIS mandate to control and eliminate infectious and contagious diseases of livestock.

5. The Endangered Species Act

On March 17, 2000, the National Park Service provided a biological assessment to the U.S. Fish and Wildlife Service pursuant to the requirements of Section 7 of the Endangered Species Act. The biological assessment concluded that the modified preferred alternative in the FEIS was not likely to adversely affect the following species listed under the ESA: bald eagle (*Haliaeetus leucocephalus*), grizzly bear (*Ursa horribilis*), Canada lynx (*Lynx canadensis*), and gray wolf (*Canis lupus*). The National Park Service provided supplemental information on pending RB51 studies to FWS on July 6, 2000.

On July 20, 2000, the acting field supervisor for the Montana Field Office concurred in the NPS determination of “not likely to adversely affect.” The acting field supervisor noted that the Interagency Grizzly Bear Study Team is evaluating whether a possible reduction in other grizzly bear food sources may make bison a more important food source for grizzly bears. The study may result in needing to reinitiate Section 7 consultation. Additionally, if the final results of the ongoing biosafety studies on RB51 show that any of the listed species may be adversely affected by indirect exposure to the vaccine, NPS will need to provide a revised biological assessment. The differences between the Modified Preferred Alternative, which was the basis of the National Park Service Biological Assessment, and the Joint Management Plan are insufficient to require the federal agencies to reopen the consultation process.

6. Executive Orders

Executive Orders 11988 and 11990 provide direction for federal executive branch agencies when undertaking actions that may have an adverse affect on floodplains and wetlands. The final EIS (p. 275) provides: “Prior to placement of capture or quarantine facilities (if they are part of the selected alternative), sites would be surveyed for wetland resources and facilities modified or moved to avoid them.” We specifically adopt this provision to avoid impacts to wetland resources.

Executive Order 12988 on Environmental Justice in Minority and Low-Income Populations directs federal agencies to assess whether their actions have disproportionately high and adverse human health or environmental effects on minority and low-income populations. The FEIS addressed this topic on pages 497-498.

The discussion on each impact topic in the FEIS addressed the specific laws, policies, and regulations relative to the affected resource (see vol. 1, pp. 375-656).

V. Implementation

A. Interagency coordination

As set out above, the federal agencies recognize the benefits of proceeding with a joint, cooperative plan among the federal agencies and with the State of Montana. Given that, we also recognize the need for annual operating plans, setting out specific expectations and areas of responsibility for personnel from each of the cooperating agencies. The agency personnel will meet each spring to evaluate the operations from the prior winter, identify problem areas, and propose solutions. Additionally, in the late summer or early fall of each year, the agency will review the existing operating procedures to determine if they need to amend any provision as a result of the information obtained the prior year.

B. Quarantine Facility Decision

The federal agencies believe the decision on whether to construct and operate a quarantine facility for bison is premature at this time. In steps 1 and 2 of the Joint Management Plan, the agencies will concentrate their efforts on monitoring bison outside the park to determine if the temporal and spatial separations will effectively continue to reduce the risk of transmission. Once the agencies are satisfied that their efforts are effective, the agencies will determine if a quarantine facility is a necessary or desirable component of the bison management program. If they decide in the affirmative, the necessary NEPA compliance will occur at that time.

C. Tribal Consultation

The FEIS, Appendix I, provides a detailed account of all tribal consultations held throughout this planning process. NPS will continue to consult with tribes twice a year throughout the life of this plan. APHIS will continue to cooperate in the periodic consultations hosted by the National Park Service. If the agencies decide to pursue a quarantine facility, they will pursue tribal consultations as part of that process.

D. Monitoring

By its nature, a plan using adaptive management requires monitoring and adjustments as new information is obtained. The provisions of the Joint Management Plan identify the factors that the agencies will monitor to determine if the agencies are separating bison and cattle successfully, and, thus, lowering the risk of transmission of brucellosis. The Joint Management Plan does not, however, identify how the agencies will measure success or failure. Set out above is our requirement that the agencies meet twice annually to evaluate the operations of the prior winter and determine if modifications are necessary. This also is the appropriate time for the agencies to determine if the management efforts were successful and, thus, allowing the agencies to either move forward to the next step or, if at Step 3, continue at that step. We agree that the agencies will undertake in good faith to resolve all disputes reasonable at the local management level, elevating them only if there is an impasse. The agencies will use the best available scientific information to assist them in resolving such disputes.

VI. Public Involvement

The public and the courts have discussed the issues surrounding the management of Yellowstone bison for over 20 years. Congress has held hearings on this matter and requested reports of the General Accounting Office. The Department of the Interior contracted with the National Academy of Sciences to review the issue of transmission of brucellosis.

Pursuant to NEPA, the National Park Service obtained public comment on the four interim management plans and the Draft EIS. The agencies received over 67,520 comment documents from persons and entities responding to the Draft EIS. Additionally, the agencies solicited comments on the Final EIS. Over 3,800 persons and entities provided comments on the Final EIS.

A. Public Comments on the Draft EIS

A notice of availability for the Draft EIS was published in the Federal Register on June 18, 1998. The comment period closed on November 2, 1998. A summary of the comments and the agencies' responses to those comments are in volumes two and three that accompanied the Final EIS.

B. Public Comments on the Final EIS

The FEIS was released for public comment on August 18, 2000. The agencies agreed to a two-week extension, bringing the final date to submit comments to October 17, 2000. The agencies received 3,888 comments on the final EIS during this period. The review of and comment on a FEIS is not required by NEPA, the Council on Environmental Quality regulations implementing NEPA, or the policies of any of the agencies involved. Because bison management is considered an issue of nationwide importance, however, the agencies agreed to a 45-day review and comment period, and in Appendix A to this Record of Decision offer a brief response to the major issues raised by the public.

Comments fell into three larger groups—those dealing with broad issues or philosophical differences on the approach the agencies have selected to manage bison, specific comments on or requested changes to the modified preferred alternative, and comments on the planning process itself. Although dissenting opinions were offered in many cases, these are not presented below (but are laid out in more detail in Appendix A) because they were significantly less frequently expressed than the comments noted below.

In the first group, commentators voiced opinions on the uniqueness and importance of the Yellowstone bison, especially relative to cattle in the impact area. The majority of commentators expressing opinions on this subject (1,800 vs. 2) indicated that it should be cattle rather than bison that are moved or managed to prevent contact and possible transmission of brucellosis. Part of the value of the herd to commentators was in its wild and free-ranging nature. Management practices such as capture, testing, slaughter, quarantine, corralling, radio collars, vaginal transmitters, etc. were considered antithetical to the concept of a wild herd by many commentators. Many (1,458) felt that all slaughter should be stopped.

Commentators confirmed a strong feeling that since public lands belonged to the public, they should be managed the way the public wanted them to be managed. This included that they be either set aside for wildlife, or that they be used for bison and not cattle if there is a conflict (2,974 commentators). Many commentators (372) expressed their feeling that recently acquired lands north of the park be used as soon as possible for bison, or that the agencies pursue additional acquisition of lands (38 commentators) for bison.

Commentators (849) indicated the modified preferred alternative was too expensive and that it was not a cost-effective approach to managing the risk of transmission. Several asked for a cost-effective plan, and noted the easiest way to achieve this was by managing cattle, rather than bison. Other cost issues concerned the split of cost among the

agencies, with many (93) indicating the share of financial burden was too high for NPS. A third cost issue involved a challenge and debate over Montana's assertion that severe economic impacts would result from an outbreak of brucellosis, especially since they believed the chance of transmitting the disease in the wild was so close to zero as to be indistinguishable, even with no management. Other broad issues included the apparent disregard for scientific evidence on the viability of *B. abortus* and a concern that non-random removals would affect bison genetics. Some commentors also disagreed that grizzly bears would not be adversely affected by the plan.

Specific changes to the plan requested by commentors included requests for a different population size, a minimum population size (1,864 commentors), more bison allowed outside the park, a wider variety of bison allowed outside the park, sparing use of hazing, later haze-back dates or no hazing back into the park at all, re-examining research to ensure a bison vaccine is safe for calves, less reliance on capture and slaughter, revised testing procedures, a shorter quarantine protocol, compensation and incentives for private livestock owners not to run cattle and a request that elements of the plan be made much more specific and concrete. These elements include the roles and responsibilities of each agency and dates for research results and when triggers to move to each step would occur.

Comments on the planning process included a different scope for the EIS, including different objectives and alternatives, as well as challenges to the agencies' interpretation of their own policies and mandates. Commentors questioned how the agencies could confine the plan to bison only, when elk posed an equal risk to cattle in their opinion. Others did not feel the FEIS adequately addressed their questions or comments on the draft. Some commentors expressed dissatisfaction with the time available for reviewing the EIS, or the complexity or length of the document. Many (1,016) felt that comments on the draft EIS had been ignored in crafting a final preferred alternative.

VII. Review and Approval

A. Administrative Review

There is no administrative appeal from decisions of the Secretary of the Interior or the Secretary of Agriculture.

B. Effective Date

The agencies will make this decision effective immediately. It is the agencies' understanding that the State of Montana is concurrently issuing its ROD to implement the Joint Management Plan.


C. Administrative Record

The administrative record for this action is stored in three different locations. The NPS component of the record is located at Yellowstone National Park, the Forest Service component is located at Bozeman Montana, and the APHIS component is located at Riverdale, Maryland.

D. Signatures

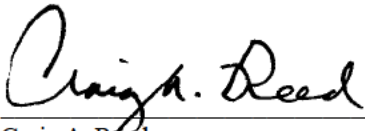
By signing this Record of Decision together, we exercise our respective authorities over only those portions relevant to our authority.

Recommended:



Robert G. Stanton
Director, National Park Service

12/18/2000
Date



Craig A. Reed
Administrator, Animal and Plant Health Inspection Service

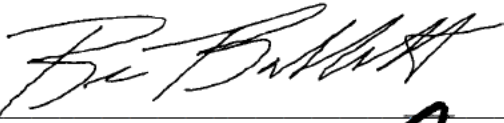
12/19/2000
Date



MIKE DOMBECK
Chief, U.S. Forest Service

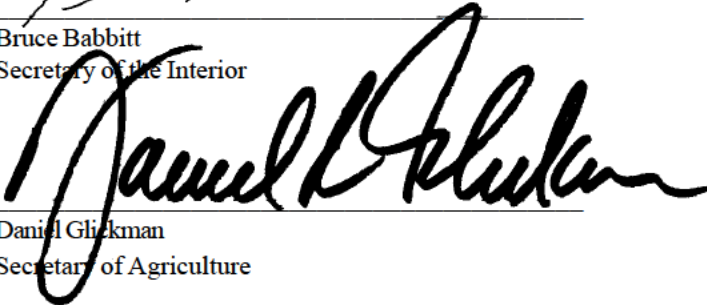
12/19/2000
Date

Approved:



Bruce Babbitt
Secretary of the Interior

DEC 20 2000



Daniel Glickman
Secretary of Agriculture

12/19/2000

APPENDIX A

Response to Comments on Final Environmental Impact Statement

The federal agencies received nearly 4,000 comment letters, cards and electronic mail messages on the final EIS and modified preferred alternative. The following is a summary of major issues resulting from this review, with particular attention to comments specific to the modified preferred alternative, new information with bearing on the decision at hand, or entirely new comments relevant to the choice between alternatives. They are organized into three groups: broad philosophical or approach issues, specific changes requested on the modified preferred alternative, and comments on procedural issues.

I. Broad philosophical or approach issues

Topic: Uniqueness and Importance of Yellowstone Bison

The importance of the Yellowstone bison herd was reaffirmed by many (31) commentors. Commentors noted that bison had once blanketed the Great Plains and were the most “scientifically, genetically, spiritually and esthetically important bison herd in the United States.” Many emphasized language from the EIS which identified the herd as the last and only continuously wild herd in the U.S., without cattle DNA and with a large degree of genetic resistance to brucellosis. The bison herd is “part of the nation’s heritage, and important cultural resource and integral to the ecology of the Yellowstone area.”

Response: The EIS recognizes the unique and important status of this herd. Please see “Need for Action,” p. 14 of volume I of the FEIS. It is not true, however, that there is evidence of a large degree of genetic resistance to brucellosis in this herd. Approximately 40% of the bison test seropositive. There is a small percentage of bison that may be genetically resistant, or that may be resistant through low dose exposure. This has not been proven yet, however. Since development of the antibodies that are detected on the blood tests is antigen driven, those bison that are resistant would be seronegative.

Topic: Manage Cattle More and Bison Less

The importance of the herd to commentors was used to justify requested changes in bison management. The vast majority of commentors expressed their belief that the needs of bison must take precedence over a few cattle, since cattle are not unique and their needs can be met in a variety of geographical locations. For instance, more than 2,850 letters indicated support for the management of cattle in the impact area instead of bison to eliminate the possibility of brucellosis transmission. More than 100 suggested eliminating cattle altogether by closing grazing allotments, either with or without compensation to lessees, and/or by offering payment or other incentives to private landowners not to graze cattle on their lands. Others suggested further restrictions to grazing allotments, or not renewing specific allotments (such as those on Horse Butte, where bison traditionally winter). Many commentors (123) asked that cattle not be allowed to occupy allotments until bison moved naturally back into the park, or that cattle not be allowed to occupy allotments in the impact area for more than 30 days. Many others (1,800), some following up on the language in the NAS report that cattle vaccination may be the best short-term strategy to solve the brucellosis transmission problem, either showed support for making it mandatory or requested an alternative based solely on cattle vaccination be adopted. Others affirmed their belief that with the risk of transmission so low, vaccination of cattle, or of both bison and cattle, would prevent the possibility of transmission from occurring. A minority (2 commentors) indicated any changes in allotments would be unacceptable. Of those expressing a preference for an alternative analyzed in the EIS, most (38 of 64) chose alternative 2, indicating a preference because this alternative focused on cattle management.

Response: Please see responses in volume 2, Public Grazing Allotments- Modify, pages 257-265 of the FEIS. To summarize generally, Gallatin National Forest does not believe its multiple-use mandate is best fulfilled by closing or modifying allotments unless a replacement allotment is available, and replacements are not available. As to the vaccination question, neither cattle nor bison vaccine is 100% effective; therefore some risk of transmission would remain even with vaccination. Additionally, the Joint Management Plan provides for actions directly related to cattle management, such as mandatory vaccination and cattle surveillance and testing.

Topic: Use of Public Land

Some commentors stated opinions on how public land should be used generally—many (114) indicating that the public owns public land and should determine whether that land is used for wildlife or cattle. Others directly criticized the agencies for “allowing a small commercial industry to dictate how public lands are managed” or ranching in the impact area, rather than responding to the wishes of the majority of commentors that public lands be used for wildlife. One commentor suggested the plan did not adequately reflect that grazing on public lands was a privilege, rather than a right. Several suggested that, since the public subsidized ranchers on public lands, they should graze at their own risk. Many (372) expressed specific concerns that the lands newly acquired by the U.S. Forest Service north of Reese Creek would not be immediately available to bison and asked that the USFS expend staff and money to make sure no grazing occurred on these lands after the expiration of a lease in 2002 and that bison be allowed on them. Others (38) asked that additional land be purchased; some noting it would soon be subdivided as growth in the area continues. A few commentors objected to uses inside the park, including to operate the Stephens Creek capture facility, and facilities on traditional winter range in the Lamar Valley.

Response: Although it is true Yellowstone National Park and much of the land surrounding it are public lands, the public in the form of its congressional representatives has determined the policies and regulations of each of the federal agencies involved (and the Montana State Legislature determined the role of Montana agencies) and charged the agencies with implementing these mandates. All alternatives, including the modified preferred alternative and the Joint Management Plan, are within the very narrow intersection of the mandates of each of the agencies charged with bison or brucellosis management. The Record of Decision will describe the final plan, including when and how the agencies will phase out cattle leasing on the acquired lands north of Reese Creek, and phase in the use of these lands by wildlife.

Topic: Wild and Free-Ranging Bison

Many commentors (1,458) reaffirmed their belief that this plan should end the slaughter of bison, and that bison must be wild and free-ranging. Many of the management practices in the modified preferred alternative, such as radio collars, ear and back tags, vaginal transmitters, painted or bleached hides, limiting bison to a prescribed area, vaccination, quarantine, capturing, corralling and quarantine were viewed as intrusive, disrespectful and inconsistent with the concepts of wild and/or free-ranging.

Response: The agencies have defined both wild (not routinely handled) and free-ranging (can move without restriction within specific geographic areas) in a specific way, again because more traditional definitions are not within the ability of the agencies to allow given their respective mandates. Each of the alternatives in the EIS ensures the herd remains wild and free-ranging as defined. This includes the final selected alternative, referred to in the remainder of the responses as the “plan.” Some handling of some bison will be required to implement the plan, particularly in the early stages of the Joint Management Plan. If the handling becomes routine, such as in a quarantine facility over a number of years, these individual bison will no longer be considered part of the Yellowstone herd and will be distributed to tribes or public entities after completing the quarantine protocol.

Topic: Cost/Benefit of the Modified Preferred Alternative

Many commentors (949) expressed dissatisfaction with the cost of the modified preferred alternative, or the negative benefit/cost ratio for all alternatives examined in the EIS. Some noted that it was unfair to ask a public that does not want bison to be slaughtered at all, and who owns public lands to pay for capture, test and slaughter to prevent bison from entering these lands. Others made comments like “it does not make sense to spend \$30 million to protect less than 2,000 cattle,” or “it would be more cost-effective to move or remove cattle.” One commentor suggested that the costs of expensive and excessive management tools for bison would stall progress in achieving greater tolerance for bison outside the park. Others noted it would be easier and cheaper to allow bison and cattle to intermingle. One commentor asked whether the costs of this plan also included costs to bald eagles of placing a capture facility at Horse Butte. Another objected to any plan that created long-term employment obligations. A few stated their belief that costs for land acquisition were exaggerated, and alternatives including these costs (such as alternative 2 and 3) would perform much better on the benefit cost ratio than the EIS indicated.

Response: Given the narrow range of options available to the agencies (because of the plan’s purpose, need, objectives and policy restrictions noted above), alternatives involving more intensive management, such as capture, slaughter, quarantine, hazing, vaccination, land purchase, etc. were the ones considered adequate by all agencies.

The costs reported for acquiring land are rough estimates only, as all land would be purchased from willing sellers who have not been approached or come forward to date.

Topic: Split of Costs among Agencies, Private Sector

Other cost issues concerned the burden of cost between the agencies. Many (93) stated a belief that NPS shouldered too much of the monetary burden, and that the costs should be more evenly shared by the federal agencies or the plan might fail. In addition, park visitor services and education would suffer because resources would be diverted to bison management. Others indicated Montana should pick up the cost if they were unwilling to tolerate bison in their own state. One commentor noted the plan had to be funded with public funds, or the cost would fall to livestock producers. A few others (5) indicated the burden of the modified preferred alternative was already too large on livestock producers, and asked that the agencies do more to reduce the prevalence of brucellosis than implement a bison vaccination program “at some future time.” Several commentors (30) disagreed with this philosophy, noting for instance, that even though “this is a problem only from the perspective of the livestock industry, ...they have taken no affirmative actions to date to aid in resolving the problem.”

Response: The livestock industry does vaccinate its cattle against brucellosis. The FEIS estimates this cost at \$5 to \$10 per animal (see FEIS volume 1, page 456). Each agency attempted to estimate its costs of conducting the various management actions called for in the alternatives. These actions were sometimes shared, and sometimes under the exclusive authority or jurisdiction of the respective agency. Each agency will need to anticipate these costs and include them in requests for congressional or legislative appropriations to implement the Joint Management Plan.

Topic: Class-Free Status/State Sanctions/Economic Impacts

A few commentors (11) called on the agencies to make it much clearer and more specific what commitments APHIS would make to defend Montana against possible state sanctions. They requested terms such as “immediately consult with the state” threatening a sanction, “pursue all legal remedies, including seeking an injunction,” “willing to recommend that U.S. Department of Justice seek an injunction,” etc. be added into the ROD. Two asked that the agencies guarantee no state sanctions would occur. One stated changes from alternative 7 to the modified preferred alternative would increase the threat of sanctions. One commentor expressed an opinion that the plan would put livestock operators out of business by allowing bison to have brucellosis and this was unacceptable. Another argued the ranchers would be more severely affected than the EIS indicated. A third suggested APHIS should obtain concurrence from other states and Canada before going forward with the plan or accept financial impacts of a sanction. One re-stated a concern expressed in the draft EIS that incubation of the disease was variable and an outbreak could spread in cattle that had tested negative because of this. Other commentors challenged the assumption that severe economic impacts were likely even if an outbreak were to occur. Citing the FEIS cost-benefit analysis, they noted two outbreaks were very unlikely, yet this would be required before class-free status was subject to downgrading. If downgrading did occur, it is much more likely it would be confined to Gallatin and Park Counties, a cost of \$61,000 per year.

Response: The agencies believe the FEIS accurately reflects the economic implications to ranchers in the analysis area. The agencies believe all alternatives, including the modified preferred, will reduce the potential transmission of brucellosis to cattle and therefore not result in any state sanctions. Concurrence from other states on this plan is not required. The agencies cannot guarantee that other states will not impose sanctions; however the agencies will work with Montana to convince other states that the sanctions are unwarranted. Additionally, if downgrading of brucellosis status were to occur, it usually would affect the entire state. A state is allowed to have two statuses at one time. However, in order to do so, there must be strict border controls to control movement between the two areas, and certain other provisions must be put into place. For example, the state would be allowed to have two statuses if they have the authority and have committed the resources to maintain the two distinct areas. Please see additional information in the FEIS, Vol. 2, page 268.

Topic: Risk of Transmission in the Wild

As in the draft EIS, many commentors (108) stated their beliefs that the risk of transmission from bison to cattle in the wild is very low or even zero. Several cited the intermingling that takes place between infected elk, bison, and cattle in the Jackson area with no confirmed cases of transmission. The modified preferred alternative “does not recognize or give proper weight to the fact that no documented cases of brucellosis transmission from bison to cattle in the wild exist.” One commentor noted the lack of evidence invalidated the EIS cost-benefit scenario. This was

countered by one commentor who noted “saying no transmission has occurred in the wild only means it has not occurred yet.” Another commentor calculated what they believed would be a quantitative estimate of risk by predicting an average number of infectious females outside the park given no management, noting the actual risk would be lower because it would be tempered by bison behavior during birthing, cattle vaccinations, actions by predators and scavengers, and other factors. This same commentor noted the presence of peer-reviewed articles criticizing and debating results from the study which showed transmission from bison to cattle under confined conditions. Another commentor argued the bison herd was technically “captive” in the analysis area, and transmission was therefore a possibility as it was in the above-mentioned study.

Response: The FEIS addresses the risk of transmission in the wild in detail in the section Brucellosis Transmission and Public Perception, and in particular, issue 2 (pages 186 to 192 of volume 2). Commentors are correct that available evidence indicates the risk of transmission under natural field conditions is extremely low. However, because transmission between bison and cattle has occurred under experimental conditions and on ranches with privately owned bison and cattle, the risk of transmission is not zero.

Topic: Science and Bison Management

A few commentors (3) reiterated a concern expressed with respect to the draft EIS that all management actions in the plan be based on sound science. Many of the specific comments on this topic centered around forage available in the northern range of the park and natural regulation of bison and other ungulate population numbers. Others questioned the statement that the Greater Yellowstone Area is the last large reservoir of brucellosis in wildlife, noting studies that found the *B. abortus* bacteria in several species of wildlife in Arkansas and Utah. One commentor asked for the results of an ongoing study of radio-collared bison in the park and the collection of reproductive tract tissue from slaughtered female bison to better ascertain the number of potentially infectious bison. The same commentor indicated the NAS report should not have been used since it did not meet the standard of unbiased examination of the scientific literature, and also asked that work completed by Meagher be included in assessing the use by bison of groomed trails. The majority of comments (15) in this section questioned why the modified preferred alternative did not base the separation of cattle and bison on new information indicating the *B. abortus* bacteria does not survive for more than a few days in the environment typical of a Wyoming spring (e.g., the Cook (1999) study). Most of these commentors suggested decreasing the separation time to 30 days, although one indicated 7-10 days would be appropriate. Another commentor challenged the validity of this study, noting a storm washed out several study sites and the bacteria used was from a vaccine, which may be less able to withstand heat and light than field strain *B. abortus*. Finally, some commentors (16) requested specific research studies be completed to determine the true seroprevalence, the viability of the bacteria in the environment, the rate of disappearance of fetal material in the environment and a safe and effective bison vaccine.

Response: As noted in the EIS, professionals in each agency interpret the existing scientific literature differently, therefore decisions on management are often those where all can agree on the implications of completed research. Questions concerning forage and managing bison based on its availability are answered in the FEIS (vol. 2, pages 90-95 and others) and indicate little evidence of inadequate forage quantity or quality. The Cook (1999) study was conducted in Wyoming, where agencies believe the weather conditions may be dissimilar to those in Montana, particularly in West Yellowstone. An ongoing study to determine viability of the bacteria in the winter and spring in the study area is planned to begin in 2001. The research mentioned is high priority research (see appendix D, vol. 1 of the FEIS). Under the Joint Management Plan, the length of the time period separating bison and cattle use of lands outside Yellowstone National Park will not impact the timeframe when bison are allowed outside the park. The bison will be allowed outside the park until certain dates (May 15 in the western boundary area and April 15 in the Reese Creek area of the northern boundary). Historically, on these dates, the agencies have been able to haze the bison back into the park successfully. The temporal separation period will be added on to those dates to determine when cattle may be turned on to cattle allotments. The additional research regarding the viability of *Brucella abortus* will inform the agencies' determination of a sufficient temporal separation period between the dates certain and the dates when cattle may be turned on to allotments.

Topic: Bison Genetics

Most commentors (74) who spoke to this topic indicated they believed the Yellowstone bison to be genetically unique, either by virtue of their continuous wild status, DNA which shows no sign of cattle contamination, or behavior characteristics such as migration to winter range and spring birth sites which increase the viability of the herd. Some of these commentors (41) stated their belief that management practices of non-random selection of bison

“families” attempting to exit the park would have an adverse impact in removing the adaptive behavior of migration from the herd. One commentor indicated the gene pool for the herd was not unique, and that “there is a great gene pool for bison all over the U.S.” Other commentors debated the EIS analysis of a minimum viable population size to preserve genetic diversity. One pointed out a minimum breeding adult population of 500 bison is not likely if the population drops to 1,700; another that 500 as a minimum is only true under ideal conditions, with random mating, no fluctuation in population size, etc. Others found this entire section confusing. A few commentors noted that the scientific literature supports a larger territory for large animals to maintain genetic diversity. Others indicated cautious management would be prudent given the many unknowns on bison genetics.

Response:

The estimation of a minimum viable bison population size involve not only genetic factors but also demographic and environmental factors such as sex ratio, reproductive success of males and females, fluctuations in population size, and random chance or catastrophe. These factors differ for different species, hence, no universal estimate of a minimum viable bison population exists. Given these and other unknowns, the National Park Service is committed to conducting additional research on genetics in bison. If the additional information suggests the management practices of the Joint Management Plan adversely affect genetic diversity, the NPS will review management actions and recommend adjustments. Considering the information currently available, the agencies believe they are providing for the conservation of Yellowstone bison genetics by balancing a spring bison population limit of about 3,000 animals with other management objectives.

Topic: Threatened, Endangered, or Sensitive Species

Some commentors (12) disagreed with the EIS analysis of impacts of bison management in the modified preferred alternative on grizzly bears, noting that bison carrion is particularly important when the availability of other major food sources is unpredictable, as they are in the Greater Yellowstone Area. Three organizations indicated their intent to sue over the failure to initiate proper consultation with the U.S. Fish and Wildlife Service on impact to grizzlies. Other commentors (7) objected to the capture facility and capture operations in the Horse Butte area, a productive bald eagle feeding and nesting area. Most of these commentors indicated the Montana DOL is not abiding by conditions imposed to protect eagles. Still other commentors (6) challenged the continued use of the Stephens Creek capture facility, as it is located in winter range for pronghorn, an unusual subspecies which is decreasing in number. A few commentors indicated this population of bison should be listed as endangered or threatened.

Response: Consultation with the U.S. Fish and Wildlife Service, including the completion of a biological assessment, was completed as indicated in Appendix J of the FEIS (vol. 1, p. 797). The U.S. Fish and Wildlife Service agreed with the agencies’ conclusion that the modified preferred alternative was not likely to adversely affect grizzlies or bald eagles (or lynx or gray wolf). Two research projects are underway to determine the factors affecting the declining pronghorn population in the park—it is possible the Stephens Creek facility is one of the factors influencing the population (please see p. 50 of volume II of the FEIS for more information). It is our understanding that a petition for listing this population of bison has been filed with the U.S. Fish and Wildlife Service. The NPS ESA consultation on the Modified Preferred Alternative covered the impacts to listed species of the Joint Management Plan. There has been no flagrant or willful disregard for the terms and conditions of the special use permit that the Montana Department of Livestock has to operate a capture facility on the Gallatin National Forest, although unintentional errors did occur. The permit authorizes MDOL to haze bison by helicopter. The use of helicopters, however, is prohibited in certain areas at certain times of day or times of the year. On one occasion, a helicopter in transit from Helena to the capture facility inadvertently crossed the eastern edge of the Horse Butte closure area. Representatives of the Gallatin National Forest met with Montana DOL personnel and issued a verbal warning. Montana DOL discontinued the use of helicopters at that time, and the closure area for helicopters has been clarified with Montana DOL.

II. Specific Changes to the MPA

Topic: Population Control

Many commentors (1,864) asked that the modified preferred alternative be changed to specify a minimum population size for the herd, and that the agencies commit to ceasing any lethal control of bison should the herd reach this number. Most suggested this minimum be either 1,700, as specified in the preferred alternative in the draft

EIS, or 2,100 bison, because tolerance levels in boundary areas outside the park would add another 400 bison. Commentors did not agree on a total herd size, or even whether the agencies should attempt to manage for a particular size. Some (25) suggested managing for the ecological carrying capacity of the analysis area, others indicated 3,500 would be appropriate. Some (7) said 3,000 is too large and unmanageable and the herd should vary between 1,700 and 2,100; one argued for at least 10,000 since 60-70 million had been killed in the past. Others (57) simply said 3,000 was not large enough. One commentor argued that the carrying capacity for all ungulates should be determined using references from the 1950s and 1960s on range management, and this was the way to manage bison as well. Another indicated bison should be kept to the park, and kept at current population levels. Some who did not want the agencies to manage for any particular herd size argued natural regulation should determine the size of the herd, as the park is a variable environment and in a state of flux. The population size needed to “reflect this reality.” One noted the alternative selected should simply increase the size of the population. Some re-stated a belief they had stated on the draft EIS that prohibiting snowmobiles and closing roads and trails in the winter would keep bison inside the park, and so population control was not required. Other re-stated their opinion that hunting should be used to control population size.

Response: As noted in the FEIS (see, for example, vol. 2, p. 93), 3,000 bison was identified in the NAS report as the level above which the frequency and size of bison movements to areas outside the park would increase. Although it is true that environmental and other conditions in the analysis area are variable and other research suggests the population in the park would likely fluctuate between 1,700 and 3,500, the agencies are trying to balance factors such as natural regulation and maintaining ecosystem processes, which contribute to the wildness of the herd, with protection of Montana cattle from the risk of transmission. The agencies have adopted 3,000 as a spring population limit, maintained through culling of bison as they attempt to exit the park, to both maximize the effects of ecosystem processes inside the park and help keep relatively large-scale migrations from occurring. Additionally, the agencies recognize that severe winter weather conditions, including deep, crusted snow, can occur on bison winter ranges within the park. These conditions can force larger numbers of bison to lower elevation winter ranges outside the park. Tolerance of up to 100 bison on public lands in the west boundary area and up to 100 bison on public and Royal Teton Ranch lands north of the Reese Creek boundary also provides managers with flexibility in managing bison. In addition, the final plan outlined in the ROD proposes mitigation measures that emphasize non-lethal measures to preserve the bison population. The mitigation measures require the agencies to consider emphasis of non-lethal management measures when the bison population reaches 2,300. If the bison population reaches 2,100, the agencies are required to increase implementation of non-lethal management measures. As to the grooming of trails, the agencies do not believe the evidence supports the idea that closing them will preclude bison from entering Montana.

Topic: The number of Bison Outside the Park in Management Zones

Some commentors (8) called the 100 bison tolerance limit in the western and northern boundary areas arbitrary, and asked for the rationale in using this number. One said 100 would be too difficult to manage in the winter. Another noted if funding were cut or experience showed only 25 bison could be managed, this would be the number outside the park, rather than 100. Commentors asked that the carrying capacity numbers used in alternative 2 for these management areas be used instead. Some requested up to 1,000 bison be allowed out into these areas.

Response: Tolerance limits are defined in the FEIS (vol. 2, p. 128) as levels where movements beyond specified areas would be unlikely. They are not based on carrying capacity limits, but on logistical feasibility, risk management and risk to private property (see FEIS, vol. 1, p. 192). Although 100 is an estimate on the maximum number in each area which would meet these requirements, the Joint Management Plan would test lower numbers in the Reese Creek area first to ensure the agencies ability to manage them. The adaptive management framework would allow the agencies to adjust this tolerance limit based on new information and experience.

Topic: Types of Bison Allowed Outside the Park

Several commentors (32) re-iterated (the same comments were made on the draft EIS) their belief that Montana should adopt the federal definition of low risk bison and agree to allow these types of bison outside the park without testing. Some stated that at a minimum, the ROD must state that it is only Montana that disagrees with this definition and so Montana must take responsibility for removing these animals from management areas outside the park. One commentor asked that the ROD state the reasons for keeping low risk bison separate from cattle at all. Another indicated even pregnant seronegative females should be considered low risk. Other commentors (3) disagreed, indicating that no seropositive bison or female bison should be allowed outside the park, even if they are

fitted with electronic transmitting devices. Noting that grizzlies and wolves are testing positive for exposure to brucellosis in the Yellowstone area, one commentor said this was evidence bison should be restricted to the park, rather than allowed to expand into management areas outside the park. One commentor asked that bison in Zone 3 in the western boundary area be tolerated to a greater extent than the plan calls for, as this is primarily public land.

Response: Rather than identifying which agency agrees to which provision of the plan, the EIS and ROD describe areas where bison are allowed on public land, and where each agency's mandate overlaps, e.g., areas of common ground. In Step 3 of the plan, for instance, untested bison, regardless of their serological or "risk" status, are allowed into the management zones up to a prescribed tolerance level. However, this is only possible after the agencies have proven to each other that seronegative bison are manageable, and a series of requirements regarding the completion of research and monitoring has been completed and applied. This research includes the viability of the *B. abortus* bacteria in the environment of the analysis area, the results of telemetered female bison and remote vaccination of vaccine-eligible bison. For further information and the position of agencies on management of low-risk bison, see pages 52-56 of volume II of the FEIS. Although grizzlies and other carnivores and scavengers may test positive for the presence of antibodies to brucellosis, bears, carnivores, and other scavengers are considered dead-end hosts for the disease. For a complete discussion of brucellosis in other wildlife, please see FEIS, Vol. 2, pages 207-208. Although Zone 3 in the western boundary does include public land, it is also the last area where agencies will be able to haze or otherwise ensure bison do not cross onto adjacent lands outside the analysis area. Zone 3 is a zone where bison are not allowed.

Topic: Hazing and Haze-Back Dates

Several commentors (73) voiced their opinion that hazing was not appropriate for a population of wildlife, or that it should be severely limited in the plan. They indicated hazing is noisy and affects other wildlife, it frightens bison and may cause stress or problems with birthing, etc. Some asked that the agencies drop the idea of hazing bison attempting to exit the park if they would be tolerated anyway, or to leave bison on private lands alone unless it is during the haze-back period in the spring. One asked that volunteers be used to haze bison. Many commentors (126) asked that the time bison are allowed outside the park be extended, even if it meant shorter grazing times for cattle. Specifically, they requested the "haze-back" date for bison be eliminated, and that bison be allowed to re-enter the park in the spring in their own time. The "cattle-on" date would then begin 30 (as opposed to 45 as specified in the plan) days later. Thirty days was considered plenty of time by many of these commentors (15) because of the Cook (1999) study cited above. Although another commentor also asked that the date remain flexible, it was to allow livestock producers to bring their cattle onto grazing lands earlier if spring warm-up occurred earlier. The Environmental Protection Agency asked that the "haze-back" date be mutually decided by the agencies, rather than by the Montana State Veterinarian acting alone.

Response: The plan calls for hazing during the winter in steps 1 and 2 to prevent untested bison from exiting north or west of the park boundary. Because only seronegative bison are allowed on public land in these boundary areas in the first two steps of the plan, hazing is intended to reduce lethal removal via capture, test and slaughter. Bison begin naturally moving back into the park as the land begins to green in the spring. Hazing is used to assist in this natural process, and does not apparently affect birthing. Whenever possible, a minimum of noise occurs, because bison are inclined to head back into the park and take little coaching to do so. The agencies have worked together to determine specific haze-back dates to which all agree, and these are included in the Record of Decision. These haze back dates (April 15 in the Reese Creek area of the northern boundary and May 15 in the western boundary area) are dates by which the agencies historically have been able to haze bison back into the park successfully and keep them in the park. Based on the current information and on an assessment of risk, the agencies will determine an appropriate temporal separation period and will adjust cattle allotment turn-on dates accordingly. The haze back dates will not be adjusted based on the determination of the appropriate temporal separation period unless all agencies agree to do so pursuant to the adaptive management

Topic: Vaccination of Bison and/or Cattle

Many commentors (more than 1,700) supported a mandatory vaccination program for cattle, and a few suggested that this alone would prevent transmission of brucellosis from bison to cattle. One commentor asked that this be funded by the agencies. Another asked why vaccinate bison if the vaccine is proven more effective in cattle. While a small number believed vaccination of bison was inappropriate for wildlife, many more (1,800) supported a bison vaccination program using a safe and effective vaccine with a safe and effective delivery system, with research being focused on finding such a vaccine. Some felt this system must be non-intrusive as well, and indicated concern

that calves would be unduly stressed. Some commentors (14) also were worried that adverse reactions from bison calves to RB51, such as anorexia or infertility, and requested evidence substantiating the claim that RB51 is safe even for bison calves. Another expressed concern that bison might be infected with genetic material with undesirable effects through vaccination. One commentor asked that bison be immediately vaccinated using RB51 or Strain 19; another requested that bison be revaccinated every year. Others were worried that no provisions for adaptive management of vaccination, such as cessation if vaccinating bison has unanticipated impacts, were part of the plan. Although most livestock interests indicated appreciation of APHIS' offer to fund cattle vaccination if it was mandated, two commentors noted they already vaccinated their cattle as a sound livestock management practice. Another indicated APHIS should pay for all costs associated with whole herd testing. One commentor suggested culturing the NRAMP1 gene, which is resistant to brucellosis, as a possible vaccine. Another suggested that bison only be allowed outside the park when a vaccination program had been implemented.

Response: The plan includes the possibility of state-mandated cattle vaccination, if livestock producers do not voluntarily vaccinate 100% of the test-eligible cattle in the analysis area. The plan also describes steps in which vaccine-eligible bison would be vaccinated. The agencies believe the evidence shows RB51 to be a safe vaccine for bison calves; the plan would immediately initiate vaccination of calves if they were captured when attempting to exit the park. The criteria and research results of vaccine trials on calves and other classes of bison are summarized in volume I of the FEIS (pages 93-97). While research is ongoing in the development and testing of a remote vaccine delivery system, the agencies have agreed to use such a system only when it is proven safe. Additional NEPA analysis would also occur prior to initiating a park-wide, remote vaccination program. If any vaccine or delivery system was not determined safe, it would not be used. If a vaccine or remote delivery system thought to be safe and effective was found not to be either after use in the field, or some unanticipated adverse impact were discovered, the agencies would reevaluate the program, and might modify, adjust or begin a new, safe program.

Topic: Capture, Test, and Slaughter of Bison

Many (1,458) commentors indicated opposition to slaughter of bison. Reasons varied, as some simply felt it went against their social values, and that bison should not be subject to the "fear, stress and immense cruelty associated with capture and slaughter." Others believed slaughter was unwarranted, given the very small risk of transmission and lack of proof that transmission could occur in the wild and/or relatively low correlation between those testing positive on the blood test and positive for actually having the bacteria in their tissues (culture positive). One commentor indicated bison should be shot instead of sent to slaughter, since this was more humane. Some opposed the practice of capture, test and slaughter because it would selectively remove bison with resistance to brucellosis as expressed through seropositivity. Some commentors (9) indicated they believed the card test used in the field to determine whether bison were seropositive or seronegative was untrustworthy. One commentor noted that since the transmission between bison and cattle had occurred under controlled conditions, field testing (card testing for seropositive bison) must be done under similar controlled conditions, e.g. using a mobile testing lab with new equipment, controlled temperatures and other factors, etc. Another suggested suspending testing until an accurate test is developed. For those in favor of testing, one commentor asked that bison held over the winter at Stephens Creek be re-tested before they are allowed back into the park, and a second affirmed the value of testing and slaughtering seropositive bison.

Response: The agencies recognize the valid and important social values the commentors have reiterated in stating their opposition to slaughter, and agree most bison are frightened and stressed by capture and transport to slaughter and that shooting by trained agency personnel may be more humane. Shooting bison does not allow the agencies to discriminate between bison testing positive for exposure to brucellosis and those bison testing negative. Without capture and testing of bison during Step 1 and Step 2 of the joint management plan, the agencies would not have a way to allow seronegative bison into Zone 2 lands outside the park during winter.

The plan would attempt to minimize capture, test, and slaughter within the constraints imposed by agency mandates by moving toward Step 3, where untested bison are able to exit the park up to the tolerance levels in each management area. Whenever the agencies need to haze, capture or otherwise handle bison, humane methods will be used as described in the FEIS (see vol. 1, pages 88-89 and vol. 2, pages 70-77). As indicated in volume II of the FEIS (p. 45), bison who test seropositive are not likely to be those with natural immunity to brucellosis, so selective removal will not reduce the segment of naturally immune animals in the population. Although a single blood test cannot definitively prove that an animal is infected with *Brucella abortus*, it is important to recognize that in a known infected herd, the screening tests are critical and useful to detect early infections. Therefore, although

bacterial isolation is the “gold standard” in proving infection, one should not expect a high rate of bacterial isolation from some animals since they may be too early in the course of infection for culture attempts to be successful. Testing is not confined to a single card test, but agencies use a multiple battery of tests to determine seropositivity (please see the FEIS, vol. 2, Brucellosis Testing, pages 168-179 for more information). Card tests are processed under standardized conditions in heated buildings at or near capture facilities to minimize inaccurate results. A recent comparison of field vs. lab results showed about 2% (3) false positives and 2% (3) false negatives in a sample of 157 tests (M. Philo, pers. comm., 11/2000). The plan provides that bison being held at Stephens Creek will not be retested before being released into the park in the spring.

Topic: Quarantine for Bison

Most commentors who addressed this topic (1,725) said they favored a quarantine, or health certification facility outside of the park as part of the plan. Some (18) voiced opposition to quarantine as inappropriate for wildlife. A few commentors (4) also re-stated their objection, as in the draft EIS, to the quarantine protocol as too harsh and unjustified, particularly since the bison herd is characterized as being similar in some ways to a chronically infected cattle herd. One asked that the ROD include a provision that bison go only to public or a tribal entity. Many commentors (1,762) asked that live bison completing quarantine be distributed to tribes according to the Intertribal Bison Cooperative relocation plan. Another commentor indicated the unknowns associated with conducting a second NEPA process to examine the quarantine facility location and design meant a critical part of the modified preferred alternative might fail.

Response: Because bison take longer to reach sexual maturity than cattle, the quarantine protocol results in some of them being held longer than similarly aged cattle to ensure they do not carry the bacteria (please see volume II, pages 116-118 for more information and responses on the protocol). The final plan calls for consideration of a quarantine facility, although it would not be accurate to call the quarantine facility a critical piece of the modified preferred alternative. A separate NEPA process for such a facility if the agencies decide quarantine is needed is anticipated, although there is nothing inherent in the NEPA process that dooms a project or proposal to failure. While this separate process will define the entities receiving bison (as well as the design, location, operation, and protocol of the facility), the EIS does indicate the agency preference that they are distributed to public or tribal entities.

Topic: Actions on Private Land

Commentors indicated private landowners should be compensated to take care of bison, rather than run cattle, or to run non-breeding cattle. Private land could be fenced with money from the government. Livestock operators on private land could receive special labels for their meat as “bison safe” if they take active measures to allow bison on their lands during the winter. Others noted the pattern of land use, domestic grazing and political realities would change in the 15 years of the plan. One commentor indicated agencies must keep bison off private land unless they have specific permission to remain, while other indicated bison should be left alone on private land unless the landowner requests they be removed.

Response: The idea of compensating private landowners to run non-breeding cattle is examined in alternative 2 in the EIS. The intent of the final plan is to provide tolerance for some bison on public land during winter. Bison would not be allowed on private land where cattle graze and current Montana law provides several options for removing bison from private land if the landowner chooses. Although the idea of “bison safe” beef is intriguing, most livestock operations in the analysis area are cow-calf or breeding cattle operations. For breeding cattle operations, APHIS has agreed to provide funding to certify eligible cattle herds within the bison management area as brucellosis-free. The agencies are aware that patterns of land use may change over 15 years and if there are significant ramifications for bison management because of these changes, the plan may need to be updated as well. The actions Montana DOL can and must take on private land are described on page 91 of volume I of the FEIS. Generally, Montana would seek landowner permission to shoot or otherwise remove bison from private land.

Topic: Specificity of Measures in the Plan

A few commentors (6) indicated they wanted specific and clear triggers of progress from one step of the plan to the next, as well as guarantees of timeliness to assure Step 3 can quickly be reached. Some (5) also asked for specific commitments of staff and money for relevant research—in particular viability of the bacteria, a certified safe and effective vaccine and delivery system for bison, and the rate of disappearance of any bison fetal material from the environment. Commentors requested that APHIS and USFS commit to specific management actions each would

take in the ROD, rather than just NPS and Montana. For instance, they asked that APHIS commit to certifying individual cattle herds as class-free. They also asked that a specific timetable and measures be included to ensure the sunset of grazing leases and use by bison of acquired land north of Reese Creek. The Environmental Protection Agency and others (23) indicated dissatisfaction with the open-ended authority of the Montana state veterinarian to decide management actions outside the park, and asked that at a minimum, the decision-making process, authority, and criteria be clearly laid out. Ideally, all agencies would make joint decisions and agree to and abide by specific management steps detailed in the plan inside and outside the park.

Response: In the final plan, the agencies have come to agreement on the specific provisions of managing bison in and out of the park by which all would abide. For instance, specific haze back dates, classes of animals allowed outside the park, number of bison outside the park, specific triggers for each step including the results of particular ongoing research studies and cessation of cattle grazing on the acquired lands, are spelled out in some detail in the ROD. Additional research on the viability of the bacteria will likely be completed in 1 to 2 years, and during Step 1 of the final plan. Additional research on the efficacy and safety of RB51 vaccine for all classes of bison is expected by 2003. Specific safety research on reproductive effects of RB51 in non-target species should be completed by 2002 (see FEIS, vol. 1, pages 98-100). The agencies anticipate research and development of a safe and effective remote delivery system to be complete in 3 to 4 years. The plan also provides that the federal agencies will cease endorsing or participating in lethal control measures and may withdraw from other management actions if Montana is not tolerating untested bison outside the park in management Zone 2 in the western boundary area by the winter of 2003-2004 or by the initiation of a vaccination program within the park, whichever occurs later. See parag. 31.1. of the plan for a similar provision for the northern boundary area.

Topic: Miscellaneous Requests for Changes in the MPA

The Environmental Protection Agency requests that the plan eliminates the Stephens Creek facility and build a capture facility in the Yankee Jim area as needed. One commentor indicated continual boundary patrol must be maintained. A few commentors either requested hunting be added in to control population numbers, or be kept out. The Shoshone-Bannock tribe indicated if hunting were added in, existing treaties giving them the right to hunt in the Yellowstone area should be honored. One commentor asked that bison meat be sold to wholesale markets. Some commentors (64) requested the agencies close roads or trails in the winter; others (3) asked they be kept open. One commentor requested the use of tranquilizers instead of shooting or hazing; another indicated the provisions of the Animal Welfare Act would apply to the handling and management of bison. That majority addressing snowmobiling (47 or 50) asked that it be discontinued in the park. The remainder (3) requested no changes resulting in reduced opportunities for snowmobiling be included. A few commentors asked that action be taken quickly. One commentor asked that bison entrails not be left for bears.

Response: The capture facility at Yankee Jim would be a second facility on the north side, used to enforce the Zone 2 management boundary specified in the plan. The Stephens Creek facility would be used to maintain population size and tolerance levels outside the park, as well as controlling which bison are allowed out of the park in Step 2. Hunting, trail or road closures or changes to snowmobile activities other than those designated in the park's Winter Use Plan, are not anticipated. The use of tranquilizers and other non-lethal activities could be considered in the course of management as alternatives to hazing or shooting. Because bison would be captured for shipment to slaughter or quarantine rather than shot, entrails are not expected to be routinely available to bears. The agencies would make every attempt to handle bison humanely; as noted in the FEIS (vol. 2, pages 71 and 74), the Animal Welfare Act does not apply to wild bison, except those held in research facilities.

III. Comments on the Planning Process

Topic: Objectives and Constraints

One commentor alleged the process of defining objectives and constraints was illegal because it did not involve the public. Commentors indicated the plan could not meet the objective of eliminating brucellosis, and was therefore invalid. Some noted that allowing bison outside the park would not contribute to eliminating the disease. One commentor indicated protecting human health should be the purpose of action. Another said protecting the cultural and nutritional needs related to bison should be the objective. A third indicated the goals stated by a cross section of citizen's in the 1990s should guide selection of an alternative. Others said the EIS failed to prove any need for

action, since the risk of transmission was essentially zero and the economic consequences of an outbreak of brucellosis in a cattle herd were much smaller (as analyzed in the FEIS cost-benefit analysis) than originally indicated (in the purpose and need section of the FEIS). One commentor indicated the modified preferred alternative would not fully meet purpose, need or objectives.

Response: The purpose, need and objectives were decided by the agencies as indicated on pages 42-43 of the FEIS (vol. 1). These objectives were developed over an extensive, systematic, multi-year planning process by the agencies. During this time, the public was frequently involved and consulted. However, ultimately, it is appropriate that the agencies charged with managing bison determine constraints imposed by their mandates and objectives set by their policies. The agencies agree that each alternative, including the modified preferred alternative would satisfy the purpose and need, and meet all objectives to a large degree. This reasoning is also reflected in table 11 of the FEIS (vol. 1). Eradication of brucellosis is not an objective; however, a commitment that the plan move toward elimination is. This means seropositive rates cannot remain as they are or increase, but must decrease over the life of the plan. In the selected alternative, this is accomplished primarily through bison vaccination. Preventing brucellosis in cattle is one of the purposes of APHIS' brucellosis eradication program; however, the purpose of action in the plan is confined to actions in the analysis area and is to "maintain a wild, free ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in the State of Montana." Although the risk of transmission is low, it is not zero. Also, although the likelihood of two outbreaks and a downgrade in state status is also quite low, it is a possibility with serious economic ramifications, should it occur. Both are legitimate reasons for taking actions.

Topic: Agency Relationships and Mandates

Commentors were concerned that Montana was no longer involved in the planning process, and would therefore pursue its own management plan. Others indicated the National Park Service had lost sight of its preservation mandate and indicated this plan would not satisfy the requirement that resources not be impaired for future generations because of excessive hazing and marking of bison. One commentor noted that while APHIS had agreed to work on sanctions, pay for vaccination and testing, etc., the NPS had offered nothing to benefit bison inside the park, and would still operate the Stephens Creek capture facility, groom winter trails, haze and shoot bison inside the park, and commit to vaccination, a practice the commentor felt was unwarranted and intrusive. A large majority (1,725) stated they realized the NPS had limited authority to manage bison in this process. Some commentors (26) expressed dissatisfaction with the U.S. Forest Service, and in particular its position on the management of wildlife on its lands and its grazing allotment renewal policies. Some said there is no statute, which delegates all wildlife management authority to Montana; others said other federal agencies had won court battles with states allowing them to manage certain species (wild horses and burros). One commentor indicated the U.S. Forest Service had recently adopted a policy of ecological sustainability and was bound by law to maintain "viable populations of vertebrates," yet had not determined what a viable population of bison would be or taken steps to ensure its future. Another commentor indicated that the USFS was violating several laws by not deeding grazing allotments to wildlife as they came up for renewal. One asked that the NPS and U.S. Forest Service "take over" management of bison on public lands outside the park. Another requested that the Yellowstone National Park boundaries be redrawn to include adequate winter range. A few commentors asked for clarification of APHIS' authority to downgrade status based on the presence of affected bison in the state, to allow bison to cross state lines from Wyoming to Montana, or to allow bison to be released from the Stephens Creek capture facility back into the park without being re-tested.

Response: Montana is now involved in its own planning process, and has agreed to abide by decisions collectively made by the federal agencies and Montana. The NPS is fulfilling its obligation to the Organic Act by "leaving resources unimpaired for the enjoyment of future generations" (please see "Findings of Impairment" in this ROD). Vaccination within the park will be accomplished through the least intrusive method possible. APHIS has indicated (see vol. 2 of the FEIS, p. 267) it currently does not have the regulatory authority to downgrade a state's status based merely on the presence of infected wildlife. APHIS has the authority to regulate the interstate movement of any animal to prevent the introduction or dissemination of the contagion or vector of any infections or communicable disease of livestock. APHIS also has the authority to make regulations and take measures necessary to prevent such dissemination. The Stephens Creek facility, located within the park, and the bison while they are in the park are within the exclusive jurisdiction of the National Park Service. Yellowstone National Park has no intent to expand its boundaries; doing so would take Congressional action. The authority for the State of Montana to manage wildlife on the national forest is set out in the Memorandum of Understanding between the Montana Fish and Game

Commission and U.S. Forest Service Region 1, dated September 21, 1978. The MOU recognizes that the state of Montana manages wildlife populations and the Forest Service manages habitat. The National Forest Management Act (NFMA) states that the national forests must maintain viable populations of native species. In the case of bison in management Zone 2, there is agreement among the agencies involved in the management of this species and its habitat that bison numbers will not be reduced to a point where viability ever becomes an issue, and the Joint Management Plan provides for contingency planning if the bison population reaches specified levels. In addition, individual bison rarely, if ever, spend the entire year on the Gallatin National Forest. Finally, there are no laws indicating that the Gallatin National Forest must convert livestock allotments to wildlife use. NFMA and the Gallatin National Forest Plan (1987) set allocations for grazing and for wildlife. Allotments in the Gallatin National Forest have permits or are in a permit reissuance process under the Recession Act of 1995. The forest will decide whether to reissue grazing permits following a NEPA planning process.

Topic: Consultation during the Planning Process

Commentors (13) expressed concern that government to government consultation never occurred during the planning process, and/or that the agencies never requested members from federally recognized tribes to be part of the team. One commentor indicated the federal commitment to fulfill the trust doctrine far outweighs that to the farm or ranching community or the State of Montana. A large majority (1,725) indicated an interagency/tribal/public advisory board of wildlife professionals or independent scientists should be established to help review results of research and assist in decision-making on issues such as the size of the population, haze-back dates, and tolerance levels.

Response: As indicated in the FEIS (see vol. 2, pages 233-236), the NPS does not consider bison a trust resource to manage for one or more tribes' benefits. Rather, they are a natural resource of the park, managed for the benefit of all citizens of the United States. It is the position of the agencies that government to government consultation has occurred, as indicated in appendix I (volume 1) of the EIS. The agencies do not feel the planning or management process would particularly benefit from a citizens' advisory group, as indicated on p. 233 of volume 2 of the FEIS.

Topic: NEPA and the Scope of the Analysis

Commentors stated their belief that the scope of the plan and analysis in the EIS was incorrect. Some (11) thought the EIS should have analyzed the impact of cattle grazing in the impact area, since allowing grazing on adjacent lands was "the primary driver" for bison management activities. At a minimum, grazing is a connected action with cumulative impacts. One commentor believed cumulative impacts to wildlife and to actions resulting in disenfranchised Plains Indians, particularly in the context of historic bison management, were not included in the scope or analysis. Another believed the scope should have included two alternatives only—free ranging bison vs. bison limited to a geographic area. Those who asked that the Bison Alternative be analyzed and considered in more depth debated the response to this request in the FEIS (see pages 30-32, vol. 2) by asserting no boundary line would be necessary because bison would not leave the area if roads were not groomed, and private landowners would be able to shoot bison if needed. One commentor suggested that, since no alternatives had higher benefits than costs, none were reasonable and the EIS had failed to analyze a range of reasonable options. The team received several comments (37) asking for the reasons why the plan only dealt with bison, when elk posed a risk similar to bison because of their high numbers. Leaving elk out was viewed as a segmentation of the NEPA process. The same was considered true by a few commentors for the details of quarantine and bison vaccination.

Response: The scope of the plan was defined by need for action, objectives in taking action and constraints imposed by agency policies and mandates. The agencies recognize the connection between cattle grazing and bison management, and constructed a range of alternatives including two (alternatives 2 and 3) which focused to a greater extent on removal or management of cattle than others. However, these two were still within the boundaries set by objectives and constraints. A more thorough discussion of this process is presented in vol. 1 (pages 42-51) of the FEIS. An alternative allowing bison to range freely with no boundary line, similar to the Bison Alternative, was considered and rejected because it could not fulfill the purpose of action or some of the objectives (#2, #3, #5, #6). Vol. 1 (p. 218) and vol. 2 (p. 4, pages 30-32) of the FEIS have laid out the agencies' reasoning in rejecting an alternative without boundaries. Although it may be true that ceasing road and trail grooming would keep some bison from being able to cross out of the park or analysis area, scientific evidence does not suggest it would keep all or even most bison from doing so.

In terms of costs, agencies are not bound to create or adopt alternatives with high or even positive benefit/cost ratios, but simply to analyze a range of reasonable alternatives. Reasonable is defined by CEQ as technically and economically feasible and uses common sense (40 CFR 1500-1508, Question 2A). In addition, whether an alternative is reasonable depends on whether it fulfills the purpose and need for the proposed action. In this case, constraints imposed by the agencies' mandates and policies have resulted in a narrow range of possible alternatives that could be implemented. Each of these involves either management techniques to ensure no transmission of the disease, the purchase of additional land to remove cattle, or a combination of these admittedly expensive options. Since these are the only choices that are within the constraints and meet the objectives, the agencies believe it makes common sense to analyze only these options. They are expensive, but are economically feasible.

We do not believe the EIS improperly segments issues, but rather that it is the first step in what may be a multi-step process of fully managing the risk of brucellosis transmission in the Greater Yellowstone Area. The FEIS (vol. 2, p. 284) includes a discussion of the concept of tiering and the mandate to focus on areas "ripe for decision" in any given NEPA analysis. Bison exiting the park and mingling with cattle in the analysis area was an issue that required attention and management by the agencies—hence planning on how best to avoid contact between them was an area ready and ripe for decision.

Topic: NEPA and CEQ Requirements

The team received several requests (71) for an extension of the review period for the FEIS, with commentors indicating the document was long and complex. One commentor asked that the process used in meeting CEQ requirements to respond to comments on the draft EIS be identified. A few others noted all material cited in the bibliography was not reasonably available for inspection within the time allowed for comment. Another commentor asked why the biological assessment was not incorporated into the final EIS or available for inspection when the commentor visited the park. Some commentors (26) indicated their belief that there was enough new material and changes to the preferred alternative that the final EIS was really a supplement to the draft EIS. Another noted that because negotiations between the federal agencies and Montana were ongoing, the final alternative would again be changed and the public would have no additional chance to comment on it.

Response: A two-week extension was granted, bringing the total public review period for the final EIS to 45 days. The process used to respond to comments recognized a provision in the CEQ regulations (40 CFR 1503.4(5)(b)) which allows agencies to summarize comments on the draft EIS where the "response has been exceptionally voluminous." The team received about 64,000 comments letters on the draft, which easily qualified as "exceptionally voluminous." A database of comments received was created. Similar comments were combined and lumped under larger "issues" for response by specialists on the team. More information on this process is available by reading pages i-ii of volume 2.

The section of the CEQ regulations cited regarding available information (1502.21) refers to material incorporated by reference, rather than a simple bibliographical reference or citation. This process is specific to a case where an entire article or report, or a large piece of it, is important to understand the analysis, but the agency chooses to incorporate that material simply by referencing and briefly summarizing it in the EIS. Most of the references cited in the EIS were only cited as the location of a fact noted in the EIS, and were not incorporating material. The biological assessment is readily available for inspection, but there is no requirement that it be attached as an appendix to a NEPA document. The agencies chose instead to attach a letter summarizing findings by the U.S. Fish and Wildlife Service (see appendix j of volume 1, page 797) as most of the scientific material in the biological assessment is summarized in the body of the FEIS.

The reasons for not preparing a supplement for the modified preferred alternative are described in vol. 2 of the FEIS (pages 290-291). In addition, no supplemental EIS is necessary for the Joint Management Plan, which is the same or very similar to the Modified Preferred Alternative. Because the Joint Management Plan would not have impacts different than the range of impacts analyzed in the FEIS, the agencies do not believe a supplement is needed. In addition, although new information was indeed made available between the release of the draft EIS and the publication of the final EIS, this information ultimately had little or no bearing on the decision made by the agencies.

Topic: Role of Public Comments and NEPA

Many people (1,016) indicated they believed comments on the draft EIS asking that bison be managed through non-lethal means or in support of the Citizen's Plan were ignored.

Response: Considering public sentiment against human intervention and lethal control, the agencies have constructed a plan whose ultimate goal is to alleviate the need for large-scale capture and slaughter, as occurred under the interim bison management plan during the winter of 1996-97. The agencies are accomplishing this by keeping the population size near the number below which evidence suggests they are less likely to exit in large numbers because of severe winter weather conditions, and by moving steadily toward allowing bison to migrate to winter range in the analysis area without being handled by humans. Hazing is used only on a case-by-case basis during the winter. Bison attempting to exit the park after the tolerance level has been achieved would be held at the Stephens Creek capture facility over the winter to keep them from being shot or shipped to slaughter. A quarantine facility that may be considered as part of Step 3 would also keep some bison from this same fate, and would begin to supply a small number of live bison to tribes or public herds. Many of these features, as well as the acquisition and use of lands north of the park's Reese Creek boundary for bison and other wildlife, are also part of the proposed Citizen's Plan (please see p. 33-35 of vol. 2 of the FEIS for response to Citizen's Plan). Although the agencies could not adopt every piece of other proposed alternatives, including the Citizen's Plan, or completely eliminate all lethal control because of constraints noted in other responses on this FEIS, they did not disregard the outpouring of public sentiment and truly appreciate the time and effort each citizen, business, organization, tribal government or agency representative took to read, digest and participate in the EIS planning process.

Topic: NEPA- Inadequate or Flawed Analysis

Commentors requested additional information on the adverse impact on the livelihoods of people in the analysis area, on impacts and alternatives for grizzly bears, on the economic impact of brucellosis on the livestock industry, on historic bison reductions and their impact on bison nationwide, on the human health impacts of seropositive bison meat, the impacts to bison of winter mortality, and the impacts to different subpopulations of bison in the Yellowstone herd. Some believed the analysis of impacts of snowmobiling to bison is incorrect and that bison would not be affected by snowmobiling. Also, data shows that visitor numbers to the area would increase at the same rate with or without bison viewing opportunities. One commentor indicated they believed alternative 5 was presented in an unfairly negative way.

Response: The agencies believe the document adequately analyzed impacts to livestock operators, both statewide and in the impact area (see pages 453-476 of volume I of the FEIS), the livelihoods of people in the analysis area (see "Regional Economy" sections of Impacts to Socioeconomics, pages 479-498 of volume I of the FEIS), impacts to grizzly bears (see pages 565-588 of Volume I), human health impacts (see pages 611-617 of volume I), and the impacts of winter mortality to bison (see p. 378 of volume I, assumptions and methodology in estimating population sizes for bison, and pages 382 and 389). The differences between subpopulations of the bison herd were analyzed and then combined to create a whole-herd impact (see page 381 of Volume I for more information). The discussion of the near extinction of the American bison is part of the Cultural Resources section of volume I (see pages 362-365). The EIS discusses the impact of snowmobiling on wildlife generally (see pages 594, 597, 599, 603, of volume I, for example), and on the basis of relevant scientific literature, concludes "impacts on wildlife from snowmobile use are not well known, but would likely to be minor as use would be confined to groomed trails" (p. 596). Additional analysis completed over the summer of 2000 examined the likelihood of viewing bison and its relationship to visitation and expenditures in the area. (See Impacts on Socioeconomics, pages 477-498 for more information). This study found it would take a larger-scale increase (such as in alternative 2) or decrease (such as in alternative 5) in bison population numbers to affect visitation. The agencies believe the impacts and costs associated with alternative 5 are presented accurately in the final EIS.

Topic: Decisions Based on EIS

One commentor indicated they believed approving the modified preferred alternative would be an arbitrary and capricious decision, since no evidence to substantiate risk of transmission or risk of a downgrade in status existed. The same commentor called for a more reasonable, less expensive, more humane alternative that was based on science and included cattle management.

Response: The agencies believe the analysis of alternatives, including the modified preferred alternative, is complete, and that a decision to select it or any alternative whose impacts are within the range analyzed would

comply with the requirement of NEPA to be fully informed. In this Record of Decision, the agencies have also laid out their rationale in choosing this particular alternative from among the range, including those the commentor may view as more reasonable.

Topic: EPA Review of EIS

The Environmental Protection Agency reviews all draft EISs and the final versions of those where it expressed concerns. The EPA did not feel the plan would avoid significant environmental effects, or that it contained sufficient information to fully assess impacts that could be avoided to fully protect the environment.

Response: Many of EPA's specific comments are similar to others and are addressed in topics above (for example, the support of an alternative using only cattle vaccination, with no population control, as an option; the dissatisfaction with the open-ended authority of the Montana State Veterinarian; and the request to adopt the federal definition of low-risk). The agencies believe the EIS team has responded to all of the detailed comments provided by EPA that support the statements above. Therefore, given no additional details about what these statements specifically mean, the agencies assume EPA's concerns have been adequately addressed.

Topic: Miscellaneous Procedural Comments

The Governor of Idaho noted that the edge of Zone 3 on the western side of the management area extends into Idaho, and this team should not be making any decisions that affect Idaho. A few commentors re-iterated a desire for APHIS to analyze the impacts of its policy to rid cattle of brucellosis, since they believed it was responsible for the need to manage bison. A few indicated they "looked forward" to the APHIS NEPA process on this topic. One commentor indicated actions in the modified preferred alternative should be characterized as mitigation; in particular, that tolerance of untested bison or low risk bison was mitigation for lethal control actions in other steps of the plan. Another commentor said the bison protocol is subject to public notice and comment as required by the Administrative Procedures Act. One noted this EIS and plan should have been better coordinated with the Yellowstone National Park Winter Use Plan. One commentor asked whether additional NEPA would be required before the vaccination program takes place. Others asked if any NEPA compliance was conducted on renewing the Horse Butte allotments or on acquisition of lands north of Reese Creek.

Response: In the final plan, Zone 3 does not extend into Idaho. As indicated in the FEIS (vol. 2, p. 273), although APHIS agrees a nationwide review of its brucellosis eradication program might be useful in reviewing past performance, such a review would not be completed in time to help in evaluating this bison management plan. It is true that another way to look at the ultimate tolerance of untested bison outside the park is as mitigation for lethal actions either in earlier steps, or in Step 3 to control bison numbers. This EIS is one vehicle by which the public is able to comment on the bison quarantine protocol under the Administrative Procedures Act, and as noted in the FEIS, additional NEPA analysis on features of the quarantine process and facility is anticipated in the future, offering another public input opportunity. The EIS also includes information on the Winter Use Plan, and any decisions on road or trail closures as a result of that plan would be carried over into the Bison Management Plan. Impacts of those closures can be found in the EIS accompanying the Winter Use Plan. As indicated above, additional NEPA analysis and public input opportunities will also be available before parkwide bison vaccination is implemented.

The livestock permit on the Horse Butte allotment is due for consideration and probably reissuance in 2001. The Gallatin National Forest will complete a NEPA process tiered to the bison management EIS before it issues a permit. Additionally, the Forest Service acquired most of the Royal Teton Ranch lands under a Congressional mandate and with Land and Water Conservation Fund dollars and, therefore, did not require a NEPA process. Part of the forest's future land acquisition includes a land exchange with Royal Teton Ranch, which requires a NEPA process currently in progress.

APPENDIX B: ERRATA

The following text was inadvertently deleted from the FEIS. This text was found on page 199 in the draft EIS in Chapter 4, Impacts on Bison Population, Methodologies for Analyzing Impacts, under the heading Seroprevalence Estimates. This text should have been included in the final EIS before the existing text highlighted in green on page 380 in Chapter 4, Impacts on Bison Population, Methodologies for Analyzing Impacts, under the heading Seroprevalence Estimates.

For many of the alternatives, bison removals are tied to serological status of the animal. Therefore, annual seroprevalence rates were estimated for each alternative to use in predicting the changes in seroprevalence rates and predicting impacts on the bison population. Although all alternatives include vaccination in estimates of seroprevalence, efficacy of the vaccine that would be eventually used is unknown (because the safety and effectiveness of current vaccines have not been tested in bison) and was assumed based on studies of earlier vaccines.

Seroprevalence estimates in the Yellowstone herd have varied from 28% seropositive in the park interior during 1964–68 (NPS, Meagher 1973) to 54% seropositive among bison removed through hunting and agency shooting between 1984 and 1989 (Pac and Frey 1991). Between 1985 and 1992, 49% of 904 bison sampled as a result of management actions were seropositive. Based on these estimates, initial seroprevalence was assumed to be 50% for model calculations.

The efficacy (preventing infection) of Strain 19 vaccine in cattle has been estimated at approximately 65% (Davis et al. 1991), and about 9% in bison calves (Davis et al. 1989). Twenty-five percent of bison vaccinated as calves were protected from having abortions when injected with a challenge dose of *Brucella* bacteria (Davis et al. 1989). Based on the ability of the vaccine to protect adults from infection and from having abortions, efficacy values used in the model were 70% and 25%, respectively. For the purposes of the model, efficacy was assumed to mean the percent of the vaccinated population for which there was no chance of seroconversion. For the purposes of the model, vaccination was assumed to begin in the year 2000 after safety and efficacy testing in bison was expected to be completed. For alternatives 1 through 4, the beginning population of seronegative adult bison and a proportion of vaccinated calves that were seronegative and recruited into the adult population were assumed to remain seronegative in subsequent years. Beginning in 2000 for alternatives 1 through 4, the model assumed that approximately 95% of bison calves would be vaccinated. In alternative 5, vaccination of 95% of seronegative bison calves and adults was assumed to begin in 2000, during the capture and testing operations. In alternative 6, whole herd vaccination of 95% of the bison population would be the primary method of brucellosis control and was assumed to begin in 2000. The rate at which unvaccinated and vaccinated but unprotected calves, the 30% (100%–70% effective) or 75% (100%–25% effective; see above) of calves for whom the vaccination is ineffective, became seropositive in the model was based on the seroprevalence of the adult bison population for that year.

Computer simulation of the effect of vaccines in bison calves in Grand Teton indicated vaccines would reduce the initial population seroprevalence rate of 61% to a seroprevalence rate of 23% in 20 years (Peterson, Grant, and Davis 1991). Because abortion events containing infected tissues were considered the most likely vector for exposure to other animals, factors such as vaccination that might provide protection from abortion could result in seroprevalence lower than predicted by the model.

The predicted seroprevalence rates are useful for comparison among alternatives. However, because the models are based on average migration, capture, and slaughter rates, the actual numbers might not be accurate in the short term. Realistically, bison migrations (and therefore capture, slaughter, and decreased seroprevalence rates) follow stochastic events, such as weather changes and forage production in a given year. Since the seroprevalence estimate in any alternative for a particular year might or might not be realistic, alternatives cannot be accurately tested for statistical differences.

The following are corrections to the Bibliography in the FEIS beginning on page 805 of the FEIS.

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1922 Superintendent Annual Report, Yellowstone National Park, WY, p 52.

***this reference should be included in the bibliography**

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1993 "Immune Response and Protection Against Infection and Abortion in Cattle Experimentally Vaccinated with Mutant Strains of *Brucella abortus*."

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2000 "Biological Assessment for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park." Prepared with the assistance from Greystone Environmental Consultants, Inc. and BRW, Inc. On file at Yellowstone National Park.

U.S. Department of Commerce, U.S. Bureau of Economic Analysis

2000 Information extracted from Regional Economic Information System Web Page on February 1, 2000. Available on Internet @ <http://govinfo.kerr.orst.edu/reis-stateis.html>.

***is corrected to:**

U.S. Department of Commerce, U.S. Bureau of Economic Analysis

2000 Information extracted from Regional Economic Information System Web Page for Park County, MT and the State of Montana on February 1, 2000. Available on Internet @ http://govinfo.library.orst.edu/cgi-bin/reis-list?7_05-state.mts
http://govinfo.library.orst.edu/cgi-bin/reis-list?7_05-901.mtc

U. S. Fish and Wildlife Service, U.S. Department of the Interior

N.d. *Draft Environmental Impact Statement, The Reintroduction of the Grizzly Bear into the Selway Bitterroot Wilderness*. In prep.

***is corrected to:**

U. S. Fish and Wildlife Service, U.S. Department of the Interior

2000 *Final Environmental Impact Statement, The Grizzly Bear Recovery in Bitterroot Ecosystem*.

Wallace, L.L.

1996 *Grazing and Competition in Montana Grasslands*. Technical Report

***is corrected to:**

Wallace, L.L.

1996 *Grazing and Competition in Montane Grasslands*. Technical Report
YCR-NR-96-6. Yellowstone National Park, WY: National Park Service.

Wallace, L.L., M.I. Dyer, and J. Bell

1997 "Bison as Controllers of Ecosystem Productivity and Stability." In *Proceedings of the International Symposium on Bison Ecology and Management in North America*, abstract, 147. Bozeman, MT.

***is corrected to:**

Wallace, L.L., M.I. Dyer, and J. Bell

1998 "Bison as Controllers of Ecosystem Productivity and Stability." In *Proceedings of the International Symposium on Bison Ecology and Management in North America*, abstract, 147. June 4-7, 1997, Bozeman, MT.

Ward A.L.

- 1973 "Elk Behavior in Relation to Multiple Uses on the Medicine Bow National Forest." In *Proceedings of the Western Association of the State Game and Fish Commission* 53:125–41.

***is corrected to:**

Ward A.L.

- 1973 "Elk Behavior in Relation to Multiple Uses on the Medicine Bow National Forest." In *Western Proceedings of the Annual Conference of the Western Association of State Game and Fish Commissioners* 53:125–41.

Wilson, G.A., and C. Strobeck

- 1997 "Microsatellite Analysis of Genetic Variation in Wood and Plain Bison." In *Proceedings of the International Symposium on Bison Ecology and Management in North America*, 180–91.

***is corrected to:**

Wilson, G.A., and C. Strobeck

- 1998 "Microsatellite Analysis of Genetic Variation in Wood and Plain Bison." In *Proceedings of the International Symposium on Bison Ecology and Management in North America*, 180–91. June 4-7, 1997, Bozeman, MT.

Youmans, J.

- 1992 *Montana-Elk Management Plan*. Helena, MT: Montana Department of Fish, Wildlife and Parks.

***is corrected to:**

Youmans, H.B.

- 1992 *Statewide Elk Management Plan for Montana*. Helena, MT: Montana Department of Fish, Wildlife and Parks. Montana State University: Special Collections.

From: [Clarke, Patrick R. - APHIS](#)
To: [Thomas, LeeAnn - APHIS](#)
Cc: [Healey, Burke L - APHIS](#); [Brown, Elizabeth M - APHIS](#); [Herriott, Donald E - APHIS](#); [Rhyan, Jack C - APHIS](#)
Subject: RE: Bison questions
Date: Monday, January 30, 2017 4:00:08 PM

LeeAnn,

We have gone through the list and contacted the various parties about sales of surplus bison. As of 16:00 MT, we are still waiting to hear back from Turner Enterprises, Inc.. What we know from the others on the list:

Turner Enterprises, Inc. : hold the 2nd largest group of Yellowstone bison....~180 head all at Red Rocks Ranch. Red Rocks Ranch is a brucellosis affected herd and probably won't be coming off State quarantine until late June.

Ft Belknap Tribe: Their bison are 31 animals given to them by Ft Peck about in Aug 2013. They had 19 die from salt toxicosis due to water deprivation in Aug 2015. They are trying to build their herd up and would not sell animals back to the Tribe that gave them the animals originally. They are actually expecting FT Peck to give them more Yellowstone bison.

APHIS, VS-GonaCon & WiLDIT: APHIS, VS-GonaCon & WiLDIT: the majority of all these Yellowstone bison are either infected, exposed or enrolled in a study. Per the IACUC approved protocol that WiLDIT is bound by, and the research permit agreement with YNP, all animals that graduate from quarantine are committed to CSU and the Laramie Foothills Herd to be used to establish a robust herd of Yellowstone animals that will be used to provide animals for conservation purposes as they become available

-
Idaho Fish & Game: these animals have been euthanized

Midewin Tall Grass Prairie, IL: Received 5 bulls a year ago. They have no surplus animals to sell. However, they would be interested in talking about locating a long-term approved bison quarantine facility on their federal land at Midewin.

Laramie Foothills Conservation Herd: This herd just started with 16 animals about 15 months ago. They have promised to send one bull to the Minneapolis Zoo.

Ft Peck Indian Tribe: Not applicable. This is probably the entity that already owns the most Yellowstone bison.

Ryan

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA

Bozeman, Montana
406-388-5162

From: Thomas, LeeAnn - APHIS
Sent: Friday, January 27, 2017 2:12 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Cc: Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>; Brown, Elizabeth M - APHIS <Elizabeth.M.Brown@aphis.usda.gov>; Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>
Subject: FW: Bison questions

Ryan,

The Administrator's Office has asked Burke if there are any locations that would be willing to sell surplus bison to the Ft. Peck tribe (see attached e-mail string – Message from Jere to Jack). Would you check/Jack check with the locations on the list and get back to us on Monday COB?

Thanks much,
Lee Ann (Acting ADA for Burke)

Begin forwarded message:

From: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>
Date: January 27, 2017 at 6:50:38 AM MST
To: "Healey, Burke L - APHIS" <Burke.L.Healey@aphis.usda.gov>
Subject: Fwd: Bison questions

It's in the attached

Sent from my iPhone

Begin forwarded message:

From: "Clarke, Patrick R. - APHIS" <Patrick.R.Clarke@aphis.usda.gov>
Date: January 26, 2017 at 12:43:09 PM MST
To: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>
Subject: RE: Bison questions

Here it is.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 12:40 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Bison questions

Huh?

We have sent animals or germplasm to these places.

Are we still getting a list?

From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 12:27 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Subject: RE: Bison questions

Been talking to Matt.....we are not including future destinations specifically.....just where the animals are presently (or were)

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 12:15 PM
To: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>
Subject: RE: Bison questions

Thanks

I was hoping jack or matt were around because they've shipped to MN and Brooklyn at least.

From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 12:10 PM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Subject: RE: Bison questions

Working on the genetics...will have something for you in 10-15 minutes

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS

District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Clarke, Patrick R. - APHIS
Sent: Thursday, January 26, 2017 11:24 AM
To: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>
Cc: Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Subject: RE: Bison questions

So we can say:

All the graduates of the BQFS have done to the Ft Peck and Ft Belknap Tribes . Off spring off BQFS animals are held by the Ft Peck Tribe. the Ft Belknap Tribe, and Turner Enterprises, Inc.

Other individual animals have gone to Tall Grass Prairie? etc.....
Matt?

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Thursday, January 26, 2017 11:12 AM
To: Shere, Jack A - APHIS <Jack.A.Shere@aphis.usda.gov>; Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>
Cc: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>; Brown, Elizabeth M - APHIS <Elizabeth.M.Brown@aphis.usda.gov>
Subject: RE: Bison questions

Hi Jack,

I have attached the 2000 ROD here. You can find a wealth of documents at our IBMPinfo website (<http://ibmp.info/>)

Hopefully Jack Rhyan or Matt are available to provide the list of facilities receiving YNP Bison genetics. The outstanding collaboration with CSU has provided an opportunity to conserve YNP genetics to zoos and other

facilities across the US. In fact, just a year ago Fall we turned out YNP bison offspring on Larimer county open space producing red calves on the landscape last spring.

From: Shere, Jack A - APHIS

Sent: Thursday, January 26, 2017 10:55 AM

To: Healey, Burke L - APHIS <Burke.L.Healey@aphis.usda.gov>

Cc: Herriott, Donald E - APHIS <Don.E.Herriott@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>

Subject: Bison questions

Burke:

Could you check with our personnel and get information sent to me on the two questions below.

1. Where have the genetics (animals) from the Yellowstone herd of bison gone. Who has them so that a list could be made for possible purchase and dissemination of those genetics.
2. There was a Record of Decision made by a Judge in the past in regards to the Yellowstone Bison according to Dr. Jere Dick. The federal agencies were squabbling so he stepped in and laid out the decision. Can we get a copy of that.

Thanks to all of you for your help on this. Can I get this quickly as possible today please for a meeting this afternoon at 3:00 pm Eastern time.

Thank you again,

Jack A. Shere, DVM PhD
Deputy Administrator
USDA, APHIS, Veterinary Services
1400 Independence Avenue, SW
Room 317-E Whitten Building
Washington, DC 20250
Phone : 202-799-7146

From: [Willard, Tracy A \(APHIS\)](#)
To: [Stephens, Stephanie H \(APHIS\)](#); [Donch, Debra A \(APHIS\)](#); [Nasr, Ann M \(APHIS\)](#); [Floyd, Samantha \(APHIS\)](#)
Cc: [Gutierrez, Vicki L \(APHIS\)](#); [Rhyan, Jack C \(APHIS\)](#)
Subject: RE: GonaCon Bison Study Information Needed
Date: Thursday, August 18, 2011 4:45:21 AM
Attachments: [ESA section for bison study.docx](#)

Hi everyone-

Here is my latest version of the ESA section for the GonaCon study EA. I made the changes to the pasture sizes based on what Jack sent us. Please review and send me your comments. I'll send Dan the coordinates for the other pastures and have him make some maps.

We might want to consider making a consultation invitation to the tribes mentioned in the latest BFC newsletter, the Confederated Salish and Kootenai Tribes, and there may be others. This should probably be done as soon as possible. Should I contact Terry Clark about this to see what tribes VS needs to make contact with? What tribes have an interest in bison? I would guess that there are many, although this study alone probably wouldn't have much impact on any particular tribe. It is actually up to VS to handle the invitation and send out the letters inviting consultation, but it wouldn't hurt for us to help with it since it is a fairly new process.

Does anyone have any thoughts on this?

Tracy A. Willard, Ph.D.
Ecologist
Environmental and Risk Analysis Services
USDA-APHIS-PPD
4700 River Rd. Unit 149
Riverdale, MD 20737
Ph: (301) 734-5213
Fax: (301)734-3640

-----Original Message-----

From: Stephens, Stephanie H (APHIS)
Sent: Wednesday, August 17, 2011 6:03 PM
To: Willard, Tracy A (APHIS); Donch, Debra A (APHIS); Nasr, Ann M (APHIS); Floyd, Samantha (APHIS)
Subject: FW: GonaCon Bison Study Information Needed

Below is information I just received from VS on the ranch locations and general acreage for the GonaCon bison study. Looks like the study area is comprised of a total of 114 acres, which seems about right to me given the general information we've gotten in the past. Please let me know if you think so too.

Thanks,

Stephanie

-----Original Message-----

From: Rhyan, Jack C (APHIS)
Sent: Wednesday, August 17, 2011 3:26 PM
To: Frey, Rebecca K (APHIS)
Cc: Stephens, Stephanie H (APHIS)
Subject: RE: GonaCon Bison Study Information Needed

Perfect Becky, thanks much. Any easy maps to get? If not we'll work on it here.
Jack

-----Original Message-----

From: Frey, Rebecca K (APHIS)

Sent: Wednesday, August 17, 2011 2:19 PM

To: Rhyan, Jack C (APHIS)

Subject: RE: GonaCon Bison Study Information Needed

Brogan front gate. N45.11341; W110.78983 Rigler front gate. N45.15783; W110.82516 SlipnSlide front gate. N45.16392; 110.83482

Dennis measured the irrigated portions of slipnslide and riglers for another project. He got 32 acres for Riglers, and 22 acres for slipnslide. Slipnslide with the handling facility and holding pens is probably closer to 25.

We guessed that if the lease description of 55 acres only refers to the irrigated pastures at Brogans, then the total must be closer to 60acres.

Best I got....

Becky

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and its implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. Program activities will occur in three pastures in southern Park County; the Brogan Bison Facility in Corwin Springs (60 acres) and two pastures (Slip 'n Slide pasture (25 acres) and Rigler pasture (32 acres) located north of Gardiner, Montana

There are two federally listed mammals in Park County, the Canada lynx (*Lynx canadensis*) and the grizzly bear (*Ursos arctos horribilis*). Critical habitat has been designated for the Canada lynx in Park County. ~~There is also a non-essential, experimental population of gray wolves (*Canis lupus*).~~

Canada lynx: Areas designated as critical habitat for the Canada lynx include boreal forest landscapes that provide one or more of the following primary constituent elements for the lynx including snowshoe hares for prey, abundant, large, woody debris piles that are used as dens, and winter snow conditions that are generally deep and fluffy for extended periods of time (USDOI, FWS, 2009).

Grizzly bear: In Montana, grizzly bears primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, sidehill parks, snow chutes, and alpine slabrock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals. Recovery zones, including the Yellowstone area in northwest Wyoming, eastern Idaho, and southwest Montana (9,200 square miles), are estimated at more than 580 bears (<http://www.fws.gov/mountain-prairie/species/mammals/grizzly/> last accessed August 4, 2011)

~~Gray wolves: The gray wolf exhibits no particular habitat preference except for the presence of native ungulates within its territory on a year-round basis.~~

The Brogan Bison Facility is currently leased and used by APHIS VS for bison research. The Slip 'n Slide and Rigler pastures are part of a working ranch. At both locations, the pastures are double-fenced with 8-foot woven wire and electric high tensile fence to contain the study bison. These fences will also prevent Canada lynx and grizzly bears, and gray wolves from entering the pastures. If Canada lynx or grizzly bears were to enter the pastures and consume GonaCon-treated bison, there would be no effect on these species. The vaccine is made of proteins, and when consumed, is broken down into amino acids in the gastrointestinal tract and would have no contraceptive effect (Fagerstone et al., 2008; Fagerstone et al., 2010). Federally-listed species and other non-target wildlife will not be directly exposed to GonaCon because the vaccine will be injected directly into the test bison and not administered orally in bait form. No wildlife habitat will be altered or disrupted by study activities. No helicopters will be used as part of this study to cause disturbance of wildlife in the surrounding area. Although the quarantine pastures occur within the designated critical habitat of the Canada lynx, the proposed research project will have no effect on the primary constituent elements of that habitat and will not adversely modify it. Therefore, APHIS has determined that the proposed action will not jeopardize the continued existence of the gray wolf and will have no effect on the grizzly bear or Canada lynx.

Commented [taw1]: Montana gray wolves have been removed from listing as of May 11, 2011. These no longer need to be considered.

"Gray wolves in Montana and Idaho, as well as portions of eastern Oregon, eastern Washington, and north-central Utah, are removed from the List of Endangered and Threatened Wildlife. Gray wolves in Wyoming remain on the List of Endangered and Threatened Wildlife and continue to be subject to the provisions of our experimental population regulations codified at 50 CFR 17.84(i) and (n)." (From FR 5/5/2011 Vol. 76, pg. 25590-25592)

References:

Fagerstone, K.A., L.A. Miller, J.D. Eisemann, J. R. O'Hare, and J.P. Gionfriddo. 2008. Registration of wildlife contraceptives in the United States of America, with OvoControl and GonaCon immunocontraceptive vaccines as examples. *Wildlife Research*. 35: 586-592.

Fagerstone, K.A., L.A. Miller, G. Killian, and C.A. Yoder. 2010. Review of issues concerning the use of reproductive inhibitors, with particular emphasis on resolving human-wildlife conflicts in North America. *Integrative Zoology*. 1: 15-30.

USDOL, FWS—see U.S. Department of the Interior, Fish and Wildlife Service

United States Department of the Interior, Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx. *Federal Register*, Vol. 74, p. 8616–8702, February 25, 2009.

From: [McCollum, Matthew P - APHIS](#)
To: [Hastings, Bruce](#)
Cc: david_c_lucas@fws.gov; [Tom Ronning](#); [Rhyon, Jack C - APHIS](#); [Nol, Pauline - APHIS](#)
Subject: RE: Well met
Date: Wednesday, April 30, 2014 11:27:18 AM
Attachments: [Contraception of BisonJWD.PDF](#)
[ContraceptionArtJZVM2013.pdf](#)

Good Morning,

Bruce and I briefly discussed bison and the issues associated with population growth. As I understand it, those issues are exacerbated by the status of the RMA as a superfund site and the present disposition of any animals that are removed from that area dictate that they may not be used for human consumption. I recognize that you are not interested in long term sterilization of the animals and that you are managing them as a meta population and selecting for certain genetics.

We could potentially be of assistance to each other by setting up a GnRH trial using your animals. We are looking to get GnRH approved by the FDA for use in bison. It is already approved for use in deer. Until we get approval, those cows that receive the experimental drug cannot be used for human consumption per FDA rules. We have completed three small studies using GnRH in bison and have two ongoing studies at present. Attached are two publications detailing our previous work.

Ongoing studies:

Sand Dunes Nature Conservancy GnRH trial: We dosed 10 cows with the medium dose of GnRH. The first year was moderately successful with 6/10 being open versus 1/9 controls. The second year was better with 9/10 contracepted vs 3/9 open controls. We are presently in the 3rd year of the study.

GnRH as a brucellosis treatment to prevent transmission: The goal of this study is to evaluate GnRH vaccine as a treatment of infected animals to prevent disease transmission. If infected bison do not get pregnant, they should have a lower potential for shedding and transmitting brucellosis. So far we have started the study and preliminary results are promising.

We recognize the difficulty of the situation you are in, but perhaps there is a potential to slow the recruitment rate of your animals and also get some good science done. We'd love to have a larger vaccinate group that is also matched with a control group. I don't know the numbers or age classes of animals you have, but one option would be to use your genetic information and then pick a vaccinate group that is well represented genetically and a control group with more valuable genetics.

This may or may not be a good fit. Maybe it'd be best to keep the pressure on to push the inertia of the regulatory agencies to make a decision and remove the restrictions from your animals. Maybe it'd be best for you to expand the range where you have your animals and have more. On the other hand, it might work well to slow the process down a bit. The GnRH vaccine is not perfected yet in bison. We need more replicates to better assess the vaccine. The use of the vaccine is for a limited

audience- most people would want to grow and grow their herd and be able to sell them for profit, but there are some groups that have conservation or, perhaps more accurately, display herds that would be easier to manage if they had a tool to slow down recruitment.

At this point, all we want to do is start a dialog and put the information out there for you to make an informed decision.

We look forward to hearing from you,

Matt McCollum

Wildlife Disease Biologist

USDA/APHIS/VS

Wildlife/Livestock Disease Investigations Team

4101 Laporte Ave

Fort Collins, CO 80521

(970)266-6233 Office

(b) (6) Mobile

From: Hastings, Bruce [mailto:bruce_hastings@fws.gov]

Sent: Tuesday, April 29, 2014 10:10 AM

To: Rhyan, Jack C - APHIS

Cc: McCollum, Matthew P - APHIS; david_c_lucas@fws.gov; Tom Ronning

Subject: Re: Well met

Jack,

I asked Matt to send me some information on this technique, which he will do tomorrow when he returns from South Dakota. However, we are trying to resolve our potential population problems by (1) opening more rangeland for grazing and (2) demonstrating to the regulators that the bison are not contaminated and therefore restrictions on their consumption can be lifted. Hopefully, we will not need to use contraception, but we always need to know our options. I look forward to reading what Matt sends, but we are not ready to initiate birth control at this time.

Bruce

On Tue, Apr 29, 2014 at 9:44 AM, Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov> wrote:

Bruce,

Matt told me of your conversation yesterday about bison contraception. We would like to visit with you more about potential collaboration.

Please give me a call if you get a chance.

Thanks.

Jack 970 266-6140

From: McCollum, Matthew P - APHIS

Sent: Tuesday, April 29, 2014 7:39 AM

To: bruce_hastings@fws.gov

Cc: Rhyan, Jack C - APHIS

Subject: Well met

Dear Bruce,

It was nice to meet you yesterday and chat a bit about bison. I need to run up to South Dakota today to pick up a squeeze chute, so I'll follow up more tomorrow in regards to our conversation about GnRH.

Best,

Matt McCollum

Wildlife Disease Biologist

USDA/APHIS/VS

Wildlife/Livestock Disease Investigations Team

4101 Laporte Ave

Fort Collins, CO 80521

(970)266-6233 Office

(b) (6) Mobile

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--

Bruce Hastings

Deputy Project Leader

Rocky Mountain Arsenal NWR Complex

6550 Gateway Road, Building 129

Commerce City, CO 80022-1748

303-289-0533

CONTRACEPTION OF BISON BY GnRH VACCINE: A POSSIBLE MEANS OF DECREASING TRANSMISSION OF BRUCELLOSIS IN BISON

Lowell A. Miller,^{1,4} Jack C. Rhyan,² and Mark Drew³

¹ US Department of Agriculture-Animal Plant Health Inspection Service, National Wildlife Research Center, 4101 LaPorte Ave., Fort Collins, Colorado 80521, USA

² US Department of Agriculture-Animal Plant Health Inspection Service, Veterinary Services, National Wildlife Research Center, 4101 LaPorte Ave., Fort Collins, Colorado 80521, USA

³ Idaho Department of Fish and Game, 16569 S. 10th Ave., Caldwell, Idaho 83607, USA

⁴ Corresponding author (email: lowell.a.miller@usda.gov)

ABSTRACT: Preventing pregnancy in brucellosis-infected bison (*Bison bison*) provides a potential means of preventing transmission of disease. To determine whether a gonadotropin-releasing hormone (GnRH) vaccine was effective in reducing pregnancy in bison and to study the safety of injecting GnRH in pregnant bison, a study was conducted at the Idaho Fish and Game Wildlife Health Laboratory in Caldwell, Idaho (USA). Four pregnant and two nonpregnant female bison were given a single injection of GnRH vaccine, and five pregnant adult females were given a sham injection that contained only adjuvant. Three of the GnRH-vaccinated bison that were pregnant at the time of vaccination delivered healthy calves. One treated bison had dystocia that resulted in a dead calf. All control bison delivered healthy calves. After calving, females of both groups were exposed to two bulls. Treated bison were palpated 6 wk after exposure to the bulls, and blood was drawn for pregnancy-specific protein B analysis. The six treated bison were not pregnant. The sham-treated bison became pregnant and delivered viable calves. This study demonstrates that a single dose of GnRH vaccine is effective in preventing pregnancy in female bison for at least 1 yr.

Key words: Gonadotropin-releasing hormone, immunocontraception, GnRH vaccine, bison.

INTRODUCTION

Bovine brucellosis, a bacterial disease caused by *Brucella abortus*, is transmitted among animals, including cattle, bison (*Bison bison*), and elk (*Cervus elaphus*), primarily through contact with infected aborted fetuses, placentas, parturient fluids, or postparturient uterine discharge. Additionally, *Brucella* is shed in milk from infected dams and can be transmitted to calves through suckling. After initial infection, a dam often experiences abortion. Subsequent pregnancies may result in abortion or the birth of weak or normal calves and may also result in the shedding of *B. abortus*. The occurrence of venereal transmission of brucellosis in bison is unknown; however, on the basis of a single study in bison (Robison et al., 1998) and studies in cattle (Manthei et al., 1950; Rankin, 1965), it is considered unlikely to be a significant route of transmission. Transmission of the disease in cattle, bison, and elk, therefore, is primarily depen-

dent on the occurrence of pregnancy and exposure to abortion or calving in infected animals.

Rhyan et al. (2002) suggested that permanent sterilization, surgical or chemical, is a disease-management strategy that could be effectively used in *Brucella*-infected bison to greatly reduce the possibility of transmission to other animals. Bison cows could remain persistently infected with *B. abortus*, and, as long as the infected animals were not allowed to become pregnant, they would not be likely to transmit the infection. Therefore, disease prevalence might decrease dramatically as that generation of infected bison disappears. Objections have been raised to permanent sterilization in relation to wild horse immunocontraception, because it might result in the permanent removal of those animals from the gene pool and the creation of a new “unnatural” class of animals (Kirkpatrick and Turner, 1991).

The gonadotropin-releasing hormone

(GnRH) vaccine is generally considered to provide temporary sterilization, because the reproductive activity of the target animal returns as the GnRH antibody titer drops below a protective level. This temporary period of infertility may allow time for *B. abortus* infection to clear.

The use of nonlethal methods to control populations of pest animals is an area of research that is receiving more interest (Fagerstone et al., 2002). Kirkpatrick et al. (1996) pioneered the use of porcine zona pellucida (PZP) for use as a nonlethal, contraceptive approach to pest animal control. The difficulty with the use of PZP in ungulates is that the animals that receive it, although they remain infertile, continue to have estrous cycles. Female white-tailed deer (*Odocoileus virginianus*) vaccinated with PZP have continued to exhibit sexual activity into February, 4 mo beyond the normal breeding season (Miller et al., 2000b). This continuous estrous cycling results in increased activity during early winter, at a time when the conservation of calories is important, although this increased cycling has not resulted in any apparent health problems (Miller et al., 2001). Additionally, it could increase the spread of venereally transmitted diseases, if present and, at least in the case of deer in populated areas, may contribute to increased collisions with automobiles. Prolonging the breeding season of bison in the greater Yellowstone area may be deleterious to the winter survival of dominant bulls and vaccinated cows because of increased activity during fall and early winter.

Immunocontraception using the GnRH vaccine is an alternative to PZP that would not extend the breeding season. The keyhole limpet hemocyanin–GnRH immunocontraceptive vaccine interferes with the release of follicle-stimulating hormone (FSH) and leutinizing hormone (LH), thereby preventing normal function of the ovaries and testes and their production of progesterone and testosterone. Thus, GnRH vaccine can effectively prevent

conception in either females or males (Talwar, 1985).

The GnRH vaccine has successfully produced sterility in Norway rats (*Rattus norvegicus*; Miller et al., 1997) and white-tailed deer (Miller et al., 2000a). The immunoneutralization of GnRH produces temporary nonsurgical castration in animals (Meloan et al., 1994; Oonk et al., 1998). In an ongoing study in female white-tailed deer conducted by the National Wildlife Research Center (Fort Collins, Colorado, USA) and Pennsylvania State University (University Park, Pennsylvania, USA), a single injection of GnRH vaccine resulted in infertility lasting up to 3 yr.

The development of immunocontraceptives that are practical to use for wildlife population control must include vaccine delivery systems. Although the administration of an oral form of the vaccine may be necessary in some situations, a long acting single-shot injectable form of the vaccine would have practical advantages over formulations that require two injections. Immunocontraception has typically required at least two doses, given as a prime and a boost. The prime dose prepares the immune system for a repeat antigen exposure and provides only a short-term immune response. The boost immunization can result in an immune response that may last for months to years. To have success with a single injection, the dose and timing of the injection is more critical than when using two injections. This article reports on the immunocontraception of penned bison using the newly developed single-shot GnRH vaccine.

MATERIALS AND METHODS

On 6 June 2002, six 6-yr-old female bison were injected with 1,800 µg of a single-shot GnRH vaccine (GonaCon/AdjuVac™, developed by the National Wildlife Research Center, United States Department of Agriculture, Animal Plant Health Inspection Service, Fort Collins, Colorado—patent pending) in a 1-ml injection given intramuscularly in the hip. Five control bison were injected with the adjuvant,

TABLE 1. Results of contraception in female bison using a GnRH vaccine.

| Treatment | Year 1 | | Year 2 | | Calving dates, 2003 |
|------------------------------------|--|---------------------|----------------|----------------------------|---------------------|
| | Pregnancy status when injected (June 2002) | Calving dates, 2002 | Pregnancy rate | PSPB ^a results | |
| Sham injection | 5/5 | 20 June–26 July | 5/5 | 5/5 positive for pregnancy | 4 June–29 July |
| 1,800 µg GnRH/AdjuVac ^b | 4/6 | 28 June–1 July | 0/6 | 0/6 positive for pregnancy | No calves born |

^a PSPB = pregnancy-specific protein B.

^b GonaCon/AdjuVac, US Department of Agriculture, Animal Plant Health Inspection Service, patent pending.

1 ml, in the hip (control). All control bison and four of the treated bison were pregnant at the time of the injection. Because the GnRH vaccine has the potential to cause abortion, the pregnant bison were vaccinated to determine the safety of the GnRH vaccine. Blood samples were drawn monthly for 4 mo and then every other month for a total of 8 mo. Serum was tested for progesterone by radioimmunoassay and for GnRH antibody by enzyme-linked immunoassay (Miller et al., 2000a).

Two months after calving, a bull was introduced to the pen and allowed to breed the cows for 2.5 mo (17 September–1 December 2002). Six weeks after the bull was removed, both control and GnRH-treated bison were palpated for pregnancy diagnosis, and results were confirmed by serum pregnancy-specific protein B assay (PSPB) testing (Biotracking, Moscow, Idaho).

RESULTS

Analysis of pregnancy and calving data in the control and GnRH-treated bison at the time of GnRH injection and the following year indicated that the GnRH vaccine was successful in reducing reproduction, compared with controls (Table 1). At

the time of vaccination, five of the sham-treated cows and three of the six GnRH-treated cows were in the last month of pregnancy. Cows in both groups delivered normal calves the first year; therefore, the GnRH vaccine did not interfere with the pregnancy. None of the GnRH-treated cows became pregnant the year after the vaccination. All control bison conceived, and four had normal calves, with calving dates of 4–30 June 2003. One control cow died on 30 March 2003 but was pregnant at the time of death. During this study, two cows, one each in the treated and control groups, had dystocia that resulted in dead calves.

The average progesterone levels for pregnant cows were the same for the treatment and control groups at the start of the study and after calving. After rebreeding, the progesterone level of cows in the control group increased to pretreatment levels, indicating that they became pregnant, and anti-GnRH titers were not detected (Fig. 1). Progesterone levels in the GnRH-treated bison remained at nonpregnant levels (Fig. 2). All control bison delivered normal healthy calves and became pregnant again the second year. One of the five control bison died from accidental causes midgestation. The remaining four controls had normal calves in year 2 of the study.

Three of the six GnRH-treated bison were in late gestation when they were immunized, and all delivered normal calves within 1 mo after treatment. Two of the GnRH-treated cows were not pregnant at the time of GnRH vaccination, as suggest-

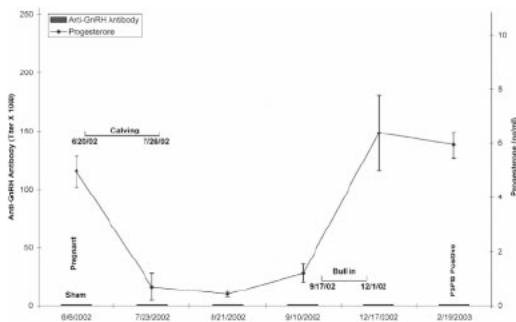


FIGURE 1. Average serum progesterone levels and anti-GnRH antibody titers for control bison cows.

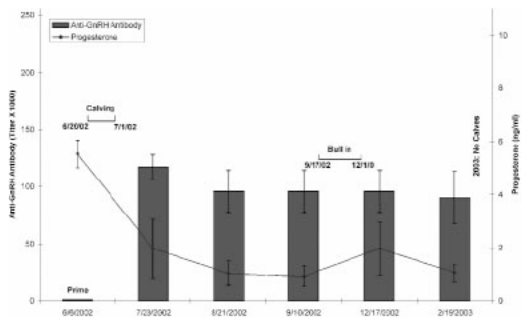


FIGURE 2. Average anti-GnRH antibody titers and serum progesterone levels in bison cows vaccinated late during pregnancy.

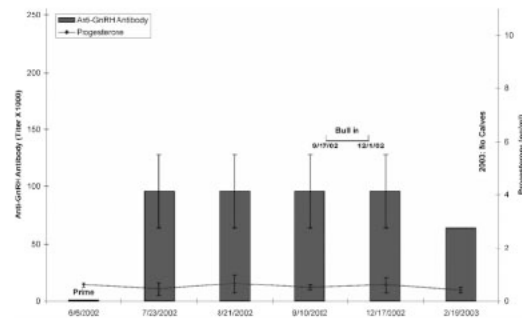


FIGURE 3. Average anti-GnRH antibody titers and serum progesterone levels in bison cows vaccinated when not pregnant.

ed by low progesterone levels at the time of treatment (Fig. 3). The low progesterone values during the postpartum period in the cows that calved were comparable to those of the control cows. However, they did not become pregnant after exposure to the bulls, as indicated by low progesterone levels, the absence of a fetus on palpation, and negative PSPB serum test results.

An exception to the results of treatment of cows during late pregnancy was bison B-40, which had been given the GnRH vaccine during midpregnancy. This bison cow was injected with the vaccine on 6 June 2002 and delivered full term on 6 November 2002, with dystocia, resulting in a dead calf. The progesterone level progressively dropped from 7.0–3.5 $\mu\text{g}/\text{ml}$ of serum during the first 2 mo after vaccination and leveled off at 3.4 $\mu\text{g}/\text{ml}$ of serum during the third month, 2 mo before the birth of the dead full-term calf. This cow had a positive PSPB result, low progesterone levels, and was not pregnant on palpation.

The anti-GnRH data in treated bison indicated that a protective antibody titer was reached by the first time blood was collected (47 days after vaccination). The mean titer at this time was 112,000, decreasing to a mean titer of 72,000 by the end of the study. Antibody titers of 64,000 or greater have been shown to be consistent with contraception (Miller et al., 2000a).

In the beginning of the study, similar progesterone and PSPB levels in control and treated groups suggested that cows in both groups were pregnant. Calving dates were comparable in the control and treated cows, indicating synchronous breeding cycles (Table 1). However, in the second year, elevations in progesterone levels in the control group suggested that they became pregnant, and low progesterone levels in the treated group suggested infertility (Figs. 1–3).

DISCUSSION

The GnRH vaccine induces infertility in female mammals by reducing the release of FSH and LH, which, in turn, interferes with either the normal estrous or ovulatory cycle or reduces progesterone concentration during early pregnancy, which may interfere with maintenance of pregnancy. Stevenson (1997) stated that GnRH controls the amount of progesterone produced by the corpus luteum (CL), which maintains pregnancy for 200 days of the mean 280-day gestation in cattle. After 200 days, the ovary containing the CL can be removed without interfering with pregnancy, which indicates that pregnancy is not maintained by pituitary GnRH; the placenta apparently takes over the production and maintenance of progesterone. Bison have a gestation period similar to that of cattle.

Our results indicate that the GnRH vaccine can be administered safely during the

last third of pregnancy. Protective levels of anti-GnRH antibody require 30–45 days to develop, which suggests that the vaccine could be safely administered at ≥ 170 days of gestation without negative effects on the fetus. This was shown to be the case in the three bison treated late in pregnancy.

One cow was vaccinated during the second trimester of pregnancy and delivered a full-term dead calf on 6 November. It is unknown whether the GnRH vaccine contributed to death the fetus. There was a decrease in progesterone levels in this cow after vaccination that could have contributed to the loss of viability of the calf. Because the bull was with the cows from 17 September to 1 December, it is unlikely that this cow could have rebred. However, anti-GnRH antibody titers were sufficient in this cow to prevent pregnancy. One control bison also had a similar late full-term dead calf; thus, it is uncertain whether the vaccine caused the death of the calf in the vaccinated cow.

All control and treated cows were tested for pregnancy by palpation and serum progesterone and PSPB levels during February 2003. Bison B-40 had a positive serum PSPB test at this time but a low progesterone level and was not pregnant on palpation. Thus, the PSPB test was incorrect. This is consistent with reports that retained placentas following abortions can cause a false-positive PSPB result for several months (Sasser et al., 1986). The bison will be monitored for 2 more years to determine the duration of the contraceptive effect.

This study demonstrates that a single injection of GnRH vaccine is effective in preventing contraception in female bison for at least 1 yr. Booster injections lengthen the contraceptive effect in white-tailed deer (Miller and Killian, 2000), and lengthening the contraceptive effect in bison may be achieved similarly. Use of the GnRH vaccine in *Brucella*-infected bison should effectively reduce transmission of disease by reducing pregnancy rates and subsequent abortion or parturition.

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THE USE OF CONTRACEPTION AS A DISEASE MANAGEMENT TOOL IN WILDLIFE

Jack C. Rhyan, D.V.M, M.S., Lowell A. Miller, Ph.D., and Kathleen A. Fagerstone, Ph.D.

THE USE OF CONTRACEPTION AS A DISEASE MANAGEMENT TOOL IN WILDLIFE

Jack C. Rhyan, D.V.M, M.S., Lowell A. Miller, Ph.D., and Kathleen A. Fagerstone, Ph.D.

Abstract: Contraception offers potential as a tool for managing certain diseases in wildlife, most notably venereally transmitted diseases or diseases transmitted at parturition. Brucellosis is an excellent example of an infectious disease present in wild populations that could potentially be managed through immunocontraception. Previous studies in bison (*Bison bison*) suggest that a single injection of GonaCon™ (National Wildlife Research Center, U.S. Department of Agriculture/Animal and Plant Health Inspection Service/Wildlife Services, Fort Collins, Colorado 80521, USA) results in 3 or more yr of infertility. Ongoing studies will determine if the use of GonaCon in bison decreases shedding of *Brucella abortus* from infected animals and will better define the duration of infertility following a single injection

Key words: Bison, *Brucella abortus*, brucellosis, gonadotropin releasing hormone, immunocontraception.

BRIEF COMMUNICATION

The management of diseases in wild populations presents many challenges, including those of difficult logistics, a paucity of efficacious techniques, effective vaccine or therapeutic delivery systems, and public acceptability. Contraception offers potential as a disease management tool for certain diseases, most notably venereally transmitted diseases or diseases transmitted at parturition. Brucellosis, a group of zoonotic diseases caused by bacteria in the genus *Brucella*, is an excellent example of a group of infections present in wild populations that could potentially be managed through immunocontraception. Swine brucellosis, caused by *Brucella suis*, is transmitted through the venereal route as well as through contact with aborted fetuses and placental membranes and fluids. Bovine brucellosis, caused by *Brucella abortus*, is transmitted among animals, including cattle, bison (*Bison bison*), and elk (*Cervus elaphus*), primarily through contact with infected aborted fetuses, placentas, parturient fluids, or postparturient uterine discharge. Additionally, the organism is shed in the milk from infected dams and can be transmitted to calves through suckling. Following infection, females often abort. Subsequent pregnancies may result in abortion or the birth of weak or normal calves and may result in shedding of the organism. The

occurrence of venereal transmission of brucellosis in bison is unknown; however, based on a single study in bison and studies in cattle, it is not considered likely to be a significant route of transmission.^{1,4,5} Therefore, transmission of disease in cattle, bison, and elk is primarily dependent on the occurrence of pregnancy and abortion or calving of infected animals.

GonaCon™ (National Wildlife Research Center, U.S. Department of Agriculture/Animal and Plant Health Inspection Service/Wildlife Services, Fort Collins, Colorado 80521, USA), a gonadotropin-releasing hormone (GnRH) immunocontraceptive vaccine, is approved for use in wild white-tailed deer (*Odocoileus virginianus*), in which a single injection usually results in 2 or more yr of infertility.² This study reports the results of three small pilot studies examining the use of GonaCon to prevent parturition in bison.

The first study was conducted at Northwest Trek, a zoologic park in the state of Washington (USA). Its purpose was to determine if the GnRH vaccine had any effect on the reproductive success of five breeding-age female bison (age range: 2–8 yr) as compared to the herd's normal reproductive history of over 60% reproduction annually. The five bison received 1,800 µg of the vaccine by intramuscular injection between 21 May and 26 July 2001. The animals were continuously exposed to multiple bulls. Three of the five did not calve in 2002, one had a live calf, and one died because of dystocia. Because of the incomplete contraception of the group, the remaining four bison were boosted with the same dose of vaccine on 30 August 2002. The boosted bison did not calve in 2003, 2004, or 2005. By 2012, at least two of the three bison remaining alive had given birth to one or more calves. These results suggested a

From the United States Department of Agriculture, National Wildlife Research Center, 4101 LaPorte Avenue, Fort Collins, Colorado 80521, USA (Rhyan, Miller, Fagerstone). Correspondence should be directed to Dr. Rhyan (jack.c.rhyan@aphis.usda.gov). The authors prepared this article as part of their official duties with the U.S. Government, and therefore unable to assign rights to the American Association of Zoo Veterinarians.

Table 1. Results of pilot study comparing the reproductive results per year of single dose gonadotropin releasing hormone vaccinated bison (1,800 µg) with nonvaccinated controls.

| Treatment group | 2002 ^a | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Total calves/RYs ^b |
|-----------------|-------------------|------|------|------|------|------|------|-------------------------------|
| Controls | 5/5 | 4/5 | 4/4 | 1/3 | 2/3 | 3/3 | 2/3 | 16/21 |
| Vaccinates | 4/6 | 0/6 | 0/6 | 0/5 | 0/5 | 0/5 | 0/5 | 0/32 |

^a 4-yr-old bison were vaccinated in June 2002. 4 of 6 were in mid or late pregnancy when vaccinated.
^b Total number of calves produced per reproductive years of cows in the study.

high degree of vaccine efficacy in bison following two vaccinations.

The second study, conducted from 2002 until 2008, was begun at the Idaho Department of Fish and Game wildlife research facility in Caldwell, Idaho (USA). The study utilized bison that were offspring of animals that had been trapped at the border of Yellowstone National Park in 1997 and taken to the Idaho facility for study. In 2004, the bison were moved to the Colorado State University, Animal Population Health Institute’s wildlife research facility in Fort Collins, Colorado (USA). The bison were serologically negative for brucellosis throughout the study. This study compared reproductive results of six bison intramuscularly vaccinated with a single dose of 1,800 µg GnRH on 06 June 2002 to those of five sham-vaccinated controls that received the adjuvant only. Breeding season for bison usually begins in July and may continue for several months. Results of the first year of this study have been previously reported.³ Four of the vaccinees were in mid- or late-term pregnancy when vaccinated. Results (Table 1) indicate that the vaccine did not interfere with reproductive success of animals in mid- and late-term pregnancy at the time the vaccine was administered. More importantly, a single dose of

vaccine resulted in infertility in all vaccinees for the duration of the study.

The third study, conducted from 2003 until 2008, evaluated the efficacy of GonaCon in bison at low, medium, and high doses (1,000, 2,000, and 3,000 µg, respectively). That study was conducted on bison purchased from a producer and was begun at a private ranch in Gardiner, Montana (USA). Bison were vaccinated on 20 May 2003; controls received the adjuvant only. After 2 yr, animals were moved to a private ranch in eastern South Dakota (USA). The first year of the study (2003), female bison were pastured with a bull that was later discovered to be infertile; therefore, the first exposure of the study animals to a fertile bull was summer 2004, 14 mo after vaccination. Results of that study (Table 2) indicate the vaccine had increased efficacy at the higher dose, resulting in 3 yr of infertility in three of four bison.

Two ongoing studies are designed to 1) evaluate the duration of infertility in 10 vaccinated bison that received 3,000 µg GonaCon as compared to 10 controls in a range setting; and 2) determine if the use of GonaCon decreases shedding of *B. abortus* from a group of 14 naturally infected bison during the calving season as compared to a similar group of nonvaccinees. If these studies confirm the safety and efficacy of GonaCon in bison and demonstrate its utility in reducing shedding of *B. abortus*, the vaccine could provide a potential nonlethal management tool to prevent transmission of the disease in an infected bison population.

Table 2. Results of dose response study comparing reproductive results per year of nonvaccinated controls and single shot low (1,000 µg), medium (2,000 µg), and high (3,000 µg) doses of gonadotropin releasing hormone vaccine in bison.

| Treatment | 2004 ^a | 2005 | 2006 | 2007 | 2008 | Calves/RYS ^b |
|-------------|-------------------|------|------|------|-----------------|-------------------------|
| Controls | 0/5 | 5/5 | 4/5 | 2/3 | ND ^c | 11/13 |
| Low dose | 0/5 | 2/5 | 3/5 | 2/4 | ND | 7/14 |
| Medium dose | 0/5 | 3/5 | 2/5 | 0/2 | 0/1 | 5/13 |
| High dose | 0/4 | 0/4 | 1/4 | 1/4 | 0/2 | 2/14 |

^a 2-yr-old female bison were vaccinated in May 2003 and were placed with breeding bull in July 2004.
^b Total number of calves produced per reproductive years of cows in the study.
^c ND not done.

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From: [Clarke, Patrick R. - APHIS](#)
To: [Frey, Rebecca K - APHIS](#); [Rhyan, Jack C - APHIS](#)
Subject: Fwd: Paper
Date: Thursday, May 05, 2016 10:17:32 AM

Sent from my iPhone

Begin forwarded message:

From: "Treanor, John" <john_treanor@nps.gov>
Date: May 4, 2016 at 10:37:53 AM MDT
To: "Clarke, Patrick R. - APHIS" <Patrick.R.Clarke@aphis.usda.gov>
Subject: Re: Paper

Ryan,

Here are some of the conclusions from the study:

1. A single vaccination of SRB51 provided to female, yearling bison may offer some protection from clinical disease (*B. abortus* induced abortions) in c. 50% of vaccinated animals.
2. The production of IFN- γ in response to *B. abortus* antigen seemed to be deficient in a similar proportion (0.58) of bison (weak and non-responders) within both study groups (quarantine & Yellowstone), though the vaccinated bison experienced different environmental conditions during the study period. .
3. The abortion and subsequent isolation of *B. abortus* in one of the three naturally infected bison underscores that a single dose of SRB51 does not offer complete protection from clinical disease.
4. Findings support that variation in individual immune responses are likely to play a role in the efficacy of SRB51.
5. Findings of this study suggest that protective immune responses may be reduced in Yellowstone bison during periods of nutritional restriction. Therefore, seasonal nutrition may play a role in the effectiveness of bison vaccination, with protective immune responses reduced during the primary *B. abortus* transmission period.

Thanks,

John

John Treanor
Wildlife Biologist
Yellowstone Center for Resources

P.O. Box 168
Yellowstone National Park, WY 82190
Phone: 307-344-2505
Email: john_treanor@nps.gov

On Tue, May 3, 2016 at 8:04 AM, Clarke, Patrick R. - APHIS
<Patrick.R.Clarke@aphis.usda.gov> wrote:

Thanks, John.

What were the conclusions of that work?

P. Ryan Clarke, DVM, MPH

Regional Epidemiologist -GYA

USDA, APHIS, VS, District 5

406-388-5162

From: Treanor, John [mailto:john_treanor@nps.gov]
Sent: Monday, May 02, 2016 9:49 AM
To: Clarke, Patrick R. - APHIS
Subject: Re: Paper

Ryan,

The work was published as a dissertation chapter and a report for the grant (RM-CESU).

John

John Treanor

Wildlife Biologist

Yellowstone Center for Resources

P.O. Box 168

Yellowstone National Park, WY 82190

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Email: john_treanor@nps.gov

On Wed, Apr 27, 2016 at 8:04 AM, Clarke, Patrick R. - APHIS
<Patrick.R.Clarke@aphis.usda.gov> wrote:

John,

When you testing our BQFS bison back in late 2008-early 2009....the study where you were using flow cytometry.....did you end up publishing the results?

Ryan

P. Ryan Clarke, DVM, MPH

Regional Epidemiologist -GYA

USDA, APHIS, VS, District 5

406-388-5162

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From: [Frey, Rebecca K - APHIS](#)
To: Rick_Wallen@nps.gov
Cc: [Rhyan, Jack C - APHIS](#); [Clarke, Patrick R. - APHIS](#)
Subject: GonaCon needs
Date: Friday, January 06, 2012 9:23:17 AM

Hi Rick,

After crunching the numbers including our latest test results, our 1st priority is negative bulls, 1-3 years old preferred, but we may be less picky here
We will need a minimum of 8, and hopefully a max of 16 (if seroconversion is about 50%) to accommodate all of the test groups.

2nd priority: We need 4 positive females (1-3 yo's) to start the 1st 2 test groups.

Then: 32-40 seropositive 1-3 yo's non-pregnant

3-5 seronegative 1-3 yo's non-pregnant

That should do it.

Becky

Rebecca Frey
Wildlife Biologist/Disease Specialist
Greater Yellowstone Area
406-333-4425

-----Original Message-----

From: Rick_Wallen@nps.gov [mailto:Rick_Wallen@nps.gov]
Sent: Thursday, January 05, 2012 3:41 PM
To: Frey, Rebecca K - APHIS
Subject: Stephens Creek results

Eartag 930502 female calf tested on 10 Feb 2011
seropositive FP result 19 mP above the seropositive cutoff

Eartag 930765 female yearling tested on 23 May 2011
seropositive FP result 31.2 mP above the seropositive cutoff

From: [Clarke, Patrick R. - APHIS](#)
To: [Herriott, Donald E - APHIS](#); [Linfield, Thomas F - APHIS](#)
Cc: [Frey, Rebecca K - APHIS](#); [Rhyan, Jack C - APHIS](#); [McCollum, Matthew P - APHIS](#)
Subject: RE: DRAFT joint talking points
Date: Tuesday, January 24, 2017 10:24:11 AM

Just got a call from Marty.

They are getting multiple calls from the Governor's Office wanting to know about any progress on the proposal on APHIS's part. Need a statement... any statement...by noon. Even if it's "APHIS is assessing it's capacity to hold extra bison at the GonaCon Study pens and at NWRC, etc.

P. Ryan Clarke, DVM, MPH
USDA, APHIS, VS, SPRS
District 5 Epidemiologist-GYA
Bozeman, Montana
406-388-5162

From: Herriott, Donald E - APHIS
Sent: Tuesday, January 24, 2017 10:00 AM
To: Linfield, Thomas F - APHIS <Thomas.F.Linfield@aphis.usda.gov>
Cc: Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Subject: Re: DRAFT joint talking points

Avoid 1 start if can but I will make it work

Add Sara Ahola

Thx

Sent from my iPad

On Jan 24, 2017, at 9:56 AM, "Linfield, Thomas F - APHIS"
<Thomas.F.Linfield@aphis.usda.gov> wrote:

Will check on his availability –

- 1) Time up to him (Mz), as long as in the 11:00 am to 1:00 pm window for start time?
- 2) Any other invitees besides the folks on this email recipient list and Mz?

Tom

Thomas F.T. Linfield, DVM | Assistant Director | District 5 Field Offices for MT & WY | USDA-APHIS-VS
208 N. Montana Ave.; Suite 101 | Helena, MT 59601
406-437-9451 | (b) (6) (cell) | 406-449-5439 (FAX)
Thomas.F.Linfield@aphis.usda.gov

From: Herriott, Donald E - APHIS
Sent: Tuesday, January 24, 2017 9:53 AM
To: Linfield, Thomas F - APHIS <Thomas.F.Linfield@aphis.usda.gov>; Clarke, Patrick R. - APHIS <Patrick.R.Clarke@aphis.usda.gov>; Frey, Rebecca K - APHIS <Rebecca.K.Frey@aphis.usda.gov>; Rhyan, Jack C - APHIS <Jack.C.Rhyan@aphis.usda.gov>; McCollum, Matthew P - APHIS <Matt.McCollum@aphis.usda.gov>
Subject: Re: DRAFT joint talking points

Tom, can you set up a call with Marty today between 11 and 1:00?

Sent from my iPad

On Jan 24, 2017, at 9:44 AM, "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov> wrote:

Tom, I'm calling Burke now. May want to set a call w Marty. No action for you yet

Ryan, status of bison and housing report? BTW, the study costs report is low priority for now

Thx

Sent from my iPad

Begin forwarded message:

From: "Herriott, Donald E - APHIS" <Don.E.Herriott@aphis.usda.gov>
Date: January 23, 2017 at 9:00:47 PM MST
To: "Healey, Burke L - APHIS" <Burke.L.Healey@aphis.usda.gov>
Cc: "Clarke, Patrick R. - APHIS" <Patrick.R.Clarke@aphis.usda.gov>, "Rhyan, Jack C - APHIS" <Jack.C.Rhyan@aphis.usda.gov>
Subject: Fwd: DRAFT joint talking points

Dan called me this afternoon. I heard a slightly different story. Joint talking points with MT, not a press release.

Let me ponder

Don

Sent from my iPhone

Begin forwarded message:

From: Dan Wenk <dan_wenk@nps.gov>
Date: January 23, 2017 at 8:51:56 PM MST
To: Don Herriott
<Don.E.Herriott@aphis.usda.gov>
Subject: Fwd: DRAFT joint talking points

Don, thanks for the conversation this afternoon. Below is the email with attachment that we sent to Governor Bullock's communications office. We sent this knowing that the shipment of the 40 bison would potentially be a topic of discussion with reporters and members of the community including the Buffalo Field Campaign, Greater Yellowstone Coalition and many wildlife organizations. The NPS never planned or drafted a press release to notify the public of the shipment of any bison, including the 40 in discussion now.

We believe that we represented the positions of all accurately and would have continued our outreach to you and other agencies if the plans for shipment were not placed on hold.

Any questions please let me know.

Dan Wenk
Superintendent
Yellowstone National Park
(307) 344-2002

Begin forwarded message:

From: "Lyle, Jody"
<jody_lyle@nps.gov>
Date: January 23, 2017 at 6:00:51 PM MST
To: Dan Wenk
<Dan_Wenk@nps.gov>
Subject: Fwd: DRAFT joint talking points

See below.

Jody Lyle

Chief, Office of Strategic
Communications
Yellowstone National Park
307-344-2012 (office)
(b) (6) (cell)

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[Flickr](#) | [YouTube](#) | [Periscope](#)

----- Forwarded message ---

From: **Lyle, Jody**
<jody_lyle@nps.gov>
Date: Thu, Jan 19, 2017 at 8:51
AM
Subject: DRAFT joint talking
points
To: "Abel, Ronja"
<RAbel@mt.gov>

Ronja,

Per our discussion this morning,
here is a draft of some joint
messages that the state and NPS
can use about bison. As I
explained, these were written
about the 40 bison going to
slaughter, so if a different path
forward is chosen, we will make
the necessary changes.

Looking forward to talking with
you after the 9:30 meeting.

Thanks Ronja!

Jody

Jody Lyle
Chief, Office of Strategic
Communications
Yellowstone National Park
307-344-2012 (office)

(b) (6) (cell)

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[Flickr](#) | [YouTube](#) | [Periscope](#)

<DRAFT Joint Messages NPS and State.docx>

From: [Nol, Pauline \(APHIS\)](#)
To: Jenny_Powers@nps.gov
Cc: Margaret_Wild@nps.gov; [McCollum, Matthew P \(APHIS\)](#); [Clarke, Patrick R. \(APHIS\)](#); [Frey, Rebecca K \(APHIS\)](#); Rick_Wallen@nps.gov; [Lombard, Jason E \(APHIS\)](#); [Rhyan, Jack C \(APHIS\)](#)
Subject: RE: GonaCon Study
Date: Wednesday, May 18, 2011 2:28:47 PM

Hey Jenny,

At this point we are proposing two replicates of two pastures consisting of 16-18 seropositives and ~4-6 seronegatives. In one pasture, the seropositives will be vaccinated with Gonacon, and those in the second pasture will not be vaccinated. This would involve accumulating 36 seropositive animals for each replicate, so we will have to spend some time collecting enough seropositives for the second replicate. I hope this makes sense.

In summary-

Pasture A: 16-18 seropositive cows vaccinated with Gonacon
4-6 seronegative cows

Pasture B: 16-18 seropositive cows not vaccinated
4-6 seronegative cows

In 2012-1014 we will collect another 32-36 seropositive cows and 10-12 seronegatives to repeat the above design.

I think it will be valuable to monitor and record when the seronegatives become exposed/infected in the context of proof of concept, but I doubt we have enough numbers to do any kind of real time to event analysis do we?

Also, I recall that the question of quantifying shedding came up earlier. Anyone correct me if I'm wrong, but as I see it, we will be measuring shedding in a yes/no format in the form of culture positive/negative swabs, milk, placenta, fetus etc. But we will also be able to quantify numbers of cfu/gram of milk, placenta, or fetal organs.

Lastly, we came up with the 5-10% abortion rate in the vaccinates because nothing is always 100%. We will likely get 100% in this study, but if we don't we still want to have the power to determine a difference between the two groups.

I hope I addressed everything alright.
Pauline

-----Original Message-----

From: Jenny_Powers@nps.gov [mailto:Jenny_Powers@nps.gov]
Sent: Tuesday, May 17, 2011 8:59 AM
To: Lombard, Jason E (APHIS); Rhyan_Wilcox@fws.gov; Jack__C__ <Jack.C.Rhyan@aphis.usda.gov/@nps.gov (APHIS)>
Cc: Margaret_Wild@nps.gov; McCollum, Matthew P (APHIS); Clarke, Patrick R. (APHIS); Nol, Pauline (APHIS); Frey, Rebecca K (APHIS); Rick_Wallen@nps.gov
Subject: Re: GonaCon Study

Hi Jason and Jack,

Thanks for looking into other potential study designs. Looks like we have some good advice to work with. I like the idea of looking at shedding particularly given their exposure occurred when they were still free ranging. A few sentinels makes sense from a proof of concept standpoint as long as we still have a control pasture. Did we decide on 3 treated pastures and 1 control? I can't remember now. I agree that it doesn't seem to make sense to cycle new sentinels in now that we are concentrating on shedding. I don't quite understand the survival or time to event aspects of your second paragraph. What do other folks think? Do we need another call or do I just need to take an epi primer?

Thanks again,
Jenny

"Lombard, Jason E
(APHIS)"
<Jason.E.Lombard@aphis.usda.gov> To
"McCollum, Matthew P (APHIS)"
<Matt.McCollum@aphis.usda.gov>,
05/13/2011 09:10 "Rick_Wallen@nps.gov"
AM <Rick_Wallen@nps.gov>
cc
"Rhyan, Jack C (APHIS)"
<Jack.C.Rhyan@aphis.usda.gov>,
"Jenny_Powers@nps.gov"
<Jenny_Powers@nps.gov>,
"Margaret_Wild@nps.gov"
<Margaret_Wild@nps.gov>, "Clarke,
Ryan P. (APHIS)"
<Patrick.R.Clarke@aphis.usda.gov>,
"Nol, Pauline (APHIS)"
<Pauline.Nol@aphis.usda.gov>,
"Frey, Rebecca K (APHIS)"
<Rebecca.k.frey@aphis.usda.gov>
Subject
GonaCon Study

Hello,

I had the opportunity to discuss the study with 2 statisticians from CEAH yesterday and wanted to share with you what we discussed.

If we use seroconversion of sentinels as the outcome, we have to use pasture as the experimental unit and with only 4 pastures which we had talked about during the call, we have no power to detect any differences in seroconversion. A better option would be to measure shedding at the individual animal level (primarily seropositives) and with multiple samples per animal per sampling date and multiple dates, we will have repeated measures on each animal. We can also sample seronegatives for shedding and maybe will be able to detect shedding prior to seroconversion which I understand hasn't been fully investigated in bison. I talked with Jack and Matt yesterday and they were thinking about having 16-18 seropositives and 4 seronegatives per pasture which would give us plenty of animals to get a handle on shedding. I am not sure how you quantify shedding in animals that have aborted, had a stillborn or a normal calf where you have potentially large amounts of bacteria compared with animals that don't calve but I'm sure we can figure something out.

We had discussed replacing the control sentinels after all had seroconverted but I'm not sure that is necessary unless we want to evaluate shedding in more non-vaccinated animals, besides we are only talking about

4 bison at this point. It might be more interesting to see if shedding increases as the proportion of seropositives in a pen increases, although with only 4 sentinels per pasture, 80% will be seropositive from the start. We could also look at it from a survival analysis or time to event perspective. When all the animals in the control pastures have seroconverted, we probably don't need to keep following them.

Cheers!

Jason

Jason E. Lombard, DVM, MS

Dairy Specialist / Veterinary Epidemiologist National Animal Health Monitoring System (NAHMS)

USDA:APHIS:VS:CEAH

2150 Centre Avenue, Bldg. B-2E7

Fort Collins, CO 80526-8117

phone 970.494.7245

fax 970.494.7228

From: [Jenny Powers@nps.gov](mailto:Jenny_Powers@nps.gov)
To: [Nol, Pauline \(APHIS\)](mailto:Nol_Pauline@aphis.usda.gov)
Cc: [Rhyan, Jack C \(APHIS\)](mailto:Rhyan_Jack_C@aphis.usda.gov); [Lombard, Jason E \(APHIS\)](mailto:Lombard_Jason_E@aphis.usda.gov); Margaret_Wild@nps.gov; [McCollum, Matthew P \(APHIS\)](mailto:McCollum_Matthew_P@aphis.usda.gov); [Clarke, Patrick R. \(APHIS\)](mailto:Clarke_Patrick_R@aphis.usda.gov); [Frey, Rebecca K \(APHIS\)](mailto:Frey_Rebecca_K@aphis.usda.gov); Rick_Wallen@nps.gov
Subject: RE: GonaCon Study
Date: Wednesday, May 18, 2011 2:58:25 PM

Great, this makes sense. Thanks for the clarification. So the only issue I see now is that the numbers in the ACUC protocol aren't completely consistent with what you have laid out here. Let's say you have minimal sample size of 16 seropositives and 4 seronegative animals per pasture. This means either a total of 80 females plus 1 bull per pasture = 84 animals or at the upper end 96 females and 4 bulls for 100 total. Is this correct? Maybe the animal section at the end of the IACUC is per year?

Jenny

"Nol, Pauline
(APHIS)"
<Pauline.Nol@aphis.usda.gov> To
"Jenny_Powers@nps.gov"
<Jenny_Powers@nps.gov>
05/18/2011 02:28 cc
PM "Margaret_Wild@nps.gov"
<Margaret_Wild@nps.gov>, "McCollum,
Matthew P (APHIS)"
<Matt.McCollum@aphis.usda.gov>,
"Clarke, Patrick R. (APHIS)"
<Patrick.R.Clarke@aphis.usda.gov>,
"Frey, Rebecca K (APHIS)"
<Rebecca_k_frey@aphis.usda.gov>,
"Rick_Wallen@nps.gov"
<Rick_Wallen@nps.gov>, "Lombard,
Jason E (APHIS)"
<Jason.E.Lombard@aphis.usda.gov>,
"Rhyan, Jack C (APHIS)"
<Jack.C.Rhyan@aphis.usda.gov>
Subject
RE: GonaCon Study

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Sent: Tuesday, May 17, 2011 8:59 AM

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<Jack.C.Rhyan@aphis.usda.gov/@nps.gov (APHIS)

Cc: Margaret_Wild@nps.gov; McCollum, Matthew P (APHIS); Clarke, Patrick R.

(APHIS); Nol, Pauline (APHIS); Frey, Rebecca K (APHIS); Rick_Wallen@nps.gov

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AM <Rick_Wallen@nps.gov>
cc
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<Jack.C.Rhyan@aphis.usda.gov>,
"Jenny_Powers@nps.gov"
<Jenny_Powers@nps.gov>,
"Margaret_Wild@nps.gov"
<Margaret_Wild@nps.gov>, "Clarke,
Ryan P. (APHIS)"
<Patrick.R.Clarke@aphis.usda.gov>,
"Nol, Pauline (APHIS)"
<Pauline.Nol@aphis.usda.gov>,
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Cheers!

Jason

Jason E. Lombard, DVM, MS
Dairy Specialist / Veterinary Epidemiologist National Animal Health
Monitoring System (NAHMS) USDA:APHIS:VS:CEAH
2150 Centre Avenue, Bldg. B-2E7
Fort Collins, CO 80526-8117
phone 970.494.7245
fax 970.494.7228