UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

DRAFT BIOLOGICAL OPINION ISSUED UNDER THE ENDANGERED SPECIES ACT, BY THE U.S. FISH AND WILDLIFE SERVICE, RELATED TO THE POTENTIAL EFFECTS OF ROZOL PRAIRIE DOG BAIT, FOR THE CONTROL OF BLACK-TAILED PRAIRIE DOGS, ON THREATENED AND ENDANGERED WILDLIFE SPECIES

COMMENTS ACCEPTED THROUGH FEBRUARY 17, 2012

EPA has initiated formal consultation with the U.S. Fish and Wildlife Service on the potential effects of Rozol Prairie Dog Bait, for the control of black-tailed prairie dogs, on wildlife species listed under the Endangered Species Act (ESA) as either threatened or endangered. The Biological Opinion relative to this consultation is posted here at www.epa.gov/espp and included in public docket EPA-HQ-OPP-2011-0909 at Regulations.gov so EPA may receive public input on any changes to this pesticide's registration recommended by the U.S. Fish and Wildlife Service.

BACKGROUND

The ESA requires that federal agencies assess their "actions" to determine whether species listed as threatened or endangered under the ESA may be affected by those actions and/or whether critical habitat may be adversely modified. The registered uses of a pesticide constitute an EPA "action" under the ESA.

If EPA determines a pesticide's registered uses are likely to adversely affect a federally listed threatened or endangered species (listed species) and/or modify its critical habitat, EPA initiates "formal consultation" with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service (the Service(s)), as appropriate.

In response to a federal agency initiating formal consultation, the Service develops a Biological Opinion (BO) in which it provides its opinion on whether the "action" is likely to jeopardize the continued existence of a listed species and/or is likely to adversely modify designated critical habitat and, if so, describes reasonable and prudent alternatives to avoid jeopardy. The Service(s) may also find that an action adversely affects a species but does not jeopardize its continued existence. In these cases, the Service includes an incidental take statement in the BO. An incidental take statement typically includes the extent of the anticipated take, reasonable and prudent measures to minimize the take and terms and conditions that must be observed when implementing those measures.

PUBLIC INPUT

In 2005, EPA published in the Federal Register (FR 70 No. 211 pp. 66392-66402), a document titled *Endangered Species Protection Program Field Implementation*. That notice of how EPA intends to implement its responsibilities under the ESA, states (p 66401):

> If EPA must formally consult with the Services, after the Services issue a draft Biological Opinion, EPA will welcome input from State, Tribal and local governments **on draft reasonable and prudent measures and alternatives** [emphasis added] The purpose of this review would be to determine whether the alternatives or measures can be reasonably implemented and whether there are different measures that may provide adequate protection but result in less impact to pesticide users. The Agency will consider this input in developing its response to draft Biological Opinions.

EPA also is seeking input from the public in general, pesticide users and public interest organizations on whether the alternatives or measures can be reasonably implemented and whether there are different measures that may provide adequate protection but result in less impact to pesticide users. The agency will also consider this input in developing its response to draft Biological Opinions.

APPLICANT INPUT

Further, the Services' Consultation Handbook (pp. 2-13), supports their consultation regulations and states:

> … the Service and the action agency meet their obligations to [the applicant or pesticide registrant] as outlined in 50 CFR section 402 through the following: The applicant is entitled to **review draft Biological Opinions obtained through the action agency and to provide comments through the action agency. The Service will discuss the basis of their biological determination with the applicant and seek the applicant's expertise in identifying reasonable and prudent alternatives** [emphasis added] ….

COMMENTS

The Draft Biological Opinion is included under public docket number EPA-HQ-OPP-2011-0909 at regulations.gov and is posted here on EPA's website at www.epa.gov/espp to seek input on the Service's recommended reasonable and prudent measures and alternatives, as noted above. Such input should be submitted by **February 17, 2012,** in order to be considered in EPA's response to the Draft Biological Opinion. Comments received by EPA on other aspects of the Draft Biological Opinion will be forwarded to the Service for its consideration.

As stated in the Services' regulations (50 CFR 402.14(g)(5)):

> All comments on the draft Biological Opinion must be submitted to the Service through the Federal agency, although the applicant may send a copy of its comments directly to the Service.

SUBMITTING YOUR COMMENTS

You may submit your comments, identified by the docket identification (ID) number EPA-HQ-OPP-2011-0909, by one of the following methods:

Federal eRulemaking Portal: http://www.regulations.gov. Follow the online instructions for submitting comments.

Mail: Office of Pesticide Programs (OPP) Regulatory Public Docket (7502P), Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC 20460-0001.

Delivery: OPP Regulatory Public Docket (7502P), Environmental Protection Agency, Rm. S-4400, One Potomac Yard (South Bldg.), 2777 S. Crystal Dr., Arlington, VA. Deliveries are only accepted during the Docket's normal hours of operation (8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays). Special arrangements should be made for deliveries of boxed information. The Docket Facility telephone number is (703) 305-5805.

Instructions: EPA's policy is that all comments received will be included in the docket without change and may be made available online at http://www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through regulations.gov or e-mail. The regulations.gov website is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through regulations.gov, your e-mail address will be automatically captured and included as part of the comment that is placed in the docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the docket index available in regulations.gov. To access the electronic docket, go to http://www.regulations.gov, select "Advanced Search," then "Docket Search." Insert the docket ID number where indicated and select the "Submit" button. Follow the instructions on the regulations.gov website to view the docket index or access available documents. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either in the electronic docket at http://www.regulations.gov or, if only available in hard copy, at the OPP Regulatory Public Docket in Rm. S-4400, One Potomac Yard (South Bldg.), 2777 S. Crystal Dr., Arlington, VA. The hours of operation of this Docket Facility are from 8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays. The Docket Facility telephone number is (703) 305-5805.

United States Department of the Interior

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Mountain-Prairie Region

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IN REPLY REFER TO:

USFWS/R6
ES/041507

January 16, 2012

Ms. Anita Pease
U.S. Environmental Protection Agency
Office of Pesticide Programs
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Mail Code: 7501P
Washington, DC 20460

Re: Formal Consultation, Draft Biological Opinion, FIFRA, Section 3, Registration and Use of Rozol® Prairie Dog Bait to Control Black-tailed Prairie Dogs

Dear Ms. Pease:

This document transmits the U.S. Fish and Wildlife Service's draft Biological Opinion for the proposed use of Rozol® Prairie Dog Bait, a product registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947, as amended (7 U.S.C. §136 *et seq.*).

We understand that the U.S. Environmental Protection Agency may incorporate public comments into your response on the Biological Opinion. We anticipate providing a final Biological Opinion to your agency within 30 days after we have received your comments.

Sincerely,

Michael Thabault
Assistant Regional Director
Ecological Services

Draft Biological Opinion
For Rozol Use on Black-tailed Prairie Dogs
Registered under Section 3 of the
Federal Insecticide, Fungicide and Rodenticide Act

Photo courtesy of K. Tamkun U.S. Fish and Wildlife Service

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services Region 6 and Region 2
January 16, 2012

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ACRONYMS AND ABBREVIATIONS

§	Section
µg/g	micrograms per gram
Act	Endangered Species Act
AOK	Audubon of Kansas
BA	Biological Assessment
BGEPA	Bald and Golden Eagle Protection act
BO	Biological Opinion
BTPD	Black-tailed Prairie Dog
CPW	Colorado Division of Parks and Wildlife
CFR	Code of Federal Regulations
cm	Centimeters
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DOW	Defenders of Wildlife
DPS	Distinct Population Segment
EEC	Estimated Environmental Concentration
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
et al.	and others
Ferret	Black-footed Ferret
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FWS	U.S. Fish and Wildlife Service
g	gram
GPS	Global Positioning System
ha	Hectares
i.e.	in explanation
in	Inches
IPM	Integrated Pest Management
ITS	Incidental Take Statement
lbs.	Pounds
LC	Lethal Concentration
LD	Lethal Dose
LOC	Level of Concern
m	Meter
mg	milligram
MBTA	Migratory Bird Treaty Act
MRID	Master Record Identification
NDA	Nebraska Department of Agricultural
NGPC	Nebraska Game and Parks Commission
PCE	Primary Constituent Element
pH	measure of acidity in aqueous solution
RPA	Reasonable and Prudent Alternative

RMP	Reasonable and Prudent Measure
RQ	Risk Quotient
Service	U.S. Fish and Wildlife Service
SLN	Special Local Needs
spp.	Species
TRV	Toxicity Reference Value
USCOE	U.S. Corps of Engineers
USDC	U.S. District Court of Columbia
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Services
WAFWA	Western Association of Fish and Wildlife Agencies
WWF	World Wildlife Fund
ww	West Weight
WYNDD	Wyoming Natural Diversity Database

BIOLOGICAL OPINION

INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) requires that:

> "*Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species. . . . In fulfilling the requirement of this paragraph each agency shall use the best scientific and commercial data available.*" 16 U.S.C. § 1536(a)(2)

To meet this standard, when a federal agency determines that its proposed action may affect a listed species or critical habitat, it enters into consultation with the U.S. Fish & Wildlife Service (Service). If the effects are determined to be insignificant, discountable, or entirely beneficial, the lead federal agency should make a determination that the project is not likely to adversely affect listed species or their critical habitats, and request concurrence from the Service on its determination. If the effects are not insignificant, discountable, or entirely beneficial or are likely to be adverse, the lead federal agency should initiate formal consultation with the Service. The Service then formulates its Biological Opinion (BO) on the proposed action.

> Section 7(b)(3)(A) ". . . *the Secretary shall provide to the Federal agency and the applicant, if any, a written statement setting forth the Secretary's opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat*." 16 U.S.C. §1536(b)(3)(A)

The BO reflects the Service's analysis as to whether the effects of the proposed federal action, when viewed against the status of the species affected, the species' environmental baseline, and cumulative effects, is likely to jeopardize the continued existence of those species. Likewise, the BO reflects the Service's formal analysis as to whether the effects of the proposed federal action, when viewed against the status of designated critical habitat, the environmental baseline of designated critical habitat, and cumulative effects, is likely to destroy or adversely modify designated critical habitat.

CONSULTATION HISTORY

Prior to initiation of the current formal section 7 consultation, there was an extensive history regarding the use of Rozol® Prairie Dog Bait (Rozol) for black-tailed prairie dog (*Cynomys ludovicianus*) control. The list below is not intended to be all inclusive, but represents the

Service's perspective of milestones in the 20-year consultation history in the use of chlorophacinone, the active ingredient in Rozol, as a rodent control chemical. Many events involved several agencies/groups/individuals and are relevant to understanding the issues associated with Rozol use on black-tailed prairie dogs. Pertinent items are provided below.

Date	Activity
Feb 26, 1991	The U.S. Environmental Protection Agency (EPA) requests formal consultation with the Service on chlorophacinone (the active ingredient in Rozol) for use as a rodent control agent in specific geographic areas and specific rodent species in the United States (EPA 1991). This chemical was part of a larger suite of chemicals for which EPA initiated formal consultation with the Service.
March 1993	The Service issues a BO that determined the proposed use of chlorophacinone for specific rodent control activities would jeopardize the continued existence of 21 listed species (Service 1993). The BO included Reasonable and Prudent Alternatives to avoid jeopardy along with Reasonable and Prudent Measures to avoid and minimize impacts to listed species from the proposed uses of chlorophacinone. Chlorophacinone or Rozol use on black-tailed prairie dogs was not a described use at that time and therefore not analyzed in the 1993 BO.
1990's	Rozol Pocket Gopher Bait made with chlorophacinone is used off-label on prairie dogs with the EPA's authorization and begins to generate interest as a prairie dog rodenticide (Lee *et al.* 2005).
2000's	Six States develop Special Local Needs (SLN) labels to use Rozol on black-tailed prairie dogs (EPA 2010a). The Service provides multiple letters to State Agricultural Departments discouraging use of Rozol on black-tailed prairie dogs because of secondary poisoning and impacts to non-target animals including listed species (Service 2006a, 2006b, 2006c and 2006d).
May 5, 2006	The Service provides a letter to the EPA on a pending proposal for a SLN label that would allow Rozol use in Nebraska on black-tailed prairie dogs (Service 2006e). The Service informs the EPA of expected secondary poisoning to non-target animals, including then-listed bald eagles and requests the EPA initiate section 7 consultation under the ESA.
Oct. 1, 2006	The Nebraska SLN label allows Rozol use on black-tailed prairie dogs to begin October 1 (NDA 2006).
Nov. 8, 2006	Rozol is applied to a black-tailed prairie dog town near McCook, Nebraska (Service 2007a).

Dec. 6, 2006 A bald eagle, then-listed as threatened under the ESA, is recovered near McCook, Nebraska and determined to have died from chlorophacinone poisoning associated with a Rozol application on a black-tailed prairie dog colony (Service 2007a).

Jan. 19, 2007 The EPA, the Service, and other interested parties meet in Topeka, Kansas to discuss issues related to Rozol use on black-tailed prairie dogs, including how to prevent impacts to black-footed ferrets (EPA 2007).

May 19, 2008 The EPA and the Service have a multi-region conference call to discuss secondary poisoning of non-target animals from Rozol use on black-tailed prairie dogs (EPA 2008).

May 13, 2009 The EPA registers Rozol under section 3 of FIFRA for use on black-tailed prairie dogs in ten states with an application date of October 1 through March 15 (EPA 2009a).

June 5, 2009 The World Wildlife Fund (WWF) provides a letter to the EPA that includes a request that ESA section 7 consultation be completed for the FIFRA registration for Rozol use on black-tailed prairie dogs (WWF 2009). The EPA chooses to treat this letter as a petition to consider suspension of Rozol as a black-tailed prairie dog rodenticide (EPA 2009b).

July 10, 2009 Environmental groups Defenders of Wildlife (DOW) and Audubon of Kansas (AOK) file a petition in the District of Columbia for judicial review of EPA's May 13, 2009 decision to register Rozol for black-tailed prairie dogs noting the lack of ESA section 7 consultation (DOW and AOK 2009a).

July 15, 2009 Defenders of Wildlife submit a Notice of Intent to sue EPA for use of Rozol on black-tailed prairie dogs without ESA section 7 consultation and other issues (DOW 2009).

July 30, 2009 The Western Association of Fish and Wildlife Agencies (WAFWA) provides a letter to Department of Interior (DOI) Secretary Salazar on Rozol use on black-tailed prairie dogs and requests that DOI press the EPA to rescind use of Rozol until consultation is finished and secondary poisoning of non-target species is addressed (WAFWA 2009).

Sept. 8, 2009 The Service provides a letter to the EPA on the FIFRA section 3 registration for Rozol use on black-tailed prairie dogs and requests that ESA section 7 consultation be completed prior to use of Rozol on black-tailed prairie dogs and Rozol use for that purpose be withdrawn until completion of the section 7 consultation (Service 2009a).

Sept. 2009	Black-footed ferret reintroduction site information is provided to the EPA in response to the EPA's request for areas where Rozol use might conflict with ferrets.
Sept. 23, 2009	Two environmental groups file a complaint in the U.S. District Court of Columbia (USDC) alleging that the EPA failed to conduct ESA section 7 consultation for the use of Rozol on black-tailed prairie dogs (DOW and AOK 2009b).
Sept. 30, 2010	The EPA submits a letter to the Service requesting formal ESA section 7 consultation on Rozol use on black-tailed prairie dogs (EPA 2010b).
Nov. 16, 2010	The EPA rejects suspension of Rozol as a black-tailed prairie dog rodenticide in response to the WWF letter of June 5, 2009 that the EPA considered a petition (EPA 2010c).
June 14, 2011	The USDC issues a ruling on the environmental groups' litigation against the EPA (USDC 2011). The Court ruled against the groups on some points but found that ESA section 7 consultation must be completed. A date was set to hear arguments whether to enjoin use of Rozol until section 7 is completed.
July 13, 2011	The Service provides a signed declaration to the USDC indicating we will provide a draft BO to the EPA by December 10, 2011 (Service 2011a).
Aug. 8, 2011	In response to the litigation outcome, the EPA issues a cancellation order and modifies the Rozol label to indicate Rozol is not a labeled use in Montana, North Dakota, New Mexico, or South Dakota (EPA 2011a). Upon completion of the BO, the EPA anticipates a label modification to add those states back onto the label.
Aug. 26, 2011	A bald eagle picked up in Nebraska in the spring of 2011 is confirmed to have died of chlorophacinone poisoning (Service 2011b).
Sept. 9, 2011	The Service responds to the EPA's request for formal ESA section 7 consultation for Rozol use on black-tailed prairie dogs and acknowledges there is sufficient information to begin formal consultation (Service 2011c). The Service also requests information on the status of Reasonable and Prudent Measures and suggested studies from the 1993 BO to help inform the current section 7 consultation.
Sept. 2011	The EPA and the Service discuss conservation measures that could be developed and instituted to avoid and minimize adverse effects to listed species and agree to include the registrant and applicant, Liphatech, Inc., in those discussions.

Sept. 28, 2011 A conference call between Liphatech, Inc., the EPA and the Service discussed general aspects of formal section 7 consultation and the development of conservation measures that would avoid and minimize impacts to listed species from Rozol use on black-tailed prairie dogs. All parties were receptive to development of conservation measures that could be integrated into the proposed action.

Oct. 2011 Due to interest in the conservation measures, the Service inquires of Liphatech, Inc., and the EPA whether the draft BO deadline of December 10, 2011, can be extended to allow the conservation measures to be finalized and incorporated into the proposed action. This is expected to significantly modify the anticipated impacts to listed species and the parties agree that additional time can be afforded.

Oct. 2011 The Service begins providing maps of listed species areas where Rozol use would be prohibited or where the use dates of October 1 through March 15 would be restricted to avoid listed species interaction with black-tailed prairie dog colonies that have had Rozol applications. The EPA provides this information to Liphatech, Inc.

Oct. 17, 2011 The EPA sends a response to the Service's September 9, 2011, letter that had requested additional information from the 1993 chlorophacinone BO (EPA 2011b). The EPA letter indicates that no additional information is available; Reasonable and Prudent Alternatives, Reasonable and Prudent Measures, and suggested animal studies from the 1993 BO were either not implemented or information is not available on the implementation.

Nov. 8, 2011 Conference call between the EPA and the Service to further discuss conservation measures and confirm the information that will be provided to Liphatech, Inc.

Nov. 22, 2011 The Service provides a signed declaration to the District of Columbia Court indicating the Service will provide a draft BO to the EPA by January 16, 2012, per the understanding with the EPA that with the development of the conservation measures, additional time for drafting the BO is warranted (Service 2011d).

Dec. 13, 2011 The EPA provides a letter to the Service and Liphatech, Inc., that formalizes the agreed upon conservation measures which avoided and minimized impacts to listed species (EPA 2011c). This letter modifies the proposed action and the subsequent analysis in the BO is changed to reflect the new information.

Jan. 16, 2012 The Service provides a draft Rozol BO to the EPA.

DESCRIPTION OF THE ACTION

On December 12, 2007, the EPA, the National Marine Fisheries Service, and the Service agreed that the federal action for EPA's Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) registration actions will be defined as the "authorization for use or uses described in labeling of a pesticide product containing a particular pesticide ingredient." For this consultation, the proposed action by the EPA is the administration of the FIFRA section 3 registration of the single product label for Rozol (registration number 7173-286) to poison black-tailed prairie dogs in ten states. Rozol (active ingredient: chlorophacinone) is manufactured by Liphatech, Inc. (Liphatech, the registrant) as a loose-grain bait used to poison black-tailed prairie dogs in the ten western states of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. Its use in the states of Montana, New Mexico, North Dakota, and South Dakota was cancelled in August 2011, pending completion of the ESA section 7 consultation; however, the EPA/Liphatech have indicated the intent to resume application in those states upon section 7 consultation completion; thus, all ten states listed on the September 10, 2010, Rozol label (see Appendix) are considered herein. EPA's goal for reassessing registered pesticide active ingredients is every 15 years. Given the EPA's timeframe for pesticide registration reviews, the Service's evaluation of the proposed action is also for 15 years.

The EPA adopted conservation measures during the formal consultation process and incorporated them as part of the proposed action; those measures are listed below (EPA 2011c). The action area is described and items relevant to use of the product as directed by its label were described in the EPA formal consultation initiation package (EPA 2010b). Additionally, information regarding direct and indirect effects of the proposed action and potential exposure routes to Federal trust species, as well as a review of the EPA's biological assessment (BA), *Risks of Chlorophacinone Use on Black Tailed Prairie Dogs to federally Endangered and Threatened Species* (EPA 2010b), are provided herein. This information provides the context in which the subsequent individual species analyses were conducted.

CONSERVATION MEASURES

Conservation measures are commitments by the EPA to avoid or minimize adverse impacts of the proposed action, and for the purposes of this consultation are considered part of the proposed action and incorporated into the effects analysis in this BO. The Service identified these conservation measures and then coordinated with the EPA and Liphatech regarding the acceptability of the measures as well as the best means to implement them. The measures below were formally adopted by the EPA via letter dated December 13, 2011, and will be included in County Bulletins, considered to be an extension of the Rozol label thereby legally requiring applicators to adhere to them (EPA 2011c). Conservation measures developed for eight federally listed species are provided below. Maps of each of the excluded areas described in the Conservation Measures will be included in the EPA County Bulletin database and label requirements will make clear that Rozol use in these areas is restricted or prohibited. Any use of Rozol in these locations will be a violation of federal law.

1. **<u>Black-footed Ferret Conservation Measure</u>**
   - Prohibit application of Rozol within current (13 sites) and future black-footed ferret reintroduction areas to reduce the level of impact to the black-footed ferret. This information will be located in the EPA County Bulletin database.

2. **<u>Chiricahua Leopard Frog Conservation Measure</u>**

   - Prohibit application of Rozol within the five southwestern New Mexico counties of Catron, Grant, Hidalgo, Sierra, and Socorro to avoid impacts to the Chiricahua leopard frog and its proposed critical habitat.

3. **<u>Grizzly Bear Conservation Measure</u>**

   - Delay application of Rozol in the fall by two months, until December 1, and shorten the application period in the spring by 2 weeks, to end by March 1, in areas where the range of the grizzly bear overlaps with the range of the black-tailed prairie dog to reduce the risk of impacts to the grizzly bear.

   - The timing delay applies only in Montana, within the counties or portions of the following counties: Carbon County; Stillwater County, south of I-90; Sweetgrass County, south of I-90; Park County, south of I-90; Gallatin County, south of I-90; Madison County; Powell County; Lewis and Clark County; Cascade County; Teton County; Pondera County; Glacier County; and Toole County.

4. **<u>Jaguar Conservation Measure</u>**

   - Prohibit application of Rozol within the southwestern New Mexico county of Hidalgo to reduce the risk of impacts to the jaguar.

5. **<u>New Mexico Ridge-nosed Rattlesnake Conservation Measure</u>**

   - Prohibit application of Rozol within the southwestern New Mexico county of Hidalgo to avoid impacts to the New Mexico ridge-nosed rattlesnake and its designated critical habitat.

6. **<u>Mexican Wolf Conservation Measure</u>**

   - Prohibit application of Rozol within the four southwestern New Mexico counties of Catron, Grant, Hidalgo, and Sierra to reduce the risk of impacts to the Mexican gray wolf within the Blue Range Wolf Recovery Area.

7. Mexican Spotted Owl Conservation Measure

- Prohibit application of Rozol within the five southwestern New Mexico counties of Catron, Grant, Hidalgo, Sierra, and Socorro to reduce the risk of impacts to the Mexican spotted owl and its designated critical habitat.

8. Preble's Meadow Jumping Mouse Conservation Measure

- Delay application of Rozol in the fall by one month, until November 1, in areas where the range of the Preble's meadow jumping mouse overlaps with the range of the black-tailed prairie dog to reduce the risk of impacts to the Preble's meadow jumping mouse.

- Areas where the timing delay applies exist within Wyoming and Colorado. Within Wyoming all or portions of the following four counties are to have the above timing restriction: Converse, Platte, Albany and Laramie. Within Colorado, the timing restriction applies within the following seven counties: Larimer, Boulder, Weld, Jefferson, Douglas, Elbert, and El Paso.

ROZOL PRAIRIE DOG BAIT REGISTERED USE

The chlorophacinone concentration in Rozol is 0.005% or 50 milligrams per kilogram (mg/kg). According to Rozol label instructions (Appendix), the product is to be applied to black-tailed prairie dog colonies in rangelands and noncrop areas by inserting ¼ cup (53 grams, nearly 2 ounces) by hand at least 6 inches into active prairie dog burrows between October 1 and March 15 of the following year, when the prairie dogs most readily consume grain bait (Appendix). Any bait spilled above ground or placed less than 6 inches into the burrow is to be retrieved and disposed of by the applicator. Prairie dogs that consume the bait are anticipated to begin dying within 4-5 days. The label indicates the applicator must return to the site within 4 days after bait application and at 1 to 2 day intervals thereafter for at least two weeks (longer if carcasses continue to be found), to collect and properly dispose of any bait or dead or dying prairie dogs found at the surface. These return visits to collect bait and prairie dogs are to occur late in the day, near sundown, to reduce the potential of nocturnal animals finding dead and dying animals. Carcasses may be buried onsite, at least 18 inches below the surface or placed in inactive burrows, and burial must include covering and packing the soil atop the carcass. If onsite burial is not possible, other means of disposal to preclude scavenger access to carcasses is required. A second application may be made if prairie dog activity persists several weeks or months after the initial bait application.

ACTION AREA

The action area is defined (50 CFR § 402.02) as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The EPA has identified the action area as follows:

> "*For this assessment, BTPD range within the states of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming and counties adjacent to this range is considered to be the action area. The action area considered for direct effects includes the BTPD range within the 10 states listed above as well as counties adjacent to this range. The action area considered for indirect effects includes only the BTPD range with the 10 states listed above and does not include counties adjacent to this range. This distinction was made because indirect effects are not expected to extend beyond the use area. However, direct effects may extend beyond the use area due to exposure to individuals or via prey items with chlorophacinone residues that could be found outside of their described range.*
>
> *It is important to note that the historic range-wide action areas do not imply that direct and/or indirect effects and/or critical habitat modification are expected or are likely to occur over the full extent of the action area, but rather to identify all areas that may potentially be affected by the action. The Agency uses more rigorous analysis including consideration of available land cover data, toxicity data, and exposure information to determine areas where listed species and their designated critical habitats may be affected or modified via endpoints associated with reduced survival, growth, or reproduction.*"

In the BA, the EPA provided a map of the historic black-tailed prairie dog range from NatureServe (www.natureserve.org) (Figure 2.2 on pg 55 of BA, reproduced below in Figure 1) as an indicator of the action area, and described as the "footprint" or "initial area of concern" which covers all habitats within the historic black-tailed prairie dog range. Range maps from NatureServe for federally listed species and/or their critical habitats were overlaid on that historic black-tailed prairie dog map to determine any overlap which was used in the EPA's BA to inform "May Affect" determinations for federally threatened or endangered species and their critical habitats. As the EPA recognized in the BA, the historic range map of the black-tailed prairie dog does not necessarily include the entire "Effects Determination Area" and additional data were used as appropriate to determine effects to species and critical habitats. The current range of the black-tailed prairie dog has contracted from its historic range, so in some areas the species' current range overlap with federally listed species has been reduced (Service 2009b). The historic range map includes portions of the state of Arizona and small areas within Mexico and Canada; however, this consultation applies only to the United States and is limited to Rozol use within the ten states identified on the September 10, 2010, Rozol label (Appendix). Additionally, some of the Conservation Measures listed above further amend the EPA's action area by precluding Rozol use in some areas. However, for the purpose of this consultation, the Service agrees with the EPA's definition of the broad action area as it encompasses the potential areas where indirect effects may occur.

Initial Area of Concern for use of Rozol Prairie Dog Bait

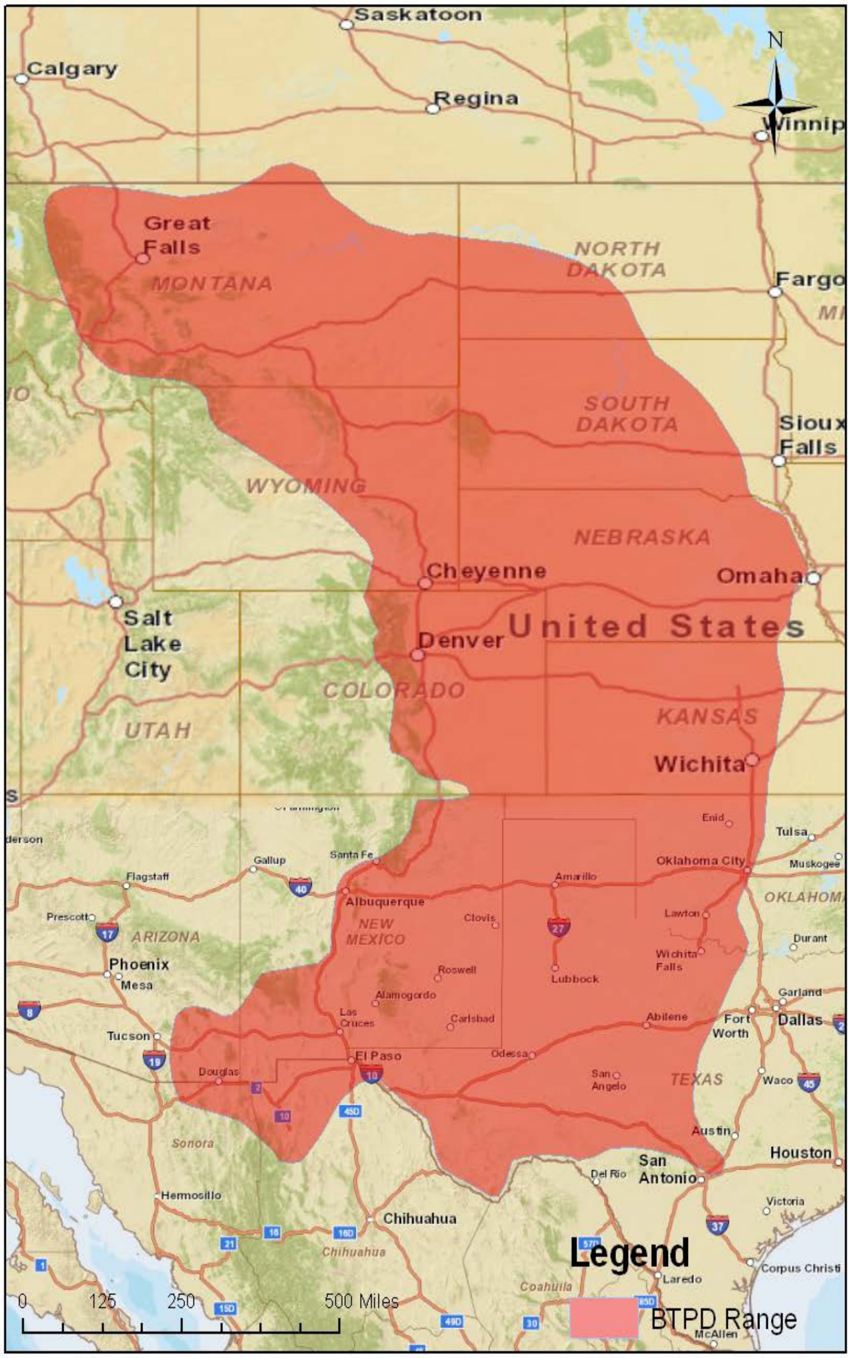

Figure 1. The historic range of the black-tailed prairie dog by NatureServe as presented in the EPA's BA (EPA 2010b).

GENERAL BACKGROUND AND EFFECTS OF THE ACTION RELEVANT TO ALL SPECIES IN CONSULTATION

Prairie dogs are considered a keystone species that have a unique and substantial influence on plant and animal communities and are critical to the integrity of grassland ecosystems (Kotliar *et al.* 2006). The habitat they create is associated with more than 150 species of amphibians, birds, mammals, plants and reptiles as well as species federally listed for protection under the ESA (Kotliar *et al.* 2006). In western South Dakota, 40 percent of all wildlife (represented by 134 vertebrate species) is associated with black-tailed prairie dog colonies (Sharps and Uresk 1990). Presence of mountain plover (*Charadrius montanus*) and burrowing owl (*Athene cunicularia*), two species of conservation concern (Service 2008a), are also considerably higher on black-tailed prairie dog colonies than grassland habitats without prairie dogs in eastern Colorado (Tipton et al. 2008). When prairie dog towns are poisoned, many other species are likely to be poisoned as well, or be negatively affected by loss of prairie dog habitat or the species associated with that habitat. Loss of seasonal habitat for bird species may be of special concern. The number of bird species present in the summer was significantly higher on prairie dog towns than paired sites without prairie dog towns (Smith and Lomolino 2004). Burrowing owls, killdeer (*Charadrius vociferous*), horned larks (*Eremophila alpestris*), and western meadowlarks (*Sturnella neglecta*) are positively and significantly associated with prairie dog towns during summer, while horned larks and ferruginous hawks (*Buteo regalis*) are significantly associated with prairie dog towns during fall (Smith and Lomolino 2004). Species declines from the reduction of prairie dog habitat will result in cascading effects through the grassland ecosystem that extend beyond the poisoned prairie dog towns.

INDANDIONE MODE OF ACTION AND TOXICITY

Chlorophacinone, the active ingredient in Rozol, is an anticoagulant chemical and, along with diphacinone, belongs to the indandione class of compounds. Chlorophacinone and diphacinone are the only indandione active ingredient rodenticides currently registered for use in the United States. Both have been registered for use to control black-tailed prairie dogs under FIFRA section 24(c) for Special Local Needs and Rozol has been registered under FIFRA section 3. Indandiones depress liver synthesis of vitamin K-dependent blood-clotting factors and increase permeability of capillaries throughout the body, resulting in systemic internal hemorrhaging (Reigart and Roberts 1999). Unlike the coumarin class of anticoagulant compounds (e.g., warfarin, brodifacoum, difenacoum), indandiones can cause neurologic and cardiopulmonary injury leading to death before hemorrhage occurs (Reigart and Roberts 1999, Hazardous Substances Data Bank, 2003). Indandiones also uncouple oxidative phosphorylation (energy generation) which may result in fatigue and restlessness (Van Den Berg and Nauta 1975, Bryson 1996). Clinical effects typically do not occur until several days after ingestion due to the persistence of blood-clotting factors. In humans, clinical effects include anemia (red blood cell deficiency), fatigue, dyspnea (breathlessness), nosebleeds, bleeding gums, hematuria (blood in the urine), melena (darkened feces associated with gastrointestinal bleeding), and extensive ecchymosis (large bruises) (Reigart and Roberts, 1999).

Indandiones are first generation anticoagulant rodenticides that are most toxic when animals are exposed to daily doses for multiple days (Vyas et al. 2012). For example, the median Lethal Dose (LD50) from a single exposure of chlorophacinone to Norway rats (*Rattus norvegicus*) is 20.5 micrograms per gram (µg/g), whereas a 5-day daily dose LD50 is 20 times lower at 0.95 µg/g (Jackson and Ashton 1992). Likewise, a dietary toxicity test that provided a measured diphacinone-treated diet for daily consumption by eastern screech-owls (*Megascops asio*) found that repeated low-dosage exposure over seven days increased diphacinone toxicity by more than an order of magnitude compared to an acute oral toxicity test (Rattner *et al*. 2011a; Vyas, personal communication, 2011a). Thus, the single dose LD50 test, which was developed to evaluate rodenticides causing acute responses, such as zinc phosphide, is not an appropriate test for evaluating toxicity for first generation anticoagulants, such as chlorophacinone, which have their greatest toxicity from repeated daily exposures. We believe acute standardized toxicity test results for chlorophacinone greatly underestimates risk to non-target species because indandiones are much more lethal when multiple doses are consumed over multiple days as opposed to a one time feeding.

When black-tailed prairie dogs are exposed to chlorophacinone, there is much variability in their susceptibility to mortality and the amount of time it takes for them to die (Yoder 2008). Death can occur when exposed to a chlorophacinone dose (oral gavage) as low as 0.5 milligrams per kilogram body weight (Yoder 2008). Mortality from LD50 tests indicate two peaks in the number of black-tailed prairie deaths, a larger peak that occurs 9 to14 days after exposure and a second smaller peak that occurs 17 to 20 days after exposure (Yoder 2008). Black-tailed prairie dogs exposed to chlorophacinone may not exhibit any symptoms prior to death but most are symptomatic for at least 24 hours before death (Yoder 2008). Black-tailed prairie dog symptoms from chlorophacinone exposure (e.g., loss of attentiveness, lethargy, swollen or closed eyes) generally take days after ingestion to manifest and this likely reduces bait avoidance (Yoder 2008). There is no apparent taste aversion to Rozol as black-tailed prairie dogs readily consume Rozol bait (Witmer 2011).

CHLOROPHACINONE ENVIRONMENTAL FATE

The number of days for chlorophacinone to degrade by 50 percent (half-life) has been reported by laboratory studies that evaluate degradation by soil, water, and light. The half-life of chlorophacinone incorporated in soil can range from 4 to 128 days depending on laboratory testing conditions. In soil under dark aerobic conditions at 25°C, chlorophacinone is degraded steadily with an estimated half-life of 128 days (European Commission 2009), whereas under artificial light on sandy clay loam soil, chlorophacinone's half-life is 4 days (EPA 1998a). Although previously reported to be very susceptible to direct photolysis in water (e.g., half-life of 37 minutes at pH 7), the assessments used acetone (a strong photosensitizer) as a solvent to introduce chlorophacinone into the test system and are now classified by the EPA as invalid (Jones, personal communication, 2011). Chlorophacinone is stable in water at a pH of 5, 7, or 9; thus, breakdown by exposure to water is not expected to be an important degradation process (Hazardous Substances Data Bank 2003).

Few studies have evaluated the field persistence of chlorophacinone rodenticide baits; however, they indicate that chlorophacinone concentrations in Rozol would not degrade prior to consumption even under wet conditions (Merson and Byers 1985; Jones, personal communication, 2011). A field study that evaluated wet weather resistance of rodenticides, including Rozol Vole Bait, found no difference in efficacy between wet and dry chlorophacinone pellets (Merson and Byers 1985). A supplemental terrestrial field dissipation study reported no dissipation of chlorophacinone in Rozol samples for up to 10 days and actually found concentrations increased over this time period, perhaps as a result of insect consumption of the internal part of the grain or changes to bait water content (Jones personal communication, 2011). The ability to evaluate dissipation of chlorophacinone on grain samples was hampered by consumption of the grain samples and the study concluded that the primary route of dissipation of chlorophacinone is through consumption of the treated grain (Jones personal communication, 2011).

Based on the information above, we agree with the EPA's assumption in the BA (EPA 2010b) that the mobility from bait into soil or water is considered a negligible exposure pathway to non-target organisms. We assume chlorophacinone remains undegraded in bait after annual application and share EPA's assumption that the only relevant dissipation of Rozol occurs through its consumption.

ROZOL EXPOSURE AND EFFECTS ASSESSMENT

Primary Exposure

Ingestion of Rozol (primary exposure) by non-target species can be expected for species that feed on grain. Twenty-nine adult domestic pigeons (*Columba livia*) were poisoned with a 0.005 percent chlorophacinone wheat grain bait after a broadcast application targeted at common voles (*Microtus arvalis*) (Sarabia *et al*. 2008). A common lesion associated with chlorophacinone toxicosis in these pigeons involved massive hemorrhage and hematoma formation in the subcutis of the neck; however, equally noteworthy was that chlorophacinone was found in the liver at 5.66 to 34.97 µg/g wet weight (ww) basis in four birds without any lesions suggestive of anticoagulant toxicosis (Sarabia *et al.* 2008). Although the label requirement to place bait "six inches in the burrow" is designed to limit exposure to granivorous birds, it does not preclude exposure to avian or other non-target species that may use black-tailed prairie dog holes. Rozol was visible in many black-tailed prairie dog burrows that contained angled entrances (as opposed to vertical entrances) and that horned larks appeared to be preferentially drawn to these burrows where they could easily feed on Rozol (Vyas 2010a). The presence of green-stained droppings, indicative of exposure to Rozol bait which contains a green dye thereby making product appear green, was observed and suspected to be from pheasants (*Phasianus colchicus*), horned larks, and western meadowlarks. Green droppings from these birds suggest they were consuming bait; an assumption subsequently confirmed by detection of chlorophacinone residues in these droppings (Vyas, personal communication, 2011b).

In addition to feeding on bait within the burrow, non-target species may also feed on bait found on the surface. Bait spilled by applicators or not entirely placed in burrows can be difficult and time consuming to collect. Further, bait that is placed in burrows can be brought back to the surface of a colony over time by the action of prairie dogs and other animals using the burrow system (Vyas 2010a). It would have been helpful if there was some documentation to indicate applicator willingness to cease operations and collect misplaced bait or return to the colony days to weeks later to collect and disposed of bait found on the surface. Absent that information, it appears bait retrieval from the surface of a prairie dog colony, days to weeks post application, could be an unrealistic expectation of the label. Thus, even if applicators attempted to follow label instructions regarding retrieval and disposal of bait at the time of application, the size of bait and landscapes where it is used brings up the practicality of adhering to that label requirement. We are aware of one field study that found bait on the surface (Vyas 2010a), and have no information from anywhere else that indicate applicators are collecting and disposing of bait found above ground.

The Rozol application rate of approximately ¼ cup of bait (53 grams) down each active prairie dog burrow may be excessive and likely results in increased risk to non-target species. According to Liphatech, 53 grams of Rozol bait provides about two LD50 doses per black-tailed prairie dog, based on a single dose oral gavage LD50 of 1.8 µg/g (Yoder 2008). However, as previously explained, a 5-day LD50 would likely be around 20 times lower than a single dose LD50, and is more representative of exposure in the field whereby animals may consume bait over multiple days. Thus, 53 grams of bait likely provides at least 10 lethal doses. Furthermore, there are on average 3.9 active burrows entrances for each black-tailed prairie dog (Biggins *et al.* 2006). If inactive burrows are mistakenly baited then even further bait availability would occur. To illustrate the point, when Forgacs (2010) treated 1,358 burrows on a 15.7 acre prairie dog plot where they had a visual count of 30 prairie dogs, they applied 71,974 grams of Rozol (at least 13,580 lethal doses) on a plot with an estimated population of 348 black-tailed prairie dogs using a scientifically accepted methodology to estimate prairie dog numbers from active burrows (Biggins *et al.* 2006). While that level of dosing likely ensures high levels of death to prairie dogs, it likely also contributes to prairie dogs consuming multiple lethal doses as well as providing left-over bait to remain available for non-target species to consume after the prairie dogs have been killed.

Results from other studies indicate that application rates of less than 53 grams of product per active burrow can be effective at killing black-tailed prairie dogs. Sullins (1990) reported a 96 percent reduction in the visible count of black-tailed prairie dogs after providing 0.01 percent chlorophacinone product in two applications of 9 grams per active burrow for a total of 18 grams within 48 hours.

Secondary Exposure

Species that ingest animals that consume Rozol (secondary exposure) are also at risk of being negatively affected, especially predators and scavengers that may gorge on poisoned prairie dogs and selectively feed on internal tissues (see “Prairie Dog Chlorophacinone Residues” section below). The study noted above (Fisher and Timm 1987) found that five of six domestic ferrets were killed after feeding on four poisoned black-tailed prairie dogs over eight days and concluded that chlorophacinone may not be an acceptable prairie dog toxicant based on high secondary toxicity. As described further in the "Field Study Observations of Secondary Toxicity" section below, field observations indicate that the availability of black-tailed prairie dogs to secondary consumers is facilitated by a prairie dogs spending time above ground after ingesting Rozol (Service 2007a, Golden and Gober 2010, Vyas 2010a). When subjected to poisoning, black-tailed prairie dogs can return to the surface of the colony, becoming increasingly debilitated until death. Prairie dogs in this debilitated state can be more susceptible to predation due to changes in behavior that render them more conspicuous and/or less wary and evasive in the presence of a predator (Hunt *et al*. 1992, Relyea and Hoverman 2006). Avian predator hunting success increases dramatically when injured or abnormal prey are available (Rudebeck 1950). Some avian predators such as ferruginous hawks are attracted to Rozol-treated prairie dog colonies, likely due to the increased presence of morbid and dead prairie dogs and perhaps other non-target species (Vyas 2010a). Thus, even though Rozol-treated prairie dog colonies may make up only a small percentage of a predator's overall foraging range, preferential selection of prey from these areas may lead to a disproportionate opportunity for exposure.

Risk to non-target species also includes effects from chronic (long term) secondary exposure. Rozol exposed prairie dogs may be debilitated on the surface for at least a month following application (Vyas 2010a, Lee and Hygnstrom 2007). Thus, predators may continue to feed from the same poisoned prairie dog town for weeks or may encounter other poisoned prairie dog towns that were sequentially poisoned and are within their home range or migration path. We assume that many of the effects described in the above "Indandione Mode of Action and Toxicity" section including sub-lethal neurologic effects, cardiopulmonary effects, energy loss, and hemorrhaging could occur in federally listed species from chronic Rozol exposure and ultimately result in decreased growth, survival or reproductive effects. Further, we agree with EPA's assessment in the BA that "toxicity resulting from chronic exposure exceeding five days cannot be determined based on current data" and that "growth and reproductive effects cannot be precluded due to the absence of chronic data."

The BA and previous risk assessments by the EPA (Erickson and Urban, 2004) indicate that mammals are at a greater risk from secondary chlorophacinone toxicity than birds; however, birds exposed in the field may be at equal or greater risk than mammals as the effects of anticoagulant rodenticide toxicosis can differ between mammal and avian species. An assessment of wildlife anticoagulant rodenticide poisonings in New York from 1971 to 1997 (Stone et al. 1999) found that pulmonary hemorrhage is far more common in mammals than birds but about one-third of birds examined had excessive external bleeding from minor superficial wounds, a condition not reported in mammals. Also, studies have reported that the first observed signs of secondary chlorophacinone toxicity in raptors include fatigue such as wing-drooping (Radvanyi *et al*., 1988). For species that rely upon speed and stamina, such as raptors to attain prey species chlorophacinone induced fatigue can result in decreased survival. Because of difference in pathologies, birds may be even more susceptible to chronic effects than mammals. Furthermore, some avian species may be just as susceptible as mammals or more susceptible when sub-lethal effects are considered in conjunction with other factors that influence exposure and cumulative effects to birds such as: a) body condition from migration; b) increased susceptibility to contact injury; c) environmental conditions such as weather extremes; and d) high energy demands in the winter.

Surface Presence of Poisoned Black-tailed Prairie Dogs

The Service is aware of three studies that inform the issue of dead and dying prairie dogs on the colony surface following Rozol application, and two of the three studies repeatedly found dead and dying prairie dogs above ground on the surface of the prairie dog colony during multiple retrun visits (Lee and Hygnstrom 2007, Vyas 2010a). The other study (Forgacs 2010) did not find prairie dogs on the surface but qualified that result noting that weather conditions deteriorated after the application to the point that precipitation prevented researchers from even being able to return to some poisoned sites to search for prairie dogs. That study also noted that the inclement weather, which began after the Rozol application, may have contributed to decreased above-ground prairie dog activity (Forgacs 2010).

Instances of above-ground prairie dogs following application have also been reported to the Service's Law Enforcement Division (Service 2007a, Golden and Gober 2010). An excerpt below from an interview with a Rozol applicator after a bald eagle (*Haliaeetus leucocephalus*) poisoning incident in Nebraska illustrates both the regularity that prairie dogs return to the surface and the state of awareness of Rozol poisoned prairie dogs (Service 2007a).

> REDACTED *also explained that he knew poisoned prairie dogs often returned to the surface before dying, as evidenced by the bloody stools he often saw when he returned to inspect the sites.* REDACTED *further relayed an incident when the poison Rozol had been applied to the prairie dog town, as per label instructions and the lady owning the property watched as poisoned prairie dogs stumbled around the surface for two weeks after the application.* REDACTED *added when he does see prairie dogs on the surface after they have been poison, they seem to be in a stupor, and not wary at all.* REDACTED *said he could often walk right up to these poisoned prairie dogs and they would not run away.*

At the time this statement was provided to Law Enforcement Agents in 2007, the Rozol Special Local Needs label did not require collection of impaired or moribund prairie dogs, but rather just retrieval of carcasses found on the surface. Even though the current label requires collection and disposal of live prairie dogs, we have encountered applicators who indicate that this is not readily accomplished (See following section below). Given the instances of Service Law Enforcement agents finding moribund and dead prairie dogs on the surface after a Rozol application (Golden and Gober 2010) and applicators reporting prairie dogs on the colony surface following Rozol applications (Service 2007a), we believe Rozol-poisoned prairie dogs and other rodents will regularly return to the surface of a colony and be available for secondary exposure to federally listed species including the northern aplomado falcon and gray wolf.

Removal of Poisoned Black-tailed Prairie Dogs

Although the Rozol label requires the search and removal of dead and dying prairie dogs following application, the limited information on applicator behavior indicates that few if any moribund or dead prairie dogs found on the surface are collected and disposed of in a manner that substantially reduces secondary exposure (Service 2010a, Tosh et al. 2011). This may be due to the difficulty of finding prairie dogs on the surface as illustrated by Vyas (2010b)(click here for video) or because resources and commitments needed to make multiple return visits are not available (Service 2010a). During a prairie dog meeting in 2010 attended by the EPA and hosted by the North Dakota Department of Agriculture and Standing Rock Sioux Indian Reservation, ranchers and professional pesticide applicators indicated they do not have the time, resources or inclination to conduct multiple return visits to a Rozol treated prairie dog colony to collect dead and dying prairie dogs, and that current label requirements for two return visits to treated prairie dog towns were unrealistic and impractical (Service 2010a). These remarks were in response to an EPA inquiry to the attendees what they would think about increasing the required returns visits to a poisoned prairie dog colony from two times as required by the label in effect at that time in August 2010 to potentially many more visits. The EPA prefaced their inquiry to the ranchers in attendance, that additional returns visits might be added to the label to address comments that the EPA received from environmental groups about dead and dying prairie dogs on the surface of a colony. One of the meeting participants indicated that if the EPA needed to increase the number of return visits on the label to pacify environmental groups, it may not matter since that speaker did not believe there was rigorous adherence for two return visits to collect prairie dogs and thus requiring even more return visits would likely meet a similar fate. Of particular note from that meeting was that none of the attendees had ever picked up and disposed of live prairie dogs or their carcasses after Rozol application. The Montana Department of Agriculture also questioned the practicality of the Rozol label, especially the retrieval of live prairie dogs, and expressed their belief that most applicators will have difficulty with strict adherence to the label (de Young 2009).

The Service believes that Rozol label directions to reduce secondary exposure by collecting and disposing of dead and dying prairie dogs at 1 to 2 day intervals late in the day are inadequate to protect non-target species. Many prairie dogs are likely scavenged prior to removal by applicators. Carcass retrieval studies, aimed at evaluating pesticide mortality events, have found that as high as 92 percent of carcasses are scavenged within 24 hours and that carcass removal by scavengers is more rapid in areas of higher carcass density than in lower density kills because clumped food sources can attract scavengers (Vyas 1999). Thus, even if the label is followed and applicators remove carcasses at one to two day intervals late in the day, it is unlikely to outpace removal by scavengers. Further, poisoned animals are alive for an extended period of time (days to weeks) and can be difficult to find without systematic searches. We could locate no information to indicate the current label requirements in practice prevent secondary exposure, mainly because we can locate no information that prairie dogs are being collected per the label restrictions. Furthermore, there is no indication that if carcasses were retrieved from the surface that they would be removed from the site, as the label allows prairie dogs found on the surface to be placed in prairie dog burrows or otherwise buried on site. Such carcasses could be targeted by coyotes, foxes, badgers, bears, ferrets, and other carnivores that can dig up prey or carrion.

A recent on-farm survey on anticoagulant use in Northern Ireland found that applicators seldom followed best practice guidelines designed to maximize efficacy and reduce risk of non-target species exposure (Tosh *et al*. 2011). They found that applicators almost never searched for and removed poisoned carcasses and many baited for prolonged periods or permanently. Challenges with label restrictions, especially retrieval of live prairie dogs and carcasses, is an issue given the amount of effort needed to accomplish this task and the few resources available to ensure compliance. We conclude that while most labels are difficult to enforce, the comparatively complex nature of the Rozol label renders it particularly vulnerable to noncompliance, and reports from users indicate that failure to pick up prairie dogs is a "widespread and commonly recognized practice," a designation outlined in FIFRA as a means for determining registration eligibility.

Pamphlets produced by Liphatech indicate that little effort is needed to meet the Rozol label requirement for carcass searches and disposal of prairie dogs carcasses (Bruesch 2009, Liphatech 2009). These pamphlets, made available during the time when the Rozol label required two return visits for carcass searches, indicated that Rozol was less labor intensive than a competing rodenticide labeled for use on prairie dogs that did not require carcass searches or in-burrow application. Bruesh (2009) makes the recommendation to "allow a little extra time for carcass search and recovery" when using anticoagulant rodenticides to control prairie dogs. Both pamphlets imply that the requirement to conduct two carcass searches and properly dispose of bait and carcasses found above ground is less labor intensive than a single pre-baiting trip and the potential need to reapply a competing rodenticide (Bruesch 2009, Liphatech 2009). Quick searches that lack systematic methods are expected to find fewer poisoned carcasses than those that include walking transects of specified width (e.g., Lee and Hygnstrom 2007, Vyas 2010a). Furthermore, Vyas (2010a) observed dying black-tailed prairie dogs on his last search 29 days after application. Thus, searchers that stop finding carcasses after two weeks and end, as specified on the label, would likely miss any second peak in deaths as indicated by (Yoder 2008). We believe that although Rozol exposed prairie dogs may be found dead or debilitated on the surface of a colony for at least a month following application, searches as described on the label are inadequate in finding poisoned prairie dogs above ground and thus unlikely to prevent non-target exposure.

Based on the information in this section, we conclude that few if any poisoned prairie dogs are removed from a colony as a result of return visits by applicators. Thus, poisoned black-tailed prairie dogs are likely to remain at the colony where they were poisoned and are available for consumption by federally listed species and other non-target predators and scavengers.

Field Study Observations of Secondary Exposure or Toxicity

As indicated previously, chlorophacinone and diphacinone toxicity share a similar mode of action thus we consider study observations of secondary exposure to non-target species from diphacinone studies as relevant in evaluating Rozol exposure. Four studies have evaluated chlorophacinone or diphacinone exposure to non-target species following applications to poison black-tailed prairie dogs (Bruening 2007, Lee and Hygnstrom 2007, Forgacs 2010, Vyas 2010a). These studies are discussed briefly below.

Field studies sponsored by Liphatech (Lee and Hygnstrom 2007, Forgacs 2010) reported little to no evidence of secondary exposure and did not observe any scavenging by avian predators. Lee and Hygnstrom (2007) performed a study designed to assess the efficacy of chlorophacinone in killing black-tailed prairie dogs and that study included searches for carcasses on and immediately around baited plots. They found 10 carcasses above ground (nine black-tailed prairie dogs and a cottontail rabbit) at a ratio of one carcass found per 14 acres searched. Forgacs (2010) quantified the number of dead and dying prairie dogs above ground following a field application and included searches on three test plots consisting of approximately 24 acres for 21 days post application. They did not find any dead prairie dogs or non-target carcasses; however, the study was performed in early February and included precipitation and storm events that the researchers believe limited the prairie dog activity above ground and the ability of the researchers to return to the sites to search for prairie dogs (Forgacs 2010). According to a field study sponsored by Scimetrics, the registrant for Kaput Prairie Dog Bait (diphacinone active ingredient), sick and lethargic prairie dogs were observed above ground following a field application and researchers also observed a bald eagle flying off the treatment plot with a prairie dog in its talons (Bruening 2007).

A study sponsored by the Service and performed by the U.S. Geological Survey (Vyas 2010a) documented avian and mammalian non-target exposure and effects following a field application of Rozol. Signs of exposure reported in this study included mortality, morbidity, discolored droppings, scavenging, possible blood stained soil, and a general change in the number of black-tailed prairie dogs and other wildlife (Vyas 2010a). Carcass searches were conducted over an area of approximately 43 acres for 14 days over the 29-day post application period and recovered two intact thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), nine intact black-tailed prairie dogs, seven scavenged black-tailed prairie dogs and one intact western meadowlark (Vyas 2010a). The meadowlark had abundant hemorrhaging in the pectoral muscle, one focal hemorrhage in the brain, and chlorophacinone was detected in the liver and lower gastrointestinal contents (Vyas, personal communication, 2010). Meadowlarks are a recognized food source for the federally endangered northern aplomado falcon (Service 2002b). Raptors were also seen visiting the poisoned prairie dog colony and foraging on black-tailed prairie dogs (Vyas 2010a).

A Rozol application in South Dakota on a prairie dog colony in 2005 found approximately 400 to 500 dead and dying prairie dogs on the surface when a 160-acre densely populated prairie dog town was treated with Rozol (Golden and Gober 2010). At that time, Rozol was not authorized for use in South Dakota and a subsequent investigation by EPA ensued but the outcome is not available at this time.

In December 2006, a deceased adult female bald eagle was recovered by Service Law Enforcement and submitted to the National Fish and Wildlife Forensics Laboratory in Ashland, Oregon (Service 2007a). The eagle carcass was in good condition when received by the laboratory and was x-rayed, dissected, and examined for gross pathological lesions. Liver samples were analyzed for lead and anticoagulant rodenticides. The laboratory diagnosis revealed that poisoning with chlorophacinone and physical trauma had occurred. The lab report concluded that "the observed small hemorrhagic skin laceration on the dorsal elbow region of the right wing was caused by trauma from an undetermined source. This trauma may have initiated the extensive hemorrhaging caused by the presence of the anticoagulant rodenticide in the eagle." Chlorophacinone was detected in the eagle's liver at 0.30 µg/g ww, a concentration similar to that detected in the liver of another bald eagle (0.40 µg/g ww, as described below) and considered indicative of chlorophacinone poisoning (Service 2011b). The Service Special Agent working on the Nebraska bald eagle mortality case interviewed a licensed applicator regarding the incident. The applicator remarked that even when label directions for Rozol applications are followed, black-tailed prairie dogs are often seen above ground in a moribund state of stupor that leaves them vulnerable to capture or predation (Service 2007a).

In January of 2009, a sub-adult female ferruginous hawk and an adult male great-horned owl (*Bubo virginianus*) were collected by Service Law Enforcement and submitted to the National Fish and Wildlife Forensics Laboratory in Ashland, Oregon (Service 2009c). Both raptors were found in an area where Rozol was being used to control prairie dogs and had a liver chlorophacinone concentration of 0.25 µg/g ww. The ferruginous hawk had prairie dog hair in its stomach contents and the owl's stomach contents had hairs from rodents and/or insectivores (Rodentia; Soricomorpha).

In March of 2011, another bald eagle carcass was opportunistically recovered and analyzed by the National Fish and Wildlife Forensics Laboratory. The bald eagle's cause of death was diagnosed as ingestion of chlorophacinone due to a liver chlorophacinone concentration of 0.4 µg/g ww and hemorrhage of the subcutaneous tissues, body cavities and lungs (Service 2011b). According to the examiner "no gut contents were available for examination, but toxicity was likely incurred through ingestion of one or more poisoned rodents." Prairie dog colonies were in the general vicinity of where the eagle was recovered, and the law enforcement case is still under investigation.

Based on the reports described above (Lee and Hygnstrom 2007, Service 2007a, Service 2009c, Bruning 2007, Vyas 2010a), we conclude that chlorophacinone exposure to federally listed species and non-target animals following field applications of Rozol has occurred in the past and is likely to occur in the future if Rozol is used to poison black-tailed prairie dogs under the current label directions.

REVIEW OF THE EPA'S ROZOL EFFECTS DETERMINATION

We believe risk calculations in EPA's BA likely underestimate risk to non-target species. Therefore, the comments in this section informed the development of the BO and serve as feedback to the EPA for consideration in developing future effects determinations.

Underestimated Risk to Avian Species

A Risk Quotient (RQ) is equal to the Estimated Environmental Concentration (EEC), a term used to estimate exposure, divided by the relevant toxicological endpoint or Toxicity Reference Value. The BA provides a RQ of 0.104 for avian species, a value that barely exceeds the EPA's Level of Concern of 0.1 (EPA 2010b). The Toxicity Reference Value (TRV) used to calculate this RQ is based on dietary median Lethal Concentration (LC50) for northern bobwhite (*Colinus virginianus*). Although the EPA's selection of a sub-acute dietary LC50 test value for the TRV is preferred to a single dose LD50 value, this TRV is still likely to underestimate risk to avian species. As dietary LC50 results can be highly dependent on a species' willingness to eat the bait and their ability to cope with reduced nutriment, their applicability in quantitative risk assessment has been questioned (Hill 1993, Mineau *et al*. 1994, Hoffman 2003). In addition, data suggest that the northern bobwhite, which eats primarily insects and vegetation, is not likely to be representative of other more sensitive avian species, especially those that prey upon and scavenge prairie dogs. Though toxicity data are lacking for chlorophacinone effects to a wide breadth of species, recent investigations have found that sensitivity of raptors to the closely related indandione rodenticide diphacinone is much greater than predicted from test species used in pesticide registrations. Acute diphacinone toxicity tests indicate that American kestrels (*Falco sparverius*) are over 20 times more sensitive than northern bobwhite and over 30 times more sensitive than mallards (*Anas platyrhynchos*), two test species required by the EPA for pesticide registration (Rattner *et al.* 2010a and 2011b). Golden eagles (*Aquila chrysaetos*) appear to be even more sensitive to diphacinone than kestrels (Savarie *et al.* 1979, Rattner *et al*. 2011b). Given the similarity of chlorophacinone to diphacinone, we conclude that at least raptors (e.g., the northern aplomado falcon), and possibly other groups of species, will exhibit greater sensitivity than can be estimated from existing mallard or northern bobwhite studies.

Furthermore, the LC50-based TRV does not account for potential sub-lethal effects of chlorophacinone that can decrease listed species survival and/or reproduction. Accounting for sub-lethal effects from chlorophacinone exposure such as fatigue, clotting abnormalities, and hemorrhaging is important when evaluating risk to federally listed species. This is especially true when evaluating cumulative effects that include sub-lethal effects from exposure to chlorophacinone as well as other environmental stressors such as adverse weather, food shortages, and predation (Vyas *et al.* 2006). The BA identifies external bleeding, internal hemorrhaging, and increased blood coagulation time as sub-lethal effects to avian species from secondary exposure to chlorophacinone-poisoned food; however, other sub-lethal effects (e.g., fatigue) can occur even prior to gross observation of internal and external bleeding. As mentioned previously, chlorophacinone uncouples oxidative phosphorylation, and studies have reported that the first observed signs of secondary chlorophacinone toxicity in raptors include fatigue such as wing-drooping (Radvanyi *et al*., 1988). Fatigue induced from chlorophacinone exposure is expected to substantially reduce a listed species' ability to capture prey and thus negatively affect its reproduction and survival in the wild.

Sub-lethal effects have been documented in raptors exposed to anticoagulants and can occur despite low tissue residue concentrations. For example, American kestrels administered diphacinone had liver residues just above the detection limits of 0.263 and 0.280 µg/g ww diphacinone, but histological evidence revealed hemorrhages in lung and liver tissues (Rattner *et al*. 2011b). Golden eagles fed muscle from diphacinone-treated sheep exhibited extreme weakness, ataxia (lack of muscle control), and hemorrhages (Savarie *et al*. 1979). These studies indicate that raptors are susceptible to indandione's multiple modes of action. Although some avian species have survived laboratory studies after being fed anticoagulant poisoned rodents until time of euthanasia (Savarie *et al*. 1979, Mendenhall and Pank 1980, Radvanyi *et al*. 1988), sub-lethal effects described in these studies (e.g., fatigue, wing-drooping, and lung, heart and liver hematomas) are expected to result in decreased survival or reproduction under field conditions. A comprehensive assessment of potential effects of chlorophacinone exposure to sensitive populations of migratory birds has not been completed and reliance on labeled use restrictions does not protect vulnerable species (Golden and Gober 2010). Thus, in addition to the avian reproduction study that the EPA has required Liphatech to complete, we have recommended that the EPA exercise their authority under FIFRA to require additional field assessments that include tracking avian predators and scavengers (e.g., ferruginous hawks, eagles) that are expected to be the most susceptible to Rozol use in prairie dog towns (Schwarz and Gober 2011). Until such studies are completed to provide data on sub-lethal effects and subsequent reproduction and survival, it is difficult to evaluate the secondary toxicity risk of Rozol exposure to federally listed species such as the northern aplomado falcon.

An acute exposure to listed species from a one-time feeding of chlorophacinone bait or poisoned prey may still result in death or harmful sub-lethal effects because even minor increases in fatigue in predators can undermine their ability to acquire prey. However, as the EPA indicated in the BA, there is high potential for chronic effects to occur in birds because LD50 and LC50 data indicate that acute environmental exposures can result in doses that do not result in immediate direct lethality, but instead create potential for long-term exposures and chronic toxicity. The potential for chronic exposure to birds is further increased by the potential for exposure to other anticoagulant rodenticides (e.g. diphacinone) and by repeated exposures to chlorophacinone and diphacinone from multiple applications and at multiple locations as the species forage over large home ranges and migrates. One of the other diphacinone products to control black-tailed prairie dogs is Kaput®-D, which was previously available for use from October 1 to March 15 under a FIFRA Section 24c registration in Colorado, Kansas, Nebraska, Texas and Wyoming, and has a pending request for registration for use throughout the black-tailed prairie dog's range (Golden and Gober 2010). Previous studies indicate that anticoagulant rodenticides have a wide geographic use and detection of one or more of these compounds in the livers of predatory birds is common (Stone *et al*. 2003, Albert *et al*. 2010). Therefore, it is a reasonable assumption that raptors such as the northern aplomado falcon may already be carrying an anticoagulant burden and are thus more susceptible to adverse effects from additional exposure.

Prairie Dog Chlorophacinone Residues

In its BA, EPA uses a maximum carcass whole-body residue value of 2.24 µg/g ww for the Environmental Effects Concentration in evaluating secondary risk to species that consume poisoned black-tailed prairie dogs; however, this value may underestimate exposure. The prairie dog with a carcass concentration of 2.24 µg/g ww had a liver concentration of 6.66 µg/g ww and was collected an unknown number of days after bait application. It is also unknown whether this prairie dog had recently consumed bait or stopped eating bait days before it died. Currently, data exists for black-tailed prairie dog carcasses that were picked up 10 to 25 days after a field application (Lee and Hygnstrom 2007, Primus 2007) but it is unclear if they still had bait in their system or if they became too sick and stopped eating bait days before they died. Lab data also exists (Witmer 2011) for black-tailed prairie dogs that consumed a single dose (53 grams bait) and were euthanized periodically after being maintained on a clean diet. Prairie dogs in the Witmer (2011) study that had most recently consumed bait had the highest liver and carcass concentrations of chlorophacinone. However, for field applications, there may be ten or more lethal doses distributed per individual prairie dog (based on 3.9 active burrows per prairie dog as explained previously) and a longer lag time between exposure and death. Thus, prairie dogs likely continue to eat Rozol after they have consumed a lethal dose. These prairie dogs likely have higher chlorophacinone residues, especially in the liver, than those that die several days after they stop eating bait (Pitt *et al.* 2005, Witmer 2011).

The use of whole-body chlorophacinone residues, as opposed to chlorophacinone residues in liver, may underestimate secondary exposure risk to non-target wildlife particularly scavenging and predating birds. The EPA's BA does not account for concentrations of chlorophacinone in internal organs, such as liver, that may be selectively consumed by predators or scavengers, and are generally much greater than whole-body concentrations. Eight black-tailed prairie dog carcasses collected after a field application of chlorophacinone bait had a mean concentration of chlorophacinone in liver of 5.86 ± 1.88 µg/g ww (maximum of 6.66 µg/g) compared to a whole body mean concentration of 1.48 ± 0.46 µg/g ww (maximum of 2.24 µg/g) (Primus 2007). Use of a liver concentration instead of a carcass concentration may be more appropriate based on feeding behavior of some animals that selectively eat parts of prairie dogs. For instance, some predators may only forage on the most readily accessible body cavity organs, including the liver (Figure 2). When multiple carcasses or moribund prairie dogs are readily available, internal organs may also be preferentially selected over other less accessible or digestible prairie dog body parts. A realistic worst-case scenario would include a maximum liver concentration for the EEC, as opposed to the maximum whole body residue used in the BA. The highest liver known chlorophacinone concentration in a black-tailed prairie dog is 8.4 µg/g ww in a black-tailed prairie dog that consumed 52.8 grams of Rozol and was euthanized two days later (Witmer 2011). We recognize that data for chlorophacinone concentrations in livers from prairie dogs is extremely limited, thus liver concentrations of 8.4 µg/g ww from a euthanized prairie dog and 6.6 µg/g ww from a dead field collected prairie dog are unlikely to be the greatest concentrations encountered if more than a few dozen prairie dog livers are examined.

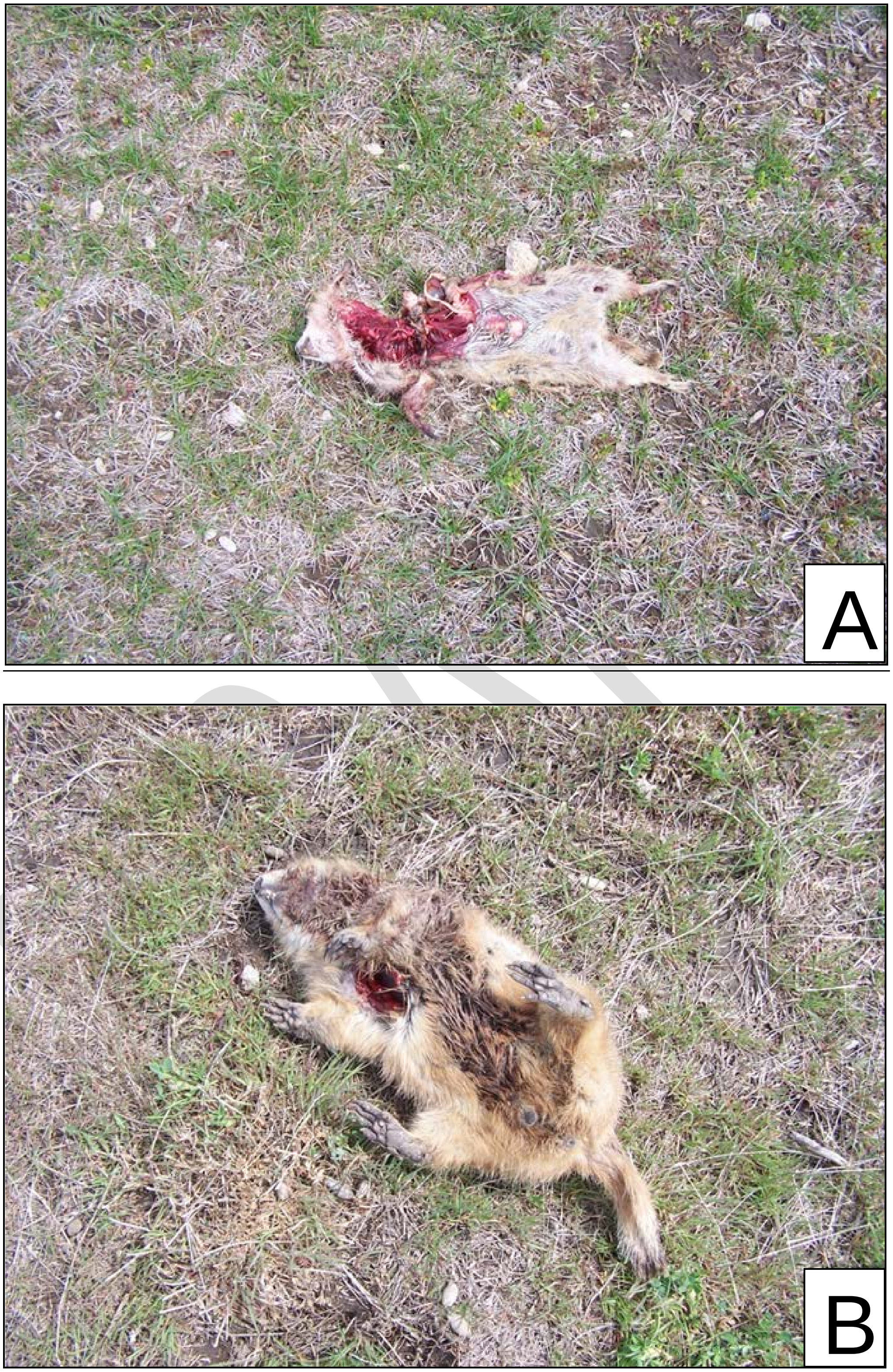

Figure 2. Black-tailed prairie dogs (A and B) scavenged at a prairie dog colony in 2005 after an application of Rozol. Note selective feeding by scavengers that target internal body organs.

Risk Quotient Calculations and Uncertainty

A review of the BA by Liphatech (2010) critiqued it for not correctly accounting for a "high degree of uncertainty in the resulting Risk Quotient calculations." We agree with this assessment, but for different reasons. Liphatech requested uncertainty be considered given use for what they termed as "extreme" data for non-target species and prairie dog carcass residues. We disagree that extreme data was used and, for reasons specified above, believe that TRVs selected for non-target species and residue values in prairie dogs used by the EPA are both too low to represent a realistic worst case scenario. Contrary to Liphatech's concern for RQs being too high due to unaccounted uncertainty, several lines of evidence regarding Rozol exposure and effects suggest that the calculated RQs should be greater to account for uncertainty and missing data. For example, as calculated in the BA, the RQ derived from the black-tailed prairie dog whole-body concentration of 2.24 µg/g ww does not exceed the Level of Concern for secondary toxicity to avian species (EPA 2010b page 80, Table 5.1). Not only are greater exposure estimates warranted that increase the EEC, based on consumption of chlorophacinone concentrations in liver, but also the TRV is overestimated based on the use of acute toxicity tests rather than chronic or sub-acute tests and differences in species sensitively as explained above. Both an increased EEC and decreased TRV would result in a greater RQ. Further, EPA's RQ calculations in the BA do not specifically address uncertainty from the influence of environmental stressors that can make them more susceptible to poisoned food (e.g., adverse weather conditions, food shortages, migration, and predation).

Uncertainty factors are recommended for use in risk assessments to protect federally listed species as scientifically appropriate or where available data are incomplete or otherwise warrant its application (EPA 1995, 2011d). For Rozol, all three reasons to include uncertainty factors are valid. According to the EPA technical guidance, reasonable uncertainty factors may range from 1 - 100 for interspecies uncertainty, 1 - 10 for intraspecies variability and 1 - 10 for sub-acute to chronic toxicity (EPA 1995). In the case of chlorophacinone, information from closely related pesticides indicate that interspecies sensitivity could be as much as 20 or 30 times greater than toxicity values measured in test species (Rattner *et al*. 2010a and 2011b). Reported mortality incidents involving raptors described herein support the likelihood that these taxa can be killed from exposure through Rozol use in prairie dogs. If the BA applied uncertainty factors for interspecies sensitivity alone, then RQs based on chlorophacinone concentrations in black-tailed prairie dogs would exceed the Level of Concern and be more in accordance with our concerns for secondary exposure to birds and mammals that consume Rozol-poisoned prairie dogs.

In addition, RQs were not calculated for chronic or sub-lethal effects to federally listed birds, presumably due to the lack of registrant-submitted reproduction studies. In the absence of data, a lack of effects cannot be assumed, but available lines of evidence must be examined to determine if effects can be reasonably ruled out. In the case of Rozol, chronic exposure to anticoagulant rodenticides is likely for predatory and scavenging species which can cause death or sub-lethal effects that may hasten death when combined with other stressors (Stone 1999). These effects are likely to occur at concentrations below those which would produce lethality in a laboratory setting and therefore must be considered as distinct endpoints. Where data are lacking to produce quantitative RQs with much certainty or assign numeric uncertainty factors, a preferred option is to express risk in qualitative terms. Professional judgment or other qualitative evaluation techniques are appropriate for ranking risks into categories such as low, medium, and high when exposure and effects data are limited or are not easily expressed in quantitative terms (EPA 1998b). For the New Mexican ridge-nosed rattlesnake, for example, the EPA determined adverse effects were likely even though both RQs were below the Level of Concern because chronic effects could occur. Thus, the Service agrees with the EPA's conclusion that chronic effects cannot be ruled out based on the available data. The EPA decision to ultimately base adverse effects determinations not solely on RQs but on the uncertainty surrounding chronic effects that could result in growth, survival, and reproductive impairments that are detrimental to species recovery we believe was appropriate.

WILDLIFE MORTALITY INCIDENTS

Due to the sensitivity of testing Rozol on listed species, we have no direct information on the effects of Rozol to the species under consultation. Therefore, we look to studies of effects of Rozol on other non-target species to inform our analysis. We characterize these studies in this section.

Based on sub-lethal effects to non-target species as reported from laboratory studies as well as reported mortalities and concerns based on opportunistic field recoveries (Erickson and Urban 2004, Service 2007a, EPA 2010, Ruder *et al.* 2011), there is a need for field studies that evaluate anticoagulant exposure and effects to the many species that consume anticoagulant poisoned prairie dogs and other primary consumers. Although a lack of incident reporting is likely a factor in addressing risk uncertainty (Erickson and Urban, 2004), wildlife mortality incidents involving chlorophacinone reported to the EPA include bald eagles, a red-tailed hawk, turkeys, coyotes, San Joaquin kit foxes, grey squirrels, and a bobcat (Erickson and Urban 2004, Service 2007a). It is noteworthy that the bobcat had a liver concentration of 0.4 µg/g ww and apparently died from tertiary exposure to chlorophacinone as it was found dead one day after seen feeding on a dead owl that contained a rodent carcass in its crop (Eriskson and Urban 2004, EPA 2010).

Ruder *et al*. (2011) reported three mortality events in Kansas involving several species, including wild turkeys (*Meleagris gallopavo*), a raccoon (*Procyon lotor*), and an American badger (*Taxidea taxus*). In all three cases, chlorophacinone was detected in the liver of the non-target species and there were known chlorophacinone applications in the area. The badger was found within an area in western Kansas where Rozol had been used and had a chlorophacinone concentration of 4.4 µg/g ww in its liver (Ruder *et al*., 2011). The authors concluded that their opportunistic findings of non-target species mortalities likely underestimate actual non-target species losses. This conclusion seems justified as a four-year survey of anticoagulant poisonings of wildlife in France based on a wildlife disease surveillance network yielded 59 confirmed diagnoses for bromadiolone and 41 for chlorophacinone, indicating that chlorophacinone is frequently detected in non-target species (Berny *et al.* 1997).

In addition to the opportunistic wildlife mortality incidents noted above, there are likely many more individuals and non-target species poisoned from chlorophacinone that have not been found. As mentioned previously, carcass-detection studies have found that even when searches are performed in areas known to contain carcasses, a significant percentage will never be found due to scavenging, or size or coloration that renders the carcass inconspicuous, or filed conditions such as remote, inaccessible areas, impede searches (Vyas 1999). In the case of anticoagulants, the delayed toxicity can temporally or geographically distance the carcass from the application area (Colvin *et al*. 1988). In addition, exposure to chlorophacinone may result in sub-lethal effects that occur at concentrations below a diagnostic threshold for lethality, masking their role in mortality incidents where acute lethal hemorrhage is not the proximal cause of death and may be attributed to causes such as trauma or disease (Stone *et al*. 1999).

Opportunistic recoveries indicate that raptors may be at high risk to secondary toxicity from chlorophacinone use to poison black-tailed prairie dogs. As described in the "Rozol Exposure Assessment" above Service Law Enforcement recovered two bald eagles in Nebraska and a great horned owl and ferruginous hawk in Kansas, which died following chlorophacinone exposure (Service 2007a, 2009c, and 2011b). More dead raptors were found in that same area of Kansas after Rozol was used to control prairie dogs in 2009 including two more ferruginous hawks and a bald eagle that were found shot and thus not tested for chlorophacinone (Service 2009c). Also in that same area of Kansas, Audubon of Kansas reported that in addition to the raptors provided to Service law enforcement in 2009 they had found an additional 17 dead hawks, mostly ferruginous hawks that were not picked up in the field.

Migratory raptors are especially susceptible to secondary poisoning from anticoagulant use due to their propensity to feed in prairie dog colonies (Golden and Gober 2011). Raptors are believed to be especially susceptible to secondary poisoning from Rozol given the likelihood that they can spot dead or dying black-tailed prairie dogs that are more difficult to see from a ground level perspective (Vyas 2010b) and raptors have been observed to be attracted to Rozol poisoned black-tailed prairie dog colonies (Vyas 2010a). The golden eagle, ferruginous hawk, and burrowing owl are among nine species with documented dependence on prairie dog colonies (Kotliar *et al*. 1999, Seery and Matiatos 2000). All three of these raptor species have been identified as "Species of Conservation Concern", defined as species that are likely to become candidates for listing under the ESA without additional conservation action (Service 2008a). Further, bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. In particular, ferruginous hawks and golden eagle populations appear to be experiencing declines throughout most of their range and the availability of poisoned prey, which occurs when anticoagulants are used for prairie dog control, are expected to exacerbate population declines. Golden eagle populations may not be able to withstand additional loss of individuals (Service 2009d, Golden and Gober 2010). Bald eagles have a kleptoparasitic association with ferruginous hawks (whereby eagles pursue ferruginous hawks and steal their prey), which are an efficient predator of prairie dogs (Jorde and Lingle 1988). Thus both species may be particularly vulnerable to anticoagulants use to kill black-tailed prairie dogs (Golden and Gober 2010). This suspected vulnerability is further supported by the opportunistic recovery of two bald eagles killed from chlorophacinone exposure previously described and the abundance of dead ferruginous hawks reported by Audubon of Kansas from an area where Rozol was being used to poison prairie dogs. Migratory bird deaths attributed to chlorophacinone poisoning are not permitted or authorized under the Migratory Bird Treaty Act. The Service is gaining a better understanding of the Rozol label requirements regarding multiple return visits to retrieve dead and dying prairie dogs and exposed bait. Based on the information provided by the EPA and for reasons explained above, we believe the label requirements do not prevent exposure to migratory birds or are practical or implementable. While the Migratory Bird Treaty Act has no provision for allowing unauthorized take, there is an expectation that reasonable and effective measures to prevent poisoning of migratory birds will be implemented. Our Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with agencies, individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Companies and agencies are encouraged to work closely with us to identify available protective measures when seeking authorization for actions that are expected to take migratory birds. Rozol use on black-tailed prairie dogs is expected to result in take of migratory birds including federally listed species such as northern aplomado falcon.

As noted earlier, Rozol use on black-tailed prairie dogs was determined to have killed a bald eagle in 2006 when that species was protected under ESA, which prohibits unauthorized taking of federally listed endangered or threatened species. In accordance with the bald eagle post-delisting monitoring plan (Service 2010b), the bald eagle monitoring team continues to track new and potentially significant sources of bald eagle mortality. Since Rozol was authorized for black-tailed prairie dog control in 2006, there have been two bald eagle deaths attributed to chlorophacinone poisoning in Nebraska. We consider Rozol use on black-tailed prairie dogs as a new and potentially significant source of mortality to bald eagles from secondary poisoning that can occur when a bald eagle eats dead or dying prairie dogs that have been poisoned with Rozol.

SUMMARY OF ROZOL EXPSOURE AND EFFECTS RELEVANT TO ALL LISTED SPEICES ADDRESSED IN THIS BO

- Toxic effects from chlorophacinone exposure include fatigue and increased permeability of capillaries resulting in systemic internal hemorrhaging prior to death. There is no evidence of taste aversion to Rozol, thus non-target species may continue consumption until they receive a lethal dose or they may suffer from sub-lethal effects. Sub-lethal effects could result in death when combined with other stressors (e.g. temperature, predation, trauma, food scarcity, migration), or growth and reproductive impairments could be detrimental to species recovery.

- Chlorophacinone is most toxic when animals are exposed to multiple doses for multiple days. Thus, current required acute standardized toxicity tests for chlorophacinone greatly underestimate risk to non-targets animals.

- According to the EPA, mobility from Rozol bait into soil or water is considered a negligible exposure pathway to non-target organisms and that chlorophacinone is expected to remain undegraded in bait. Actual consumption of bait and consumption of poisoned animals is the primary environmental dissipation pathway for Rozol. We agree with the EPA on those points.

- Based on the label application rate, excessive lethal doses per black-tailed prairie dog are likely applied and result in increased risk to non-target species. In addition to having excess bait available for direct consumption by non-target species, over-application and Rozol's prolonged toxic mode of action result in a high risk of secondary exposure to non-target species, especially those species attracted to poisoned black-tailed prairie dog colonies. A six month application season for Rozol can result in a long duration and increased opportunity for repeated exposure to chlorophacinone and/or diphacinone rodenticides as the species migrates or moves within their territory.

- Despite current label restrictions and requirements, previous studies and observations indicate that Rozol is available to non-target species by both primary and secondary exposure routes, and may even result in tertiary poisoning. Label requirements aimed at reducing non-target species exposure based on return site visits for weeks after the application to pick up dead and dying prairie dogs and bait are impractical, and not effective at protecting non-target species that may dig up carcasses or feed on poisoned prey during periods between required carcass searches.

- Risk quotients derived in the EPA's BA underestimate non-target species risk to Rozol because they are: a) based on study protocols that consider limited (one to five day) exposures in the lab; b) do not account for information indicating that raptors may be 20 - 30 times more sensitive than standard avian test species; c) do not attempt to quantify known sub-lethal effects; and d) do not consider higher concentrations of chlorophacinone in the liver, especially for species that may selectively consume internal organs instead of whole-body tissues.

- Although wildlife mortality incidents are underreported and surveillance efforts are lacking, opportunistic recoveries of non-target species exposed to chlorophacinone include: bald eagles, hawks, owls, turkeys, meadow lark, pigeons, coyotes, kit foxes, raccoon, badger, squirrels, and a bobcat.

- Opportunistic recoveries have shown that Rozol use on black-tailed prairie dogs has killed non-target species protected under the ESA, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Many of these species (e.g., bald eagles, golden eagles, ferruginous hawks, American kestrels, owls) appear to especially susceptible to Rozol toxicity and are expected to continue to die from Rozol exposure given current label use restrictions.

GENERAL CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We believe the following conservation recommendations are within the EPA's authorities and can benefit the listed species in this consultation. These recommendations are based on the information described in the previous section and are intended to reduce Rozol exposure and effects to listed species and non-target species.

1. If EPA chooses to continue registration of Rozol and other anticoagulants for use on prairie dogs, it should first develop alternative testing protocols to evaluate their toxicity to non-target species. The currently required standardized toxicity test results for chlorophacinone greatly underestimates risk to non-target species because indandiones are much more lethal when multiple doses are consumed over multiple days as opposed to a one time feeding. We recommend future assessments for first generation indandione rodenticides are modified to include multiple day exposures that measure individual daily dosage and responses to compliment the current required avian oral test and dietary lethality tests. Additionally, protocols should be designed to evaluate sub-lethal effects by including observational periods, sensitive blood clotting assays (Rattner et al., 2010b), gross pathology and microscopic examination of tissues (histopathology).

2. If EPA chooses to continue registration of Rozol or other anticoagulants for use on prairie dogs, it should first study how to prevent secondary poisoning of predators and scavengers that may feed upon dead and dying prairie dogs. The current label language does not accomplish the intended result.

3. If EPA chooses to continue registration of Rozol or other anticoagulants for use on prairie dogs, it should first study detrimental effects to raptors and other wildlife that consume dead and dying prairie dogs. Thus, in addition to the avian reproduction study that EPA has required Liphatech to complete, we recommended that EPA exercise their authority under FIFRA to require additional field assessments that include tracking avian predators and scavengers that are expected to be most susceptible (e.g., ferruginous hawks, eagles) to Rozol poisoning from applications at prairie dog towns. Such information would benefit our evaluation of the endangered northern aplomado falcon and other raptors if they were to become federally listed under ESA.

4. If EPA chooses to continue registration of Rozol or other anticoagulants for use on prairie dogs, it should not rely on quail and mallards as the test species for development of anticoagulant risk assessments. These species do not reflect the risks to raptors which can be 20 to 30 times more sensitive than these species. We recommend that risk assessments for anticoagulants include measures to assess harmful effects to the likely affected bird guild. Raptors and scavengers are those likely end-point species and the Rozol risk assessment should reflect that.

5. If EPA chooses to continue registration of Rozol or other anticoagulants, the EPA should conduct tests to determine the minimum amount of product that should be applied to accomplish the intended task.

6. Given our concerns with secondary toxicity, we encourage the EPA to include language on the Rozol label county bulletin that recommends an Integrated Pest Management (IPM) approach for use of Rozol to prevent unnecessary applications when good alternatives to pesticides exist. Guidance on how to perform IPM should also be provided on the county bulletin.

7. We recommend that EPA require applicator monitoring and reporting as part of the Rozol label. This requirement should be aimed at obtaining standardized data that identifies the number of poisoned black-tailed prairie dogs above ground and the number of individual and non-target species injured from Rozol. Such information would benefit the development of successful strategies to reduce non-target species exposure.

SPECIES ANALYSES

OVERVIEW

On September 9, 2011 we agreed with the EPA's analysis that Rozol use on black-tailed prairie dog towns is likely to adversely affect 18 listed species and critical habitat for six species (Service 2011c). As explained in the "Description of the Action" section above, additional coordination during the formal consultation process resulted in the EPA's adoption of conservation measures to avoid or reduce adverse effects to listed species and their critical habitats. The adopted conservation measures in the EPA's December 13, 2011, letter have been agreed to by Liphatech, and will be incorporated into County Bulletins as part of the Rozol label before October 1, 2012 (EPA 2011c). The analysis herein for the black-footed ferret, Chiricahua leopard frog, grizzly bear, jaguar, Mexican spotted owl, New Mexican ridge-nosed rattlesnake, and Preble's meadow jumping mouse is based on this new information.

Among those species/habitats for which conservation measures were not developed, the Service conducted additional review after submitting our September 9, 2011, letter to the EPA and found that adverse effects are not likely for the American burying beetle, black-capped vireo, Canada lynx, Eskimo curlew, golden-cheeked warbler, gulf-coast jaguarondi, ocelot, piping plover, and whooping crane (Table 1). This was typically due to lack of overlap in range of the species or critical habitat with the range of the black-tailed prairie dog or lack of common use by the species of habitats occupied by the black-tailed prairie dog. For those species, the risk of Rozol exposure and effects is considered highly unlikely, thus adverse effects are not expected to occur.

A full analysis is provided herein for the black-footed ferret, gray wolf, and northern aplomado falcon, because the conservation measures were unable to entirely preclude adverse effects to these species, although the conservation measures did reduce impacts and in the case of the black-footed ferret, did so significantly. The analyses for black-footed ferret, gray wolf, and northern aplomado falcon includes species and habitat information, environmental baseline, effects of the action, cumulative effects, conclusions regarding jeopardy or destruction/adverse modification, and associated incidental take statements with reasonable and prudent measures and implementing terms and conditions.

Thus, the species/habitats analyzed for this formal consultation are categorized as falling into one of three groups: 1) species for which the EPA adopted conservation measures after initiating formal consultation, removing or reducing the risk of adverse effects; 2) species for which further review by the Service, after consultation was initiated, revealed that adverse effects are not anticipated; and 3) species for which adverse effects are anticipated as a result of the proposed action, with or without conservation measures. The species and critical habitats that fall into each of these categories are listed below (Table 1).

Table 1. Summary of species determinations and page number for each species' analysis within this biological opinion.

Species and/or Critical Habitat	Species for Which Conservation Measures Preclude Adverse Effects	Species for which No Adverse Effects are anticipated, without Conservation Measures.	Species for which Adverse Effects are anticipated, with or without Conservation Measures	Page
American Burying Beetle (*Nicrophorus americanus*)		■		44
Black-capped Vireo (*Vireo atricapilla*)		■		45
Black-footed Ferret (*Mustela nigripes*)			■	59
Canada Lynx (*Lynx Canadensis*)		■		47
Chiricahua Leopard Frog (*Lithobates [Rana] chiricahuensis*)	■			34
Eskimo Curlew (*Numenius borealis*)		■		48
Golden-cheeked Warbler (*Dendroica chrysoparia*)		■		49
Gray Wolf (*Canis lupus*)			■	73
Grizzly Bear (*Ursus arctos horribilis*)	■			35
Gulf Coast Jaguarundi (*Herpailurus (=Felis) yagouaroundi cacomitli*)		■		51
Jaguar (*Panthera onca*)	■			37
Mexican Spotted Owl (*Strix occidentalis lucida*)	■			38
New Mexican Ridge-nosed Rattlensake (*Crotalus willardi obscurus*)	■			38
Northern Aplomado Falcon (*Falco femoralis septentrionalis*)			■	87

Ocelot (*Lepardus pardalis*)		■		51
Piping Plover (*Charadrius melodus*)		■		51
Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)	■			39
Whooping Crane (*Grus americana*)		■		54

The details regarding the anticipated effects of the proposed action on each of the species in this consultation are provided in the analyses below.

SPECIES FOR WHICH CONSERVATION MEASURES PRECLUDE ADVERSE EFFECTS

The following species analyses are based on the EPA's adoption of conservation measures that are anticipated to result in the avoidance of adverse effects to federally listed species/critical habitats, primarily by implementing exclusion zones and/or timing restrictions for the application of Rozol. As a result of the conservation measures incorporated into the proposed action by EPA and the applicant, we conclude that adverse effects are not likely for: 1) the Chiricahua leopard frog, 2) grizzly bear, 3) jaguar, 4) New Mexico ridge-nosed rattlesnake, 5) Mexican spotted owl, and 6) Preble's meadow jumping mouse. Conservation measures were also developed for the black-footed ferret and the gray wolf (Mexican subspecies); see "Species for which Adverse Effects are Anticipated" section of this BO for those species analyses.

1. CHIRICAHUA LEOPARD FROG

The area of concern for the Chiricahua leopard frog relative to this consultation includes New Mexico, the only state where the range of this species overlaps the use of Rozol as black-tailed prairie dog bait. In New Mexico, the species occurs in Catron, Hidalgo, Grant, Sierra, and Socorro Counties, in about 16 to 19 percent of its historical localities (Service 2007b). Fifteen units of critical habitat have been proposed in New Mexico for the Chiricahua leopard frog (Service 2011m). Proposed critical habitat and the black-tailed prairie dog range appear to overlap in New Mexico, at least at a landscape-scale level.

The EPA determined the proposed action may directly affect the Chiricahua leopard frog because the range of the species overlaps with black-tailed prairie dog habitat. Although Catron, Hidalgo, Grant, Sierra, and Socorro Counties do not have large colonies of black-tailed prairie dogs (1,541 acres or 2 percent of statewide acres), small scattered colonies may occur adjacent to Chiricahua leopard frog habitat, thus creating the possibility that Rozol could be used within or near Chiricahua leopard frog habitats (Johnson *et al.* 2003). The BA determined that Chiricahua leopard frog could be affected by Rozol applications through consumption of poisoned invertebrates that have ingested Rozol, or loss of invertebrate prey base. Most likely, we believe such effects would be limited to individual Chiricahua leopard frogs and would not result in large scale die-offs or population losses. In addition, leopard frogs only eat live prey and would not consume a dead organism; they do not scavenge. A large portion of Chiricahua leopard frog range in New Mexico is located on U.S. Forest Service lands, and agency approval would be required before Rozol could be deployed.

The EPA has agreed to adopt conservation measures to minimize potential exposure of Chiricahua leopard frogs to Rozol by precluding its application in Catron, Hidalgo, Grant, Sierra, and Socorro Counties. Because proposed critical habitat captures a large portion of the range of Chiricahua leopard frog in New Mexico, the proposed conservation measure of excluding Catron, Hidalgo, Grant, Sierra, and Socorro Counties would greatly reduce the potential for exposure to Rozol and significantly reduce potential for adverse effects to the Chiricahua leopard frog and its proposed critical habitat. Additionally, Rozol would not be applied within proposed critical habitat, thus no Rozol impacts to critical habitat are anticipated.

Accordingly, implementation of the proposed action, and its associated conservation measures, is not anticipated to result in adverse effects to the Chiricahua leopard frog, nor adverse modifications of its proposed critical habitat.

2. GRIZZLY BEAR

In the BA, the EPA describes direct effects to grizzly bears that are expected to occur based on potential for the species to consume chlorophacinone bait (primary exposure) or other prey items that may have consumed chlorophacinone bait (secondary exposure). The EPA assumed chlorophacinone exposure to grizzly bears would occur because the grizzly bear range overlaps black-tailed prairie dog habitat and the Rozol application season overlaps periods during which grizzly bears are active and not hibernating. The EPA defines the Rozol application period on the label as occurring between October 1 and March 15. The BA further describes that "growth and reproductive effects cannot be precluded due to the absence of chronic data; however, growth and reproductive effects are not expected because mortality typically occurs as a result of acute exposure." The EPA assumes acute exposure apparently based on the assumption that "a grizzly bear is most likely to encounter a Rozol application area shortly before or after hibernation at which time the bear is engorging itself." The EPA calculated Risk Quotients that greatly exceeded a 0.1 Level of Concern for grizzly bears (Table 5.3, page 83), especially for primary consumption (Risk Quotient = 75.42). The BA also describes the potential indirect effects due to the loss of prey base. Therefore, the EPA concluded in their BA that use of Rozol is likely to adversely affect grizzly bears.

Since the preparation of the BA, the EPA has agreed to impose a timing restriction so use of Rozol would only be used during the grizzly bear denning period (use would only occur between December 1 and March 1) within those counties in Montana where grizzly bears may occur and may overlap with black-tailed prairie dogs (see list below). This measure would greatly reduce the potential for overlap of grizzly bears and Rozol treated black-tailed prairie dog colonies during the period where grizzly bears could be exposed to Rozol through primary or secondary exposure (the non-denning period). Further, there are very few black-tailed prairie dog colonies that exist in the mountain/prairie transition zone where the occasional grizzly bear may encounter black-tailed prairie dog colonies. Based on a map produced by the Montana Natural Heritage Tracker website, less than 10 known or documented black-tailed prairie dog colonies occur where grizzly bears currently may occur (Montana Natural Heritage Program 2011).

Counties in Montana with Rozol treatment timing restrictions:

- Carbon
- Stillwater, South of I-90
- Sweetgrass, South of I-90
- Park, South of I-90
- Gallatin, South of I-90
- Madison
- Powell
- Lewis and Clark
- Cascade
- Teton
- Pondera
- Glacier
- Toole

With the timing restriction, the likelihood of grizzly bear exposure to chlorophacinone from Rozol use to control black-tailed prairie dogs is low enough to be considered discountable. With few black-tailed prairie dog colonies in areas where grizzly bears are likely to occur, the likelihood of grizzly bears using black-tailed prairie dog habitats as part of their home range is low. The restricted use season for Rozol (December 1 – March 1) would further reduce the likelihood that a grizzly bear will encounter poisoned prairie dogs or unconsumed bait. By December 1, no grizzly bears are expected to be in black-tailed prairie dog habitat as they will have moved to higher elevation mountain slopes to den. On average, grizzly bears emerge from dens in the beginning of April. However, grizzly bears would not be expected to use grassland/prairie habitat, including black-tailed prairie dog colonies, until two to four weeks after emerging from their dens if they use those areas at all. Therefore, grizzly bears would not be expected to overlap with black-tailed prairie dog colonies for approximately six to eight weeks after March 1 (around 50 days or more post any final application).

With the timing restriction conservation measure, we conclude that detrimental effects to grizzly bears from primary exposure to Rozol are highly unlikely to occur. Prevalence of chlorophacinone bait visible in or around burrows declined by approximately 87 percent by day seven (Lee and Hygnstrom 2007). Thus after approximately 50 days post application, when grizzly bears may first encounter a Rozol-poisoned black-tailed prairie dog town, essentially all of the bait is likely to have been consumed by black-tailed prairie dogs or non-target species. The EPA calculated that a grizzly bear needs only to consume four grams of bait per day for five days to exceed a 0.1 Level of Concern (page 99 of the BA), indicating that grizzly bears may not need to eat much Rozol bait to be susceptible to adverse effects. However, after 50 days following application, it is likely that an insufficient amount of bait would remain for grizzly bears to consume. Therefore, based on the timing restriction and the minimal overlap of grizzly bear habitat and black-tailed prairie dog colonies, we conclude that the likelihood of a grizzly bear encountering and consuming a sufficient quantity of Rozol bait to result in harmful effects is so low that it is discountable.

The likelihood of detrimental effects to grizzly bears from secondary exposure to Rozol is also so low that it is discountable. The die-off of black-tailed prairie dogs and non-target animals following a Rozol application would likely reach its conclusion before a grizzly bear would encounter a poisoned colony. Fifty or more days following application, few, if any, Rozol-poisoned carcasses or prey debilitated by exposure to Rozol would be available for consumption by grizzly bears. While moribund black-tailed prairie dogs were detected by 29 days after Rozol application (Vyas 2010a), the prairie dog availability is not expected to be high 50 days following application because most prairie dogs are expected to die within days to weeks of application, and predators and scavengers would likely remove most prairie dogs by the time grizzly bears may encounter Rozol-poisoned colonies. Therefore, by the time grizzly bears may use habitat within a these areas the Services believes there will be insufficient quantities of available prey items or bait to cause adverse effects.

It is also the Service's belief that indirect effects to grizzly bears due to the loss of prey base from use of Rozol are "insignificant" as defined under the ESA. Few black-tailed prairie dog colonies occur in areas where grizzly bears also occur, and prairie dogs are not known to be a significant dietary item for grizzly bears.

In summary, few black-tailed prairie dog colonies occur in areas accessed by grizzly bears, and with the restricted timing of Rozol use in grizzly bear areas (between December 1 and March 1), the Service does not anticipate adverse effects to grizzly bears as a result of Rozol use on black-tailed prairie dogs in those areas.

3. JAGUAR

The EPA determined the registration and use of Rozol may affect, and is likely to adversely affect the jaguar based on potential direct effects from prey that may consume chlorophacinone bait including black-tailed prairie dogs and non-target animals. In addition, the EPA's BA indicates that there could be indirect effects from prey-base loss.

The jaguar is reported from Mexico, Arizona, and New Mexico. It is rarely (one report in last 20 years) found within the action area in the Peloncillo Mountains of Hidalgo County, New Mexico near the Arizona border. Jaguars are generalist predators typically foraging on diurnal mammals (Seymour 1989). The jaguar is a wide-ranging species that might occasionally encounter prairie dogs; however, there are few black-tailed prairie dogs in Hidalgo County (Johnson *et al*. 2003). The proposed conservation measure of Rozol application exclusion in Hidalgo County substantially reduces the risk of Rozol exposure to the jaguar. Based on the low black-tailed prairie dog abundance, unlikely interaction of the jaguar and black-tailed prairie dog, and Rozol application exclusion in the area occupied by the jaguar, Service does not anticipate adverse effects to the jaguar.

4. NEW MEXICO RIDGE-NOSED RATTLESNAKE

The BA indicates that New Mexico ridge-nosed rattlesnakes are unlikely to be killed by bait ingestion because the Risk Quotient is less than the Level of Concern, but direct effects based on reproduction cannot be precluded. Additionally, indirect effects from prey-base loss are expected because effects to potential prey species have been demonstrated. No indirect effects from habitat loss are expected because this species does not use black-tailed prairie dog burrows. In addition, the BA indicates that adverse effects to designated critical habitat are expected because of overlap with black-tailed prairie dog habitat.

The New Mexico ridge-nosed rattlesnake is reported from Mexico, Arizona, and New Mexico. Within the action area, the New Mexico ridge-nosed rattlesnake is only found in Hidalgo County, New Mexico. New Mexico ridge-nosed rattlesnakes are found in steep, rocky canyons with intermittent streams and on talus slopes in the Animas Mountains. Black-tailed prairie dog habitat does not overlap with the New Mexico ridge-nosed rattlesnake, though occasional prairie dogs might be found in adjacent habitats where the action might indirectly affect the species. The EPA adopted the conservation measure of excluding Hidalgo County from the area where Rozol may be applied, substantially reducing the potential impacts of the action to the New Mexico ridge-nosed rattlesnake. Because of the low black-tailed prairie dog abundance in Hidalgo County (Johnson *et al.* 2003), the low probability of interaction between the New Mexico ridge-nosed rattlesnake and black-tailed prairie dog based on differing habitat use of each species, and Rozol use prohibition in the area occupied by the snake, effects from the action are unlikely to occur. The Service does not anticipate adverse effects to the New Mexico ridge-nosed rattlesnake.

Designated critical habitat for the New Mexico ridge-nosed rattlesnake occurs only in Hidalgo County within the action area. There are no known black-tailed prairie dogs in designated critical habitat. The conservation measure of excluding Rozol application in Hidalgo County precludes effects of the action on designated critical habitat. Thus, adverse effects to New Mexico ridge-nosed rattlesnake designated critical habitat are not anticipated.

5. MEXICAN SPOTTED OWL

The EPA determined that the proposed action may directly affect the Mexican spotted owl because the range of the species overlaps with black-tailed prairie dog habitat at a large landscape scale. The EPA determined that the Mexican spotted owl could be affected by application of Rozol through consumption of poisoned prey or loss of prey base and adverse effects to Mexican spotted owl critical habitat may occur.

Within the action area for this project, the Mexican spotted owl occurs within Colorado, New Mexico, and western Texas. In Texas the Mexican spotted owl is only known from the Guadalupe Mountains National Park (Service 1995). The action area was analyzed for possible effects to Mexican spotted owl that includes the black-tailed prairie dog range within the three states listed. Effects may extend beyond the use area due to exposure to individuals or via prey items with chlorophacinone residues if found outside of their described range. The final Mexican spotted owl critical habitat rule (Service 2004) designated approximately 3.5 million ha (8.6 million acres) of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on federal lands (Service 2004). Within this larger area, critical habitat is limited to areas that contain the primary constituent elements (Service 2004). The primary constituent elements include forest structure for nesting and prey maintenance, but not the prey base itself (Service 2004). In summary:

- Known habitat use by the Mexican spotted owl does not correspond with black-tailed prairie dog habitat, thus the owl is considered extremely unlikely to occur within black-tailed prairie dog habitats where Rozol will be applied. The potential for Mexican spotted owls to experience secondary exposure to chlorophacinone is considered so unlikely as to be discountable.

- The proposed action will not result in any effects to the primary constituent elements of designated critical habitat for the Mexican spotted owl.

- The proposed Rozol application exclusion in Catron, Grant, Sierra, and Socorro Counties protect important Mexican spotted owl ecological management units and designated critical habitat.

Based on the above, the Service anticipates that adverse effects to Mexican spotted owls or their critical habitat are highly unlikely to occur:

6. PREBLE'S MEADOW JUMPING MOUSE

In the BA (p. 104), the EPA concludes that the use of Rozol to control the black-tailed prairie dog is likely to adversely affect the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) for the following reasons:

> *The range of this species overlaps with BTPD habitat. Rozol Prairie Dog bait application season for the control for BTPDs overlaps periods during which the Preble's meadow jumping mouse is active and not hibernating. However, Preble's meadow jumping mice will be hibernating during most of this time. Chlorophacinone can be applied between October 1 and March 15 or spring green-up, whichever occurs later. Preble's meadow jumping mice typically enter hibernation between late August and October and come out of hibernation in May. Based on the life history information it seems reasonable that the Preble's meadow jumping mouse could be exposed to the chlorophacinone bait. A Preble's meadow jumping mouse would have to eat less than one grain of Rozol Prairie Dog bait per day for five days to reach the LOC. It is possible that a Preble's meadow jumping mouse could consume this amount of bait. The Preble's meadow jumping mouse is most likely to encounter a Rozol application area shortly before or after hibernation at which time the mouse is engorging itself. This only increases the likelihood that the bait would be consumed.*

The Preble's meadow jumping mouse is found in Wyoming and Colorado, in both the North Platte River and South Platte River basins, from the eastern flank of the Laramie Mountains and the Laramie Plains in southeastern Wyoming south along the eastern flank of the Front Range in Colorado and into the headwaters of the Arkansas River basin near Colorado Springs, Colorado. The EPA BA (Appendix A, p. 20) erroneously shows the Preble's meadow jumping mouse's range to be throughout all of Wyoming.

The action area defined by the EPA in the BA broadly overlaps the range of the Preble's meadow jumping mouse. However, the known distribution of the Preble's meadow jumping mouse and the known distribution of the black-tailed prairie dog within Wyoming and Colorado overlap significantly less than depicted in the BA. This inaccuracy results from the inclusion of areas in the mapped Preble's meadow jumping mouse range where potential habitat may exist, but where the Preble's meadow jumping mouse is not known to occur, and from the EPA's defined action area in Wyoming and Colorado extending well beyond the actual range of the black-tailed prairie dog.

In Wyoming, the Preble's meadow jumping mouse is known to occur only in Albany, southern Converse, Laramie, and Platte counties. The Preble's meadow jumping mouse is not thought to occur in Wyoming's Goshen and Niobrara counties to the east, or eastern Laramie County (Keinath 2001). Occurrence of the Preble's meadow jumping mouse and black-tailed prairie dog in Wyoming overlaps primarily in portions of southern Converse County and western Platte County (Wyoming Natural Diversity Database (WYNDD) 2011). Known distribution of the Preble's meadow jumping mouse in Colorado includes Boulder, Douglas, El Paso, Elbert, Jefferson, Larimer, Teller, and Weld counties. The easternmost captures extend to western Weld County, western Elbert County, and north-central El Paso County. No recent captures of the Preble's meadow jumping mouse have been documented within its potential range in Adams, Arapahoe, Broomfield, Denver, or Morgan counties, and it is likely that the Preble's meadow jumping mouse does not occur in these areas. Occurrence of the Preble's meadow jumping mouse and black-tailed prairie dog in Colorado overlaps primarily in west-central Weld County, eastern Boulder County, parts of Jefferson County, western Elbert County, eastern Douglas County, and northern El Paso County (Colorado Division of Parks and Wildlife (CPW) 2011).

An estimated < 30 percent of the Preble's meadow jumping mouse distribution falls within the range of the black-tailed prairie dog. Within the black-tailed prairie dog range, the species' colonies occupy only a small percentage of the area, just over 1 percent in Wyoming (Grenier *et al*. 2007, WYNDD 2011) and about 3 percent in Colorado (Odell *et al.* 2008, CPW 2011). While these same percentages may not apply directly to areas of Preble's meadow jumping mouse occurrence, it is reasonable to believe that presence of the mouse in close proximity to black-tailed prairie dog colonies is infrequent throughout occupied Preble's meadow jumping mouse range.

In the BA (p. 32), the EPA states:

> *For the animal species ingestion is the only significant route of exposure and the only exposure route assessed in this document and for that, the species' diet must be that of a granivore or it must be attracted to grain baits to have primary exposure to chlorophacinone; it must be a carnivore or scavenger to have secondary exposure to chlorophacinone. It was also determined that insects may be exposed to the grain bait and may retain residues that are high enough to cause direct mortality to invertivores.*

Meadow jumping mice are omnivores and consume such foods as seeds, fruits, fungi, and insects. Studies specific to the Preble's meadow jumping mouse diet are limited, but fecal analyses suggest that Preble's meadow jumping mouse diet shifts seasonally; it consists primarily of insects and fungus after emerging from hibernation, shifts to fungus, moss, and pollen during mid-summer (July-August), with insects again added in September (Shenk and Sivert 1999). The Preble's meadow jumping mouse would probably consume both treated grain bait and exposed insects if they were encountered.

Where both Preble's meadow jumping mouse and the black-tailed prairie dog occur, habitat isolation between the Preble's meadow jumping mouse and black-tailed prairie dog reduces the chance that the Preble's meadow jumping mouse would encounter treated grain or exposed insects. Typical habitat for the Preble's meadow jumping mouse is comprised of well-developed plains riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source. Well-developed plains riparian vegetation typically includes a dense combination of grasses, forbs, and shrubs; a taller shrub and tree canopy may be present (Bakeman 1997). Areas of highest use by the Preble's meadow jumping mouse tend to be along creeks, and in areas with a high percent cover of shrubs (especially wetland shrubs) and grasses (Trainor *et al*. 2007). In contrast, black-tailed prairie dog colonies are typically in uplands, where their activities greatly reduce vegetative cover in the vicinity of their burrows. The Preble's meadow jumping mouse infrequently enters areas of low, sparse vegetation characteristic of prairie dog colonies. Individual prairie dog burrows in proximity to dense riparian vegetation are most likely to be encountered by the Preble's meadow jumping mouse.

The Preble's meadow jumping mouse is a true hibernator, usually entering underground hibernacula (hibernation nests) in September or October and emerging the following May, after a potential hibernation period of seven or eight months. The only direct overlap between the Preble's meadow jumping mouse active season and the Rozol treatment period, as reflected in label instructions (October 1 through March 15) is October, when some Preble's meadow jumping mouse remain actively foraging above ground. During the consultation process, Liphatech and the EPA agreed to timing restrictions on Rozol applications, limiting its use within the known range of Preble's meadow jumping mouse occurrence in Wyoming and Colorado to the period November 1 through March 15. Timing restrictions will be included in County Bulletins for those counties included.

By November 1, all Preble's meadow jumping mouse individuals have likely entered hibernation and the conservation measure agreed to above would eliminate the likelihood of the species encountering Rozol-treated bait in the fall. Emergence of the mouse from hibernation in spring has not been documented prior to the first week in May. Assuming that the earliest date could be May 1, emergence would follow the last Rozol application by a minimum of 46 days. The majority of individuals are likely to emerge later in May, providing even more temporal separation between the final Rozol application and the Preble's meadow jumping mouse active season. Further, data on the diet of the Preble's meadow jumping mouse indicates that insects and fungus may be preferred rather than seeds when emerging from hibernation (Shenk and Sivert 1999).

In accordance with label instructions, Rozol-treated bait is placed at least 6 inches down black-tailed prairie dog burrows. Our knowledge of the Preble's meadow jumping mouse does not suggest that, while foraging, they would venture into prairie dog burrows where Rozol-treated bait is placed. Spillage, improper baiting, or black-tailed prairie dog digging activity could result in some bait exposed on the ground surface. By the time Preble's meadow jumping mouse emerge from hibernation, bait consumption by various granivores, including insects, would reduce remaining bait availability.

The scenario of the Preble's meadow jumping mouse emerging from hibernation in locations adjacent to black-tailed prairie dog colonies, foraging in those colonies, and encountering and consuming Rozol-treated bait or exposed insects is considered highly unlikely to occur and therefore discountable.

Potential reduction of invertebrates in Rozol-treated areas and its possible effect on Preble's meadow jumping mouse food resources was noted in the EPA's Effects Determination within the BA as a possible secondary impact to the mouse. As stated above, the species feeds on a variety of items including insects. However, it is unlikely to regularly forage in black-tailed prairie dog colonies and invertebrate prey from such habitat is not known to be a significant food source for the Preble's meadow jumping mouse. The potential for the mouse to be adversely impacted by reduction of the invertebrate populations within prairie dog colonies appears insignificant.

In summary, occurrence of the Preble's meadow jumping mouse in the proximity of black-tailed prairie dog colonies is likely infrequent within Preble's meadow jumping mouse range. Where it occurs, the Preble's meadow jumping mouse would rarely venture into black-tailed prairie dog colonies, creating a degree of habitat isolation between the two species. The Preble's meadow jumping mouse hibernates November through April, throughout the period of Rozol application as modified by the agreed upon conservation measures (November through March 15), creating a temporal isolation between availability of Rozol-treated bait or effected insects and the Preble's meadow jumping mouse active season. Therefore, the Service does not anticipate adverse effects as a result of the proposed action.

Regarding potential impact to Preble's meadow jumping mouse critical habitat, in the BA (p. 22) the EPA states:

> *Habitat modification for the Preble's meadow jumping mouse is expected because the critical habitat for the Preble's meadow jumping mouse overlaps with the use area (BTPD habitat).*

An estimated 10,200 acres of Preble's meadow jumping mouse critical habitat in Colorado overlaps with the black-tailed prairie dog range, which is approximately 35 percent of all Preble's meadow jumping mouse designated critical habitat. For the Preble's meadow jumping mouse, primary constituent elements (PCEs) of critical habitat are:

- Riparian corridors: formed and maintained by normal, dynamic, geomorphological, and hydrological processes that create and maintain river and stream channels, floodplains, and floodplain benches and that promote patterns of vegetation favorable to the Preble's meadow jumping mouse; containing dense, riparian vegetation consisting of grasses, forbs, or shrubs, or any combination thereof, in areas along rivers and streams that normally provide open water through the Preble's meadow jumping mouse active season; and including specific movement corridors that provide connectivity between and within populations. This may include river and stream reaches with minimal vegetative cover or that are armored for erosion control; travel ways beneath bridges, through culverts, along canals and ditches; and other areas that have experienced substantial human alteration or disturbance.

- Additional adjacent floodplain and upland habitat with limited human disturbance (including hayed fields, grazed pasture, other agricultural lands that are not plowed or disked regularly, areas that have been restored after past aggregate extraction, areas supporting recreational trails, and urban–wildland interfaces).

While the use of Rozol to control the black-tailed prairie dog and subsequent loss of prairie dog colonies is unlikely to adversely impact the PCEs of Preble's meadow jumping mouse critical habitat above, it could have indirect effects to Preble's meadow jumping mouse habitat due to the loss of black-tailed prairie dog burrows and cessation of black-tailed prairie dog activities that would otherwise modify vegetation. In the BA (pp. 84-85), the EPA states that loss of burrows is not expected to have an adverse impact to the Preble's meadow jumping mouse.

The Service agrees. Burrows of other animals are not specified PCEs of Preble's meadow jumping mouse critical habitat. Since the Preble's meadow jumping mouse digs its own burrows and is not known to be dependent on burrows of other animals, it is unlikely that the Preble's meadow jumping mouse critical habitat would be adversely affected by the loss of prairie dog burrows following Rozol application. In the BA (p. 60), the EPA's conceptual impact model lists "altered plant community composition" as a second indirect effect on habitat resulting from black-tailed prairie dog control. Reduction or eradication of black-tailed prairie dogs would likely lead to vegetation of greater height and density at sites of their former black-tailed prairie dog colonies. Where black-tailed prairie dog colonies are abandoned within designated critical habitat or adjacent to other riparian corridors occupied by the Preble's meadow jumping mouse, the altered plant community could be of greater habitat value to the Preble's meadow jumping mouse than low, sparse vegetation typically found within an active black-tailed prairie dog colony.

The Service initially concurred with the EPA's determination that the use of Rozol to control the black-tailed prairie dog may adversely affect the Preble's meadow jumping mouse. However, with the conservation measures agreed to by the EPA and Liphatech as well as further analysis, adverse effects to the Preble's meadow jumping mouse are considered so unlikely as to be discountable. The Service does not anticipate adverse effects to the Preble's meadow jumping mouse or its critical habitat.

SPECIES FOR WHICH NO ADVERSE EFFECTS ARE ANTICIPATED WITHOUT CONSERVATION MEASURES

In the previous section, the species analyses indicated adverse effects were not anticipated with the application of the EPA's conservation measures. In this section, adverse effects are also not anticipated for nine species, but the Service's conclusion was not made as a result of conservation measures, but rather additional review of the biology of each species. The nine species are: 1) American burying beetle, 2) black-capped vireo, 3) Canada lynx, 4) Eskimo curlew, 5) golden-cheeked warbler, 6) Gulf Coast jaguarundi, 7) ocelot, 8) piping plover, and 9) whooping crane.

1. AMERICAN BURYING BEETLE

The EPA concludes in their BA that the use of chlorophacinone to control black-tailed prairie dogs is likely to adversely affect the American burying beetle based on direct reproductive effects.

> *The reproductive effects are due to lower carcass size in chlorophacinone treated carcasses and effects to larvae. An acute toxicity test for the earthworm (MRID 47383002) and an open literature study (Fisher et al. 2007) indicate that there is no risk to invertebrates at exposure levels relevant to this use. Furthermore, the second phase of the burying beetle study (MRID 47383001) that showed reproductive effects to burying beetles based on lower carcass weights showed that there were no direct acute effects to adult burying beetles fed chlorophacinone treated ground beef. In fact, those exposed to the chlorophacinone faired better than the control group.*
>
> *Chlorophacinone use is expected to affect reproduction of the American burying beetle through effects to emerged beetles. Number of emerged beetles is negatively affected by use of chlorophacinone poisoned carcasses in burying beetles (MRID 47383001). This type of effect is considered to be a direct effect.*

The portion of the action area of concern for the American burying beetle for this consultation includes Nebraska and South Dakota where the range of this species overlaps the use of Rozol as black-tailed prairie dog bait. The current range known from South Dakota includes portions of Bennett, Gregory, Tripp, and Todd counties. However, a comprehensive status survey has never been completed in South Dakota so American burying beetles may occur in other counties with suitable habitat. In Nebraska two disjunct populations of American burying beetles occur over much of the state. Habitats between the two populations are dissimilar with the northern Nebraska/South Dakota population occurring in the Sandhills while the southwest Nebraska population occurs in the Loess Hills. These two populations alone contain as much as half of the known Midwest American burying beetle population and are a strong-hold for this species. The other Midwest populations (Arkansas, Kansas, Missouri, Oklahoma) are outside of black-tailed prairie dog range.

The American burying beetle is an annual species, active in the summer months, inactive during the winter months, nocturnal, and typically only reproduce once in their lifetime. They bury themselves in the soil for the duration of the winter. The young of the year overwinter as adults and comprise the breeding population the following summer (Kozol 1990). Both adults and larvae are dependent on carrion for food and reproduction. Reproductive activity commences in late May and is completed in mid-August in Nebraska and South Dakota. Per the Rozol label, chlorophacinone used on black-tailed prairie dog colonies is limited to October 1 through March 15 and therefore should not affect the American burying beetle.

In summary, we do not anticipate adverse effects to the American burying beetle from the use of chlorophacinone to control black-tailed prairie dogs. This conclusion is based primarily on the fact that American burying beetles are not active during the period in which the label allows the use of chlorophacinone. In addition, prairie dog carrion is not a preferred food source of American burying beetles. No critical habitat for the American burying beetle has been designated, therefore none will be affected.

2. BLACK-CAPPED VIREO

The black-capped vireo is a small (12 centimeters (cm) or 4.5 inches (in)) insect-eating songbird that was once common as far north as Kansas, but is now limited largely to western and central Texas, north-central Mexico, and the Wichita Mountains of Oklahoma (Gryzbowski 1995). Black-capped vireos were federally listed as endangered in 1987. Black-capped vireos arrive in Texas from late March to mid-April (late April in dry years). They arrive in Oklahoma from mid-April to early May (mid-May in dry years). The vireo usually migrates southward from Oklahoma by late August-September and from Texas by mid-September (Service 1991) to winter in Mexico. The black-capped vireo occurs in mixed deciduous/evergreen shrubland. Vireos require broadleaf shrub vegetation in the form of low deciduous cover (e.g., juniper and oak sp.), which is a key element in vireo habitat. Nests are preferentially located in dense deciduous vegetation. Nests are placed in the fork of a variety of deciduous species, with blackjack oak being preferred in Oklahoma, and shin oak, Texas oak, and sumac commonly used in Texas (Service 1991).

Black-capped vireos are insectivores during the breeding season, gleaning insects off the foliage of oaks and other deciduous trees (Graber 1961, Grzybowski 1995). The common prey items found in stomach contents include spiders and insects of the orders Lepidoptera (butterflies and moths), Coleoptera (beetles), and Hemiptera with suborder Homoptera (cicadas, aphids, planthoppers, leafhoppers, shield bugs, and others) (Graber 1961). During winter, black-capped vireos switch to an omnivorous diet, and nearly 50 percent of stomach contents sampled from western Mexico included seeds (Graber 1961).

To determine the risk Rozol may pose to black-capped vireos, we conducted a thorough review of their life history to determine to what extent the range, habitat preferences, and diet of this species overlaps with areas where black-tailed prairie dog colonies occur, and the likelihood that black-capped vireos would come into direct or indirect exposure with Rozol bait or dead/dying (poisoned) prairie dogs, resulting in adverse effects. Label restrictions that were designed to limit impacts to non-target species were also considered, but some were not heavily weighted due to factors previously discussed.

Habitat Use

Black-capped vireos are a lowland dependent species, preferring mixed evergreen/deciduous shrubland. Black-tailed prairie dogs are native to short-grass prairie habitats typical of the southernmost regions of the Great Plains that extend into north Texas. Black-tailed prairie dogs tend to avoid areas of heavy brush and tall grass due to the reduced visibility these habitats impose. Therefore, habitats used by black-capped vireos do not overlap with the open prairie habitat required by black-tailed prairie dogs.

Diet

Black-capped vireos become omnivorous during winter by adding seeds in their diet, but are otherwise exclusively insectivorous. Black-capped vireos do not prey on rodents or small mammals such as black-tailed prairie dogs, so risk of Rozol poisoning directly from diet is reduced. The risk posed to black-capped vireos from secondary poisoning through consumption of insects containing residues of Rozol (i.e., consumption of insects that have come into contact with Rozol grain bait or poisoned black-tailed prairie dogs) is possible but highly unlikely when all factors herein are considered.

Migration / Arrival at Nesting Grounds

The Rozol label restricts applications to the period between October 1 and March 15, which further limits potential exposures to non-target wildlife. Black-capped vireos leave Texas to migrate south for the winter by mid-September, returning in late March the following year, and would therefore be wintering in western Mexico during the majority of the October 1 - March 15 timeframe when Rozol applications are allowed.

Limited Range Overlap

Although the range for the black-capped vireo historically was larger than today, current overlap of the range of the vireo with black-tailed prairie dogs is geographically limited. Likewise, black-tailed prairie dogs historically occurred over most of the western half of Texas, but have been extirpated from portions of their former range (Davis and Schmidly 1994). Although the range for the black-capped vireo today only marginally overlaps with the range for black-tailed prairie dogs, different habitat requirements preclude the co-existence of these two species in the same location.

We conclude that adverse effects to black-capped vireos from the proposed action are unlikely due to: 1) limited geographic overlap between the current ranges of the black-capped vireo and black-tailed prairie dog; 2) black-capped vireos migrate to Mexico during the time frame in which Rozol application would be permitted; and 3) in the highly unlikely event that black-capped vireos used habitat where Rozol was applied, their dietary requirements would minimize the probability of primary or secondary exposure.

3. CANADA LYNX

The BA describes that direct effects to Canada lynx are expected to occur based on the potential for them to consume prey items that have consumed the chlorophacinone bait. It further describes that growth and reproductive effects cannot be precluded due to the absence of chronic data; however, growth and reproductive effects are not expected because mortality typically occurs as a result of acute exposure. The BA also stated that the range of Canada lynx overlaps with black-tailed prairie dog habitat. Therefore, it was determined in the BA that the use of chlorophacinone to control black-tailed prairie dogs is likely to adversely affect Canada lynx.

Within the action area, Canada lynx may occur in Montana, Wyoming, and Colorado. Upon further analysis, we have determined that the range of Canada lynx has minimal overlap with black-tailed prairie dog habitat. No overlap of lynx habitat with known black-tailed prairie dog colonies occurs in Montana, and no overlap of lynx habitat with known black-tailed prairie dog colonies or potential range occurs in Wyoming. A very minimal amount of overlap of lynx habitat with the black-tailed prairie dog's overall range in Colorado occurs; however, no overlap with mapped black-tailed prairie dog colonies occurs in Colorado.

Lynx are dependent on presence of snowshoe hares and the hare's preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface. Snowshoe hares are not found in black-tailed prairie dog habitat. Lynx have been observed (via snow tracking) to avoid open habitats (i.e. prairie dog towns) (Koehler 1990, Staples 1995) during daily movements within the home range. Lynx prefer to move through continuous forest, using the highest terrain available such as ridges and saddles (Koehler 1990, Staples 1995). While some lynx may move through open habitats at times during transient or dispersal movements, the likelihood of a lynx moving through a black-tailed prairie dog colony is small and the likelihood that they would move through a black tailed prairie dog colony that is also being treated with Rozol is so unlikely that it is discountable. Therefore, we do not anticipate adverse effects to Canada lynx from the use of Rozol to treat black-tailed prairie dog colonies.

The BA indicates that adverse effects to Canada lynx critical habitat are expected to occur because critical habitat overlaps with the use area or action area (black-tailed prairie dog habitat). Critical habitat for Canada lynx is not designated in Colorado and critical habitat in Wyoming and Montana does not overlap with black-tailed prairie dog known occurrence and potential range. Therefore, we conclude that the use of Rozol in black-tailed prairie dog colonies would not adversely affect designated critical habitat for Canada lynx.

4. ESKIMO CURLEW

The EPA determined that the use of Rozol to control black-tailed prairie dogs is likely to adversely affect the Eskimo curlew. This determination was based on likely exposure to Rozol as indicated by the overlapping ranges for the two species and expected direct and indirect effects to the Eskimo curlew associated with exposure. The EPA concluded in the BA that direct effects to Eskimo curlew could occur due to potential for this species to consume terrestrial invertebrate prey items that have consumed Rozol. Additionally, impacts to terrestrial invertebrates from Rozol exposure were expected to indirectly affect Eskimo curlews by depleting their prey base. The EPA also concluded that potential Rozol exposure to Eskimo curlews would be limited to the spring migration and reproductive effects could not be precluded based on an absence of chronic exposure and effects data for any species.

The Eskimo curlew was identified as being threatened by extinction under the Endangered Species Preservation Act of 1966 (Service 1967) and, after the ESA was enacted in 1970, was listed as endangered (Service 1970). The species once numbered in the hundreds of thousands, but declined rapidly in the 1870s to 1890s and is now most likely extinct. No nests have been located in 140 years and the last specimen was obtained in the 1960s (Environment Canada 2007). Environment Canada and the Service have both concluded that recovery of the Eskimo Curlew is currently not considered feasible as there is very little information on locations of habitat necessary for survival or recovery and there are very few, if any, individuals left in existence (Environment Canada 2007, Service 2011e).

Recent quantitative methods used to evaluate the probability of the Eskimo curlew's existence have estimated extinction dates of 1967 and 1965, respectively, with the upper bounds of 95 percent confidence intervals in 1977 and 1970 (Elphick *et al*. 2010, Service 2011e). These estimates are based on the last uncontroversial record of observance, a specimen that was shot in Barbados in 1963 (Service 2011e). From 1963 to the spring of 2009, 39 potential sightings have occurred in 22 different years (Committee on the Status of Endangered Wildlife in Canada 2009); however, the reliability of these sightings is variable and none have been confirmed by physical evidence (Service 2011e). If controversial records of observance are included, then the analysis estimates an extinction date of 2008 with the upper bound of 95 percent confidence interval reaching 2013 (Service 2011e).

Eskimo curlews were not well studied before their decline, thus their association with prairie dog towns is largely unknown. The related long-billed curlew (*Numenius americanus*) is associated with black-tailed prairie dog colonies in western South Dakota, but that species also uses short and mixed grass prairies absent of prairie dogs (Sharps and Uresk 1990). In Kansas, where the last Eskimo curlew sighting was in 1902, habitat preference purportedly included prairie dog towns where they fed on invertebrates (Kansas Department of Wildlife and Parks, 2000). Although there is some indication that prairie dog towns may provide foraging habitat for Eskimo curlews, more relevant habitat factors that have likely contributed to their decline include the widescale conversion of grassland to agriculture, fire suppression, and the extinction of the Rocky Mountain grasshopper (*Melanoplus spretus*) as an important food source (Service 2011e).

In conclusion, Eskimo curlews are likely already extinct or at best extremely rare and thus direct and indirect effects from Rozol exposure are so highly unlikely to occur, as to be considered discountable. Therefore, the Service does not anticipate adverse effects to Eskimo curlew from use of Rozol on black-tailed prairie dogs.

5. GOLDEN-CHEEKED WARBLER

The golden-cheeked warbler is the only breeding bird endemic to the state of Texas. The golden-cheeked warbler is a small (12 cm or 4.5 in) migratory songbird whose nesting range is currently confined to habitat in 33 counties in central Texas. Golden-cheeked warblers were federally listed as endangered in 1990. The birds are dependent on Ashe juniper (blueberry juniper or cedar) for fine bark strips used in nest construction. Although nests may be placed in various species of trees, such as Ashe juniper, Texas oak, live oak, and cedar elm, all nests contain strips of Ashe juniper bark woven together with spider webs. Golden-cheeked warblers feed almost entirely on caterpillars, spiders, beetles, and other insects found in foliage. The species winters in southern Mexico and Central America. In the period from July to August golden-cheeked warblers migrate southward from Texas through the pine-oak woodlands of eastern Mexico and begin returning to Texas in late February. The earliest arrival date on the breeding grounds in Texas is March 2; however, most arrive mid-March (Pulich 1976).

The EPA determined that the golden-cheeked warbler may be adversely affected by Rozol use, because the species' range overlaps with that of the black-tailed prairie dog, and they assumed that warblers could ingest toxic levels of Rozol via consumption of invertebrates exposed to chlorophacinone. For our assessment of the risk Rozol may pose to golden-cheeked warblers, we reviewed their life history to determine to what extent the range, habitat preferences, and diet of this species overlaps with areas where black-tailed prairie dog colonies occur, and the likelihood that golden-cheeked warblers would come into direct or indirect exposure with Rozol bait or poisoned prairie dogs that could result in adverse effects. Label restrictions that were designed to limit impacts to non-target species were also considered, but some requirements were not heavily weighted due to limitations with the label restrictions previously discussed.

Habitat Use

Golden-cheeked warblers use juniper and oak dominated woodlands and prefer canyon or hill country. Black-tailed prairie dogs in Texas are native to short-grass prairie habitats typical of the southernmost regions of the Great Plains that extend into north Texas, and tend to avoid areas of heavy brush and tall grass due to the reduced visibility these habitats impose. Therefore, habitats used by golden-cheeked warblers do not overlap with the open prairie habitat used by black-tailed prairie dogs.

Diet

Golden-cheeked warblers are exclusively insectivorous. Golden-cheeked warblers do not prey on rodents or small mammals such as black-tailed prairie dogs, so risk of Rozol poisoning directly from diet is not expected. The risk posed to golden-cheeked warblers from secondary poisoning through consumption of insects containing residues of Rozol (i.e., consumption of insects that have come into contact with Rozol grain bait or poisoned black-tailed prairie dogs) is possible but considered unlikely when life histories of both species are considered.

Migration / Arrival at Nesting Grounds

The Rozol label restricts applications to the period between October 1 and March 15, which further limits potential exposures to non-target wildlife. Golden-cheeked warbler leave Texas in August, returning in late February the following year, and would therefore be wintering in Mexico and Central America during the majority of the October 1 - March 15 timeframe when Rozol applications are allowed.

Limited Range Overlap

Although the range for the golden-cheeked warbler was historically larger than today, its current overlap with black-tailed prairie dogs is limited geographically. Historically black-tailed prairie dogs occurred over most of the western half of Texas, but they have been extirpated from portions of their former range (source: http://www.nsrl.ttu.edu/tmot1/cynoludo.htm). Although the range for the golden-cheeked warbler marginally overlaps with the range for black-tailed prairie dogs, different habitat requirements preclude the co-existence of this avian species with the black-tailed prairie dog.

We conclude that adverse effects to black-capped vireos from the proposed action are unlikely due to: 1) limited geographic overlap between the current ranges of the black-capped vireo and black-tailed prairie dog; 2) in the highly unlikely event that golden-cheeked warblers would use habitat where Rozol was applied, their dietary requirements would minimize the probability of primary or secondary exposure; and 3) golden-cheeked warblers winter in Mexico during the time frame in which Rozol application would be permitted.

6. GULF COAST JAGUARUNDI

The EPA determined the use of Rozol is likely to adversely affect the Gulf Coast jaguarundi based on potential direct effects from prey that may consume chlorophacinone bait including black-tailed prairie dogs and non-target animals. However, the BA indicated that there would be no indirect effects from prey-base loss expected because this species' habitat is distinct from black-tailed prairie dog habitat. No map was provided in the BA where the Gulf Coast jaguarundi overlaps with the black-tailed prairie dog, but the Service agrees with the EPA that there is no overlap in range between the two species.

The Gulf Coast jaguarundi is reported from Mexico, southern Arizona, and southern Texas. It is not found within the black-tailed prairie dog range. As such, any effects from the action to the Gulf Coast jaguarundi are considered to be highly unlikely to occur. Therefore, the Service does not anticipate adverse effects to the Gulf Coast jaguarundi from use of Rozol on black-tailed prairie dogs.

7. OCELOT

The EPA determined the ocelot may be adversely affected by Rozol use based on potential direct effects from prey that may consume chlorophacinone bait including black-tailed prairie dogs and non-target animals. However, the BA indicated that there would be no indirect effects from prey-base loss expected because this species' habitat is distinct from the black-tailed prairie dog habitat.

The ocelot is found in Mexico, southern Arizona, and southern Texas. There is no overlap between the black-tailed prairie dog and the ocelot; therefore, we conclude that the proposed action is not likely to adversely affect the ocelot.

8. PIPING PLOVER

The action area encompasses the entire U.S. breeding range of the Northern Great Plains population of the piping plover. Piping plovers have nested near prairie dog towns (within 0.10 mile) (USCOE 2011, Kempema *et al*. 2009, Montana Natural Heritage Program 2011). However, our analysis suggests that there is little, if any, overlap between prairie dog towns and piping plover critical habitat or known nesting areas. Additionally, plovers' predilection to nest and forage in sandy or gravelly areas near water with little vegetation make it unlikely that they would extensively use prairie dog towns. In areas where prairie dog towns are in close proximity to nesting habitat, it is possible that piping plovers could ingest invertebrates that had fed on Rozol, or that dying prairie dogs may expire along the shoreline, exposing plovers to Rozol through maggots. However, because plovers are not expected to forage in the prairie dog towns directly, and the Rozol use season ends before plovers are likely to encounter prairie dog colonies (see below), the risk of exposure to piping plovers is unlikely.

Piping plover critical habitat has been designated along Lake Oahe in South Dakota. The primary constituent elements on reservoirs are defined as "sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies" (Service 2002a). Piping plover breeding habitat is by nature ephemeral and cyclical, with unvegetated habitat emerging following wet periods, only to become vegetated over time and unsuitable until the next flood inundates the habitat again, clearing it of vegetation. Since prairie dogs use vegetated areas which are not suitable for piping plovers even after the prairie dogs have clipped the grasses in the area, prairie dog towns would not have the primary constituent element of "sparsely vegetated shoreline beaches." Therefore, since Rozol application would occur only in prairie dog towns which do not have the primary constituent elements that define piping plover critical habitat, we do not anticipate impacts.

The Rozol label allows treatment only between October 1 and March 15 of the following year. During this time period, piping plovers would be on the wintering grounds, which do not overlap with the black-tailed prairie dog range. Contaminated prairie dog carcasses have been documented on the surface up to 29 days post treatment, so some piping plovers arriving on the breeding grounds in April and May could overlap temporally when contaminated carcasses are available. There is some potential for disturbance by applicators collecting carcasses in April when piping plovers have started to arrive, but this disturbance is expected to be minimal since the activity will be concentrated in the prairie dog towns, which piping plovers do not use for nesting.

A number of documented prairie dog towns occur near the designated Critical Habitat along the Missouri River and reservoir system in North and South Dakota. However, no piping plover nests have been documented to occur within the prairie dog towns (USCOE 2011), nor have piping plovers been observed to forage within prairie dog towns (Someson 2012, personal communication). Piping plovers have not been documented to eat grains, so they would be unlikely to feed directly on Rozol. Secondary poisoning is a potential risk if plovers were to prey on maggots or other insects that had fed on the bait directly or on contaminated prairie dogs. In the Great Lakes, maggots were postulated to be the source of Type E botulism that infected and killed some plovers (Service 2009e). In the two reported cases where plovers have been observed foraging on carcasses, the carcasses have been along the shoreline; plovers were not documented to leave their traditional foraging areas to forage on carcasses (Keane 2002, Service 2009e). We do not anticipate Rozol use along the Missouri River shoreline so exposure of piping plovers to contaminated maggots is not expected.

Piping plovers have been documented to nest up to one-half mile from the water along the reservoirs (Pavelka 2008, personal communication), but this was in low water years, and the nests were below the elevation at which the reservoirs are considered full in a normal year. Most nests are initiated relatively close to the water (Anteau *et al*. 2011). The average number of plovers nesting on the Missouri River reservoirs annually from 1994-2010 has been 496 (USCOE 2011), but only a very small subset, less than a few dozen of these were near prairie dog towns and none were in prairie dog towns.

The risk of secondary poisoning is unlikely due to the chain of events that would have to occur for piping plovers to be exposed. Since piping plovers do not eat grain or carcasses directly, poisoning would have to occur via a secondary route. For terrestrial insects to be available for plover forage, contaminated insects would have to leave the prairie dog town and move to unvegetated habitat, most likely along the water's edge, where plovers do most of their foraging, and be ingested by plovers. It is unlikely that piping plovers would be exposed to sufficient Rozol concentrations in this manner to cause impacts because:

- The Rozol label only allows application to occur between October 1 and March 15 of the following year, when piping plovers are absent from the breeding grounds.

- The potential Rozol exposure route is circuitous with both possible transmissions through insects that are not expected to occur.

- By definition, prairie dog habitat does not have the primary constituent elements that define piping plover critical habitat. Therefore, we do not anticipate that Rozol application would adversely affect designated critical habitat.

    - *Route 1 – the invertebrates have eaten the bait directly and then move to plover foraging areas.* While this route is possible, the time lag between the last application of Rozol and the arrival of piping plovers reduces the likelihood of impact. Further, prairie dog colonies are generally well removed from piping plover nesting areas and contaminated invertebrates would have to move from the prairie dog town to piping plover habitat to be exposed to ingestion by piping plovers.

    - *Route 2 - the invertebrates (most likely maggots) may become contaminated through feeding on a contaminated carcass.* This route would require a contaminated carcass from a Rozol application (that had occurred weeks to months earlier) to be located in piping plover foraging habitat on the shoreline, which would be out of the prairie dog town, and remain in place long enough to become infested with maggots. The maggots would have to be carrying a high enough concentration of Rozol to affect plovers and/or the plovers would have to consume them in sufficient quantity to be impacted.

- Most of the activity associated with poisoning would occur outside of piping plover use areas, so disturbance associated with poisoning activities is unlikely.

Therefore, the Service concludes that adverse effects to piping plovers from the use of Rozol to poison black-tailed prairie dogs are not likely, and the action is not likely to adversely affect designated critical habitat for the above reasons.

9. WHOOPING CRANE

In the BA, the EPA concludes that the use of Rozol to control the black-tailed prairie dog is likely to adversely affect the whooping crane for the following reasons:

> *Direct effects to the whooping crane are expected to occur based on the potential for this species to consume the chlorophacinone bait (RQ of 0.89 which exceeds the LOC of 0.1) or other prey items that may have consumed the chlorophacinone bait (RQ of 0.104 for exposure to non-target animals which exceeds the LOC of 0.1). Growth and reproductive effects cannot be precluded due to the absence of chronic data.*
>
> *Indirect effects from the loss of the prey base are expected because effects to individuals within populations have been demonstrated in mammals, birds, and terrestrial invertebrates. No indirect effects from habitat loss are expected because this species does not use BTPD burrows.*
>
> *Habitat modification for the whooping crane is expected because the critical habitat for the whooping crane overlaps with the use area (BTPD habitat).*

The BA map indicates some overlap between the whooping crane and black-tailed prairie dog in Montana, North and South Dakota, Wyoming, Colorado, Nebraska, Kansas and Oklahoma. The map does not depict any counties in Texas and should be corrected to indicate the overlap in Texas counties.

Three populations of whooping cranes exist in the wild: 1) the Aransas Wood Buffalo Population, 2) the Florida Population, and 3) the Eastern Migratory Population. The Aransas Wood Buffalo Population nests in the Wood Buffalo National Park in the Northwest Territories of Canada and in Alberta, Canada. This population migrates through eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas between breeding grounds in Canada and wintering grounds of Aransas National Wildlife Refuge on the Gulf Coast of Texas. This migration route overlaps with the range of black-tailed prairie dogs. The Florida Population is non-migratory and located on the Kissimmee Prairie, south of Orlando in Osceola and Polk counties and does not overlap with the range of black-tailed prairie dogs. The Eastern Migratory Population was reintroduced to the Necedah National Wildlife Refuge in Wisconsin with captive birds trained to migrate to Chassahowitzka National Wildlife Refuge on the Gulf Coast of Florida and does not overlap with the range of black-tailed prairie dogs. The Aransas Wood Buffalo Population is the only self-sustaining wild population. The Florida Population and Eastern Migratory Population are introduced and are designated experimental non-essential by the Service.

As noted in the BA, the whooping crane is a territorial nester and returns to the same area each year. Cranes summer in marshes and prairie potholes and winter in coastal marshes and prairies. Eggs are laid from April to mid-May. Incubation lasts for a month. At Wood Buffalo National

Park whooping cranes migrate southward in the fall from mid-September to mid-November to winter at the Aransas National Wildlife Refuge. However, those dates may vary. Ten Aransas Wood Buffalo Population whooping cranes were fitted with Global Positioning System (GPS) platform transmitters and were tracked as they migrated from Wood Buffalo National Park to Aransas National Wildlife Refuge by the Service and The Crane Trust. In 2010, whooping cranes left Wood Buffalo National Park as early as August 20 and continued until October 31 (Wehtje 2011). They arrived at Aransas National Wildlife Refuge between October 28 and November 26. Whooping cranes spent most of their time in Saskatchewan followed by North Dakota, South Dakota, Nebraska, Kansas, Oklahoma and Texas. The whooping cranes made stopovers on 39 private properties and 15 public land sites and varied between rivers (including reservoirs on the Missouri River), lakes, wetlands and uplands. Upland roost sites consisted of corn fields, fields planted in winter wheat, and a harvested rice field. In spring, the migration begins between March 25 and April 15 and some may not leave Aransas National Wildlife Refuge until May.

Diet during the summer consists of larval and nymphal insects, frogs, rodents, berries, small birds, and minnows. On the wintering grounds at Aransas National Wildlife Refuge, whooping cranes feed primarily on blue crabs, razor clams, and wolfberries. During migration they forage on agricultural waste grains like barley, wheat, and corn, along with frogs, fish, insects, tubers, and crayfish.

Whooping cranes are likely to be migrating between October 1 and December 1 from Wood Buffalo National Park to Aransas National Wildlife Refuge, the first half of the Rozol application season. During their spring migration from Aransas National Wildlife Refuge to Wood Buffalo National Park in late March, it is possible that Rozol will have been applied to areas within days prior to their departure and contaminated prairie dog carcasses have been documented on the surface up to 29 days post treatment. While whooping cranes are not known to use black-tailed prairie dog colonies during their migration between wintering and breeding areas, it is possible to foresee some possible Rozol exposure routes since whooping cranes are known to eat agricultural grains, frogs, fish, insects, tubers, rodents, and crayfish during their migration. Further, since Rozol is grain-based it could be consumed in amounts that would exceed the Risk Quotient for consumption of 0.89 for endangered species. According to the EPA, the whooping cranes would have to eat 23 poisoned mice or more than one poisoned black-tailed prairie dog every day for five days to reach the Level of Concern. The BA also states that it may be possible for the whooping cranes to consume that many mice in a day, but unlikely it would eat more than one black-tailed prairie dog every day.

Although whooping cranes use a wide range of environments they primarily depend on highly productive wetlands, marshes, mudflats, wet prairies, rivers, streams and crop fields for migratory stopover habitat. They feed primarily in a variety of croplands and roost in marshy wetlands or riverine habitats. Heavily vegetated wetlands are not generally used. During migration whooping cranes are often recorded in riverine habitats such as in the Platte River, North and Middle Loup Rivers, Niobrara River in Nebraska; the Missouri River in North Dakota and South Dakota, and the Red River in Texas. They roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance.

Black-tailed prairie dogs establish colonies near intermittent streams, water impoundments, homestead sites and windmills. However, black-tailed prairie dog colonies are typically in upland locations where the Service has not documented extensive whooping crane use. The greatly reduced vegetative cover in the vicinity of prairie dog colonies may further detract from the possibility of whooping cranes foraging in those areas. Service knowledge of whooping cranes does not suggest that, while foraging, they would venture into prairie dog burrows where Rozol-treated bait is placed. Where both whooping cranes and the black-tailed prairie dog occur, habitat isolation between the whooping cranes and black-tailed prairie dog reduces the chance that the whooping cranes would encounter treated grain.

In summary: a) whooping cranes have not been documented to forage or roost in black-tailed prairie dog colonies, b) the occurrence of the species in the proximity of black-tailed prairie dog colonies is not likely to be frequent, and c) during migration whooping cranes are not expected to venture into black-tailed prairie dog colonies, creating a degree of habitat isolation between the two species.

There is some potential for whooping crane disturbance by applicators collecting carcasses, but this disturbance is expected to be minimal since the activity will be concentrated in the prairie dog towns, which whooping cranes are not known to use. The Service is also unaware of any incidents involving Rozol and whooping cranes despite Rozol's ongoing use as a black-tailed prairie dog rodenticide in the migratory corridor since the early 1990s (Lee *et al.* 2005).

Critical habitat

Whooping crane critical habitat occurs in five sites in four states. They are:

- Cheyenne Bottoms State Waterfowl Management Area and Quivira National Wildlife Refuge, Kansas;
- the Platte River bottoms between Lexington and Denman, Nebraska;
- Salt Plains National Wildlife Refuge, Oklahoma; and
- Aransas National Wildlife Refuge and vicinity, Texas.

Each of the five factors normally associated with critical elements pertain to the whooping crane (i.e. space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and generally, and habitats that are protected from disturbances or are representative of the geographical distribution of the listed species).

With exception of the Platte River Bottoms in Nebraska, all designated critical habitats are Service National Wildlife Refuges or Management Areas that are unlikely to have Rozol use on their properties; doing so would result in a future section 7 consultation. Black-tailed prairie dog colonies are not known to occur in the designated critical habitat areas. Burrows are not specified critical elements of whooping crane critical habitat. The EPA's conceptual impact model on page 60 of the BA lists "altered plant community composition" as a second indirect effect on habitat resulting from black-tailed prairie dog control. Reduction or eradication of black-tailed prairie dog colonies could lead to increases in vegetation height and density at sites treated with Rozol. However, some thicker vegetation is unlikely to cause adverse effects to the critical habitat for species because there are minimal black-tailed prairie dog colonies in whooping crane designated critical habitat.

We conclude that adverse effects to the whooping crane from the proposed action are unlikely. Additionally, we believe that adverse effects to whooping crane critical habitat are unlikely.

SPECIES FOR WHICH ADVERSE EFFECTS ARE ANTICIPATED WITH OR WITHOUT CONSERVATION MEASURES

For those species for which conservation measures did not preclude adverse effects, the full analysis of a biological opinion was necessary, which includes species/habitat information; environmental baseline; direct, indirect, and cumulative effects; conclusions regarding jeopardy or destruction/adverse modification; and associated incidental take statements with reasonable and prudent measures and implementing terms and conditions, as appropriate. Three species fit within this category: 1) black-footed ferret, 2) gray wolf and 3) northern aplomado falcon.

Background information is provided below regarding the components of species analysis within a BO. This information is presented to further the understanding of the three species analyses that follow.

Species Analysis Components:

Status of the Species/Critical Habitat. This is an analysis of information on species life history, habitat and distribution, and other data on factors related to survival and recovery. This analysis considers the effects of past human and natural activities or events that have led to the current condition of species. This information is usually presented in listing documents and refined in recovery plans. Some species/critical habitat information not directly relevant to the consultation is not included herein, but rather is referenced for the reader to obtain additional information, if needed, from other documents.

Environmental Baseline. Environmental Baseline is the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process. [50 CFR § 402.02]. The environmental baseline is a “snapshot” of a species’ health at a specified point in time. It does not include the effects of the action under review in the consultation.

Effects of the Action. This section describes the direct and indirect effects of an action on the species and/or critical habitat and its interrelated or interdependent activities, as well as the species' anticipated response to the action.

Cumulative Effects. Cumulative Effects are the effects of future state, tribal, local, or private activities that are reasonably certain to occur within the action area considered in this BO. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. This definition applies only to section 7 analyses and should not be confused with the broader use of this term in the National Environmental Policy Act or other environmental laws.

Conclusion Regarding Jeopardy. The jeopardy determination is the Service's opinion after review of the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, as to whether the as proposed action is/is not likely to jeopardize the continued existence of the species and is/is not likely to destroy or adversely modify designated critical habitat. We evaluate whether the action will directly or indirectly appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild, or will directly or indirectly alter critical habitat in a manner that appreciably diminishes the value of that habitat for both the survival and recovery of a listed species.

Reasonable and Prudent Alternatives. If the Service determines that a proposed action will jeopardize a species or adversely modify critical habitat, we then identify any reasonable and prudent alternative actions that the agency or applicant may take to avoid the likelihood of jeopardy to the species or destruction or adverse modification of designated critical habitat. These alternatives must be implemented in a manner consistent with the intended purpose of the action, fall within the scope of the action agency's legal authority and jurisdiction, and be economically and technologically feasible.

Incidental Take Statement Components

An Incidental Take Statement is provided (where appropriate) following the analysis for each species and/or critical habitat, to exempt take that may occur. The Incidental Take Statement describes the take and lists means to minimize that take by implementing reasonable and prudent measures with implementing terms and conditions. In order to be considered in an incidental take statement, any taking associated with an agency's action must meet the following three criteria:

1. not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat,
2. result from an otherwise lawful activity, and
3. be incidental to the purpose of the action

The components of an incidental take statement include the anticipated amount and extent of the take, effects of the take, and reasonable and prudent measures with implementing terms and conditions along with conservation recommendations intended to assist the EPA in achieving 7(a)(1) obligations under the ESA.

Amount or Extent of Take Anticipated. The amount of take anticipated may be the number of individuals expected to be taken or the extent of habitat likely to be destroyed or disturbed. If the take would not occur but for the proposed action, then the Service must describe the amount or extent of such anticipated incidental take. In instances where take may be difficult to detect, some detectable surrogate measure of take is provided. The time period over which the take is anticipated should also be presented here.

Effect of the Take. This segment provides a statement of impact regarding the incidental take described in the above segment.

Reasonable and Prudent Measures. These are nondiscretionary measures that are necessary and appropriate to minimize the impact of incidental take. Reasonable and prudent measures include actions that occur within the action area, involve only minor changes to the project, and reduce the level of take associated with project activities. These should minimize the impacts of incidental take to the extent reasonable and prudent, meaning they are consistent with the proposed action's basic design, location, scope, duration and timing.

Terms and Conditions. Terms and conditions implement the reasonable and prudent measures by describing the specific methods by which the reasonable and prudent measures are to be accomplished. They must include reporting and monitoring requirements to assure adequate action agency oversight of any incidental take [50 CFR §402.14(i)(1)(iv) and (i)(3)]. They also include a discussion on the "disposition of individuals taken". In order to be exempt from the prohibitions of section 9 of the Act, the EPA must comply with the terms and conditions, which implement the reasonable and prudent measures and outline required reporting/monitoring requirements. Terms and conditions are non-discretionary.

Conservation Recommendations. Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. [50 CFR §402.02]

1. BLACK-FOOTED FERRET

Status of the Species/Critical Habitat

The black-footed ferret (ferret) was listed as endangered in 1967 and again in 1970 under early endangered species legislation and was "grandfathered" into the ESA in 1973 (Service 2008b). Critical habitat has not been designated for this species. The ferret's historical range includes 12 states (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) and the Canadian provinces of Alberta and Saskatchewan (Anderson *et al.* 1986).

The ferret was considered extinct or nearly extinct when a small population was located in Mellette County, South Dakota in 1964 (Henderson *et al*. 1969). The last wild ferret observed at the Mellette County site was in 1974 (Clark 1989). Attempts at captive breeding ferrets with a few captured animals from the Mellette County population failed and when the last captive animal died at Patuxent Wildlife Research Center in Laurel, Maryland in 1979, the ferret was again presumed extinct (Service 1988).

In 1981, a second population was discovered in Meeteetse, Wyoming (Clark *et al.* 1986, Lockhart *et al.* 2006). Following disease outbreaks at Meeteetse, all surviving wild ferrets, totaling 18 individuals, were removed from the wild between 1985 and 1987 to initiate a captive breeding program (Service 1988). Seven of the ferrets captured at Meeteetse successfully reared young, leading to a lineage of continuing captive reproduction that provides ferrets to reintroduction sites (Hutchins *et al.* 1996, Garelle *et al*. 2006). Extant populations, both captive and reintroduced, descend from these seven "founder" animals that were part of the original 18 ferrets brought into captivity (Garelle *et al*. 2006). Ferret reintroductions began in 1991 with animals produced from the captive breeding ferret population that are descendants of ferrets captured at Meeteetse from 1985-87 (Table 2).

No wild populations of black-footed ferrets have been found since the capture of the last Meeteetse ferret, despite extensive and intensive range wide searches. It is unlikely that any undiscovered wild populations remain (Lockhart *et al*. 2006). No known extant wild populations of ferrets exist, except those at ferret reintroduction sites.

Ferret Reintroductions

Section 10(j) of the ESA allows reintroduced populations to be designated non-essential experimental populations to ease concerns about listed species reintroductions and facilitate species recovery efforts. To date, eleven ferret reintroductions have occurred through use of section 10(j) designated experimental population areas in the United States (Service 2008b). There have also been six ferret reintroductions that used section 10(a)(1)(A) recovery permits along with one ferret reintroduction in Chihuahua, Mexico and one reintroduction in Saskatchewan, Canada for a total of 19 reintroduction attempts (Service 2008b, Fargey 2010). See Table 2 for the location and date of initiation of each of the ferret reintroduction sites.

Table 2. Black-footed ferret reintroductions in North America locations, year initiated and prairie dog species.

SITE (YEAR INITIATED)	PRAIRIE DOG SPECIES
Shirley Basin, Wyoming (1991)	White-tailed Prairie Dog
UL Bend National Wildlife Refuge, Montana (1994)	Black-tailed Prairie Dog
Badlands National Park, South Dakota (1994)	Black-tailed Prairie Dog
Aubrey Valley, Arizona (1996)	Gunnison's Prairie Dog
Conata Basin, South Dakota (1996)	Black-tailed Prairie Dog
Ft. Belknap Indian Reservation, Montana (1997)	Black-tailed Prairie Dog
Coyote Basin, Utah (1999)	White-tailed Prairie Dog
Cheyenne River Indian Reservation, South Dakota (2000)	Black-tailed Prairie Dog
Bureau Land Management 40-complex, Montana (2001)	Black-tailed Prairie Dog
Wolf Creek, Colorado, (2001)	White-tailed Prairie Dog
Janos, Mexico (2001)	Black-tailed Prairie Dog
Rosebud Indian Reservation, South Dakota (2004)	Black-tailed Prairie Dog
Lower Brule Indian Reservation, South Dakota (2006)	Black-tailed Prairie Dog
Wind Cave National Park, South Dakota (2007)	Black-tailed Prairie Dog
Espee Ranch, Arizona (2007)	Gunnison's Prairie Dog
Smoky Hill, Kansas (2007)	Black-tailed Prairie Dog
Northern Cheyenne Indian Reservation, Montana (2008)	Black-tailed Prairie Dog
Grassland National Park, Canada (2009)	Black-tailed Prairie Dog

Life History

The ferret is a medium-sized mustelid typically weighing 1.4 to 2.5 pounds (lbs) (645 to 1,125 grams) and measuring 19 to 24 inches (479 to 600 millimeters) in total length. Upper body parts are yellowish buff, occasionally whitish; feet and tail tip are black; and a black "mask" occurs across the eyes. It is the only ferret species native to the Americas (there are no recognized subspecies). Other ferret species in the genus include the Siberian polecat (*Mustela eversmanni*) and the European ferret (*Mustela putorius*) (Hillman and Clark 1980, Anderson *et al*. 1986). The black-footed ferret was first formally described in 1851 by J.J. Audubon and J. Bachman (Clark *et al.* 1986). The black-footed ferret is endemic to North America. Ferrets entered North America from Siberia approximately 1 to 2 million years ago, spread across Beringia, and advanced southward through ice-free corridors to the Great Plains approximately 800,000 years ago (Wisely 2006). Contrary to early characterizations that addressed natural history, the species was probably common historically, although its secretive habits (nocturnal and often underground) made it difficult to observe (Forrest *et al*. 1985, Anderson *et al.* 1986, Clark 1989).

Ferrets prey primarily on prairie dogs (*Cynomys* spp.) and use their burrows for shelter and denning (Henderson *et al.* 1969, Hillman and Linder 1973, Forrest *et al*. 1985). Since ferrets depend almost exclusively on prairie dogs for food and shelter, and ferret range overlaps that of certain prairie dog species (Anderson *et al*. 1986) with no documentation of ferrets breeding outside of prairie dog colonies, the Service believes that ferrets were historically endemic to the range of three prairie dog species. There are records of ferrets from the ranges of black tailed prairie dog (*Cynomys ludovicianus*), white-tailed prairie dog (*Cynomys leucurus*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Anderson *et al.* 1986), which collectively occupied approximately 100 million acres (40 million hectares) of intermontane and prairie grasslands (Biggins *et al.* 1997, Clark *et al*. 1986, Ernst *et al.* 2006). Ernst (2008, personal communication) estimates that in the United States, this occupied habitat existed within an estimated 562 million ac (228 million ha) of potential habitat. Ernst (2008, personal communication) used a geographic information system database to predict the distribution of prairie dog habitat across the United States and concluded that historically 85% of all ferrets probably occurred in black-tailed prairie dog habitat, 8% in Gunnison's prairie dog habitat and 7% in white-tailed prairie dog habitat. We conclude that most ferrets likely occurred in black-tailed prairie dog habitat.

The ferret breeds at one year of age, from mid-March through early April, and gestation is about 42-45 days. Litter sizes average about 3.5 (Wilson and Ruff 1999). Juveniles disperse in late summer/early fall. The ferret leads a solitary existence; except for the period when mother and young are together (Forrest *et al*. 1985). It is a "searcher" predator and is generally nocturnal, appearing above ground at irregular intervals and for irregular durations (Clark *et al.* 1986).

The ferret's close association with prairie dogs was an important factor in its decline. From the late 1800s to approximately 1960, both prairie dog habitat and numbers were dramatically reduced by the sequential and overlapping effects of habitat loss from conversion of native prairie to cropland, poisoning, and habitat modification due to disease (Service 2008b). The North American ferret population declined precipitously as a result (Biggins 2006) and the species was one of the original species listed under early versions of the Endangered Species Act and was grandfathered in as an endangered species with passages of the ESA in 1973 (Service 2008b). Ferret populations in the black-tailed prairie dog range and other prairie dog species are only known to exist where ferret reintroductions have occurred (Service 2008b).

Environmental Baseline

Since the 1960s, occupied black-tailed prairie dog acreage has increased from approximately 365,000 acres to approximately 2.4 million acres within the ten states where Rozol is currently allowed or proposed to be used as a rodenticide (EPA 2010b, Service 2009b). There is an extensive history of prairie dog poisoning in these ten states, and we believe that black-tailed prairie dogs are likely to be poisoned by various rodenticides into the future regardless if Rozol is available or not. In 2009, the Service and concluded that rodenticide use was a threat to the species that could warrant listing of the species under the ESA (Service 2009b). Current black-tailed prairie dog populations do not indicate a downward trend even though Rozol has been used under Special Local Needs labels for black-tailed prairie dog control since 2004 and as early as 1991 under a pocket gopher formulation (Lee *et al.* 2005).

While current information suggests the black-tailed prairie dog species can withstand the impact of Rozol use prairie dog poisoning is a high magnitude threat to the black-footed ferret (Service 2008b). Therefore, the conservation measure that prevents Rozol use in ferret reintroduction areas is key to maintaining the current reintroduction sites and providing a mechanism to accommodate future reintroduction sites.

Nineteen ferret reintroductions (Table 2) have been undertaken in North America beginning in 1991, and most of these sites continue to have some ferrets remaining (Service 2008b, Fargey 2010). Thirteen reintroductions are within the range of black-tailed prairie, and 11 of those sites are within the ten states where Rozol is either labeled for use or proposed to be used as a prairie dog rodenticide (EPA 2010b). While there have been 19 ferret reintroductions to date, insufficient time has passed at approximately one third of the sites to indicate whether the existing reintroduction sites may eventually meet criteria for Ferret Recovery Plan objectives (Service 2008b).

A recent estimate of ferret populations at reintroduction sites indicates approximately 840 ferrets alive in the wild with approximately half of those located in the black-tailed prairie dog range (Service 2008b). Since that time, plague has reduced ferret numbers at Conata Basin in South Dakota (Griebel 2010) while ferret populations are believed to have expanded in Arizona and Wyoming (Corcoran 2011, Grenier 2011). The Service believes that approximately 800 ferrets alive in the fall of 2011 is a reasonable estimate of current ferret population numbers in the wild.

To date, there have been a few instances where ferrets are known to have left a ferret reintroduction site and been located on adjacent property. If a ferret does disperse from a reintroduction site, there are provisions in the reintroduction site permit, or the reintroduction plans, to relocate that ferret at the request of the adjacent property owner if they grant access and permission to do so. This accommodation, while available to adjacent landowners, has rarely been used or needed. The Service does not expect that to change with Rozol use as a black-tailed prairie dog rodenticide.

Landowners adjacent to current ferret reintroduction sites are not required to conduct ferret surveys prior to undertaking normal ranching operations, such as the use of rodenticides to control prairie dogs. The Service anticipates that future ferret reintroduction sites will similarly not require ferret surveys on adjacent properties. Ferret surveys can be time consuming and expensive to undertake; requiring them of adjacent landowners prior to normal ranching operations would undermine support for the reintroduction effort.

The Black-footed Ferret Recovery Plan identifies recovery objectives for downlisting the ferret from endangered to threatened status. The objectives include increasing the captive population of ferrets to 200 breeding adults, establishing at least 1,500 free ranging breeding adult ferrets that are distributed between at least 10 populations with no fewer than 30 breeding adults in a population and those populations shall have the widest possible distribution (Service 1988). The first objective of increasing the captive ferret population has been surpassed. The second objective is approximately 25% met when fall ferret numbers of approximately 800 animals are estimated to result in 400 breeding adults by spring and four reintroductions sites have successfully established free ranging populations and meet recovery objectives (Service 2008b). This indicates additional successful ferret reintroduction sites will be needed to meet the downlisting objective for ferrets. Recovery objectives for complete delisting of the ferret have not been finalized but are anticipated to be at least 3,000 free ranging breeding adult ferrets distributed between at least 30 populations. The downlisting objectives indicate there will need to be significant continued efforts to establish free ranging ferret populations through the use of reintroductions and complete delisting of the ferret will require considerably more ferret reintroductions.

Effects of the Action

Rodenticides used to poison prairie dogs can have multiple effects to ferrets by secondarily poisoning the ferret or by destroying the habitat where ferrets live or could live. A study in the 1980s evaluated the potential secondary poisoning of chlorophacinone, the active ingredient in Rozol, and found that 5 of 6 domestic ferrets were killed after feeding on four poisoned black-tailed prairie dogs over 8 days. The study concluded that chlorophacinone may not be an acceptable prairie dog toxicant based on high secondary toxicity to non-target animals (Fisher and Timm 1987). The Service believes black-footed ferrets would be similarly killed as the domestic ferrets were, if they consumed prairie dogs poisoned by Rozol. Accordingly, the Service, the EPA and the registrant developed conservation measures that would prevent Rozol use at current and future ferret reintroduction sites. These measures were intended to address the secondary poisoning of ferrets and the loss of the ferrets' prey base at reintroduction sites (EPA 2011c). The issue of ferret dispersal away from a reintroduction site that might encounter a Rozol poisoned black-tailed prairie dog colony was more difficult to address.

The key challenge with development of the ferret conservation measures was to ensure that Rozol use would not occur at locations where ferrets are being reestablished, while at the same time ensure that adjacent landowners' ability to manage prairie dogs on their properties would not be impacted. The parties involved discussed banning Rozol use in areas surrounding ferret reintroduction sites (up to a county in size) but concluded that doing so would increase animosity towards ferret reintroduction efforts and could undermine or prevent reintroductions altogether. Accordingly, to avoid creating a backlash against ferret reintroduction sites, conservation measures were developed that would restrict Rozol use at the reintroduction site but not impose restrictions on adjacent landowners' use of legal rodenticides. As indicated above, the Service does not believe ferret surveys on properties adjacent to or in the vicinity of a ferret reintroduction are needed prior to undertaking otherwise legal activities such as rodenticide use on prairie dogs, and the cost and inconvenience of ferret surveys on adjacent lands would generate opposition to, and possibly compromise, the ferret reintroduction effort. If a ferret disperses from a reintroduction site and the landowner wants the ferret relocated, and grants permission to access the property, then the relocation can be done under the existing permits.

The ferret conservation measures rely upon identification of existing and future ferret reintroduction sites on the County Bulletin database maintained by the EPA and referenced on the Rozol label that then becomes part of the legal requirement for label compliance. Prior to Rozol use, applicators are to consult this database to ensure they are not applying Rozol at an existing ferret reintroduction site. If new ferret reintroductions are started in the future, we will provide the information for those sites to the EPA for inclusion on the County Bulletin database to reflect new ferret reintroduction sites.

The Service recognizes that a ferret that leaves a reintroduction site could encounter prairie dog colonies where Rozol is being used and consume poisoned prairie dogs and perish. That mortality must be balanced with the intent of the reintroduction, which is to establish a breeding ferret population at the reintroduction site. These ferret deaths are not anticipated to materially affect the reintroduction site’s ability to meet ferret recovery objectives because the sites are reliant upon the ferret habitat within their boundaries to meet those objectives. The Service selects reintroduction sites because they have the attributes (i.e. prairie dog acreage, densities, locations, partnerships) to help meet ferret recovery objectives of establishing widely distributed breeding ferret populations. The Service and our reintroduction partners have long understood that dispersing ferrets from a reintroduction site could be lost from many factors, and that use of legal rodenticides off the reintroduction site is one of those factors. Accordingly, we believe the conservation measures to restrict Rozol use at the reintroduction site but not on adjacent properties are appropriate.

The Service also acknowledges there could be incidental take of ferrets when Rozol is used outside the reintroduction site if dispersing ferrets encounter prairie dog colonies where Rozol is used to poison prairie dogs. We recognize that ferrets leaving reintroduction sites may feed upon Rozol poisoned prairie dogs outside the reintroduction site and in doing so are expected to die. However, those ferret deaths are not anticipated to materially affect the reintroduction site’s ability to meet ferret recovery objectives because reintroduction sites are reliant upon the ferret habitat within their boundaries to meet recovery objectives.

Another possible effect of Rozol use for black-tailed prairie dog control involves the elimination of possible ferret reintroduction habitat because of Rozol use. In 2009, the Service estimated there were approximately 2.4 million acres of black-tailed prairie dog in the 10 States where Rozol is used or proposed for use as a black-tailed prairie dog rodenticide (Service 2009b, EPA 2010b). Luce (2006) examined opportunities for immediate and near term potential ferret reintroduction sites and concluded there are over 70 potential sites within the ferret range, most in the black-tailed prairie dog species. The Service believes that rodenticide use, including Rozol, while widespread in the black-tailed prairie dog range, in and of itself is not the determinate factor whether a ferret reintroduction can occur. Instead, it is the willingness of partners (private, state, tribal and federal) to consider a ferret reintroduction and then commit to manage a block of prairie dog habitat for ferret conservation. Most recent black-tailed prairie dog surveys indicate there are many biologically suitable and potential ferret reintroduction sites available, but the key to achieving ferret reintroductions and thus recovery, is finding interested landowners and partners (Service 2009b, Lockhart *et al* 2006, Luce 2006). Further, our experience is that landowners who are strong proponents of poisoning prairie dogs are not interested in participating in ferret reintroductions and if Rozol was not available, they would likely use a different rodenticide. Therefore, the Service believes that Rozol use on black-tailed prairie dogs with the agreed upon conservation measures to restrict Rozol use on future ferret reintroduction sites, will not eliminate enough future opportunities for ferret reintroductions to preclude ferret recovery. At this time, the Service does not believe additional restrictions on Rozol use on behalf of ferrets are warranted.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Service believes that future rodenticide use along with some land conversion from grasslands or rangeland into croplands or other development will continue in the range of the black-tailed prairie dog. With the black-footed ferret conservation measures in place we do not believe these actions will preclude conservation and recovery of the black-footed ferret because recent trends in black-tailed prairie dog occupied habitat are stable to increasing over large areas of the species' range (Service 2009b). While Rozol use is likely increasing, its use may be supplanting some of the previously used prairie dog rodenticides and this would explain the stable to increasing prairie dogs trends found in Service (2009b) even though Rozol has been used for prairie dog control for nearly two decades in one state and five to ten years in others (Lee *et al*, 2005, EPA 2010b). Further, we believe with the agreed upon Rozol conservation measures, where use of Rozol in ferret reintroduction sites will not be allowed, the impacts to current and future ferret reintroduction sites will not be seriously impacted.

Within the ferrets' range, which includes three species of prairie dogs, the Service believes that the availability of rodenticides will not prevent recovery of the ferret because recent analysis of the three prairie dog species indicates those prairie dog species continue to inhabit millions of acres of habitat (Service 2010c, 2009b, 2008c). But as noted earlier, without adequate regulatory mechanisms, poisoning can affect current and future ferret reintroduction sites (Service 2008b). While the total prairie dog acreage among the three species is much greater than is believed necessary to recover the ferret, much of the existing prairie dog acreage is not of a size or in a location to contribute to ferret recovery. The Ferret Recovery Plan estimated an average of 124 acres of prairie dog colonies is needed per ferret or approximately 185,000 acres of ferret occupied prairie dog habitat needed to meet downlisting objectives for ferrets (Service 1988). This acreage amount can be distributed between the three species of prairie dogs that encompass the ferrets' range (Service 1988). While complete delisting objectives for the ferret have not been finalized, it is likely that 500,000 acres of managed prairie dogs distributed between the three prairie dogs species would be sufficient to support delisting recovery objectives for the ferret (Service 1988).

Another important factor affecting prairie dog populations and therefore ferret recovery is sylvatic plaque and the ongoing outbreaks which can result in widespread prairie dog die offs or in some cases or more subtle deaths (Cully *et al.* 2010, Matchett *et al.* 2010). This exotic disease can directly kill ferrets that consume infected prairie dogs or eliminate ferret habitat among the three prairie dog species (Gage and Kosoy 2006, Godbey *et al.* 2006). At this time, the Service does not have information that Rozol use on black-tailed prairie dogs in combination with other rodenticides and sylvatic plague will prevent ferret recovery, but in order to make informed decisions in the future it will be important to have an understanding of the extent of Rozol use in each state.

At this time, the Service believes that Rozol use on black-tailed prairie dogs, as modified through the agreed upon conservation measures will not preclude the conservation and recovery of the ferret even when combined with the use of other currently available legal rodenticides and our understanding of sylvatic plague.

Conclusion Regarding Jeopardy

After reviewing the current status of the black-footed ferret, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the use of Rozol as a black-tailed prairie dog rodenticide, which includes the ferret conservation measures, is not likely to jeopardize the continued existence of the ferret.

This conclusion is based on the following:

- Rozol use will be prohibited in current and future ferret reintroduction sites. Survival of the species will not be compromised.
- The ferret conservation measures are designed to avoid Rozol restrictions on adjacent properties to minimize opposition to ferret reintroductions.
- There is sufficient prairie dog acreage between the three species of prairie dogs to support current ferret Recovery Plan downlisting objectives and likely future delisting objectives.

This conclusion is based in part on the project description as modified by the ferret conservation measures included in the EPA's letter of December 13, 2011 (EPA 2011c).

Incidental Take Statement

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the EPA so that they become binding conditions of any grant, permit or registration that may be issued, for the exemption in section 7(o)(2) to apply. The EPA has a continuing duty to regulate the use of Rozol for black-tailed prairie dog control to receive coverage by this incidental take statement. If the EPA (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the label and County Bulletins the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the EPA must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement (50 CFR § 402.14(i)(3)).

Amount or Extent of Take Anticipated

The Service has developed this incidental take statement based on the premise that the EPA and the Registrant will implement the ferret conservation measures as proposed. Take of black-footed ferrets is expected in the form of mortality when ferrets disperse from a reintroduction area and encounter a black-tailed prairie dog colony that has been poisoned with Rozol within the previous two months or if the ferret is residing on a colony when Rozol is applied. While ferrets can leave reintroduction sites, the Service is very unlikely to know when that occurs nor be able to accurately predict the number of ferrets that may encounter Rozol poisoned black-tailed prairie dog colonies. Most ferrets that leave a reintroduction area are likely to die because of natural causes (predation/starvation) or other activities (vehicle collisions) unrelated to Rozol. Further, due to ferrets’ nocturnal behavior and tendency to spend much of their time underground in prairie dog burrows, it is unlikely that many if any ferret mortalities due to Rozol will be reported to further inform this issue. Therefore, while dispersing ferrets may die from consuming Rozol-poisoned prairie dogs, this number is not anticipated to be large and will rarely be detected.

At previous ferret reintroduction sites, there are very few reports of dispersing animals outside the reintroduction site, and the reports received are typically associated with mortalities such as vehicle collisions or possible sightings that are followed up with concerted nighttime surveys (Hanebury and Biggins 2006). Ferret reintroduction site managers are authorized to retrieve dispersing ferrets if that information is available and the adjacent landowner wants the ferrets removed from their property. Requests to relocate ferrets that have left a reintroduction area are very rare.

The Service anticipates that take of dispersing ferrets that leave a reintroduction area and encounter a Rozol poisoned black-tailed prairie dog colony will result in two or fewer ferret mortalities per year because the number of dispersing ferrets is not believed to be high and most dispersing ferrets are expected to die of natural causes or other forms of incidental take. Ferrets that are captured alive from an area proposed for Rozol use and relocated to suitable habitat where Rozol will not be applied will not be counted against the lethal take of two ferrets per calendar year. The relocation of live ferrets from proposed Rozol use areas, while considered take is authorized under each ferret sites' existing management plan and authorized through a Service issued permit to the recovery partners at that site. That Service issued reintroduction site permit, authorizes activities, including ferret relocation if needed, at each of the reintroduction sites through coordination with the Black-footed Ferret Recovery Coordinator. Therefore this Rozol Incidental Take Statement is not intended cover relocation activities because such actions have been previously authorized. Ferret mortalities from those relocation efforts are not anticipated. If two ferret mortalities in a calendar year are attributed to Rozol use then the EPA and the Service shall reinitiate consultation to determine if there is additional conservation measures that can be incorporated to reduce take of ferrets. This incidental take statement exempts take of black-footed ferrets protected by the ESA that may be incurred by the proposed action, provided the September 10, 2010, Rozol label is followed. Noncompliance with the Rozol label that results in take of black-footed ferrets is not covered by this incidental take statement; end users who do not comply with label requirements are not afforded take coverage and are subject to prosecution under section 9 of the ESA.

The Service does not anticipate take in the form of harm through habitat loss because the conservation measures prohibit Rozol use in existing and future ferret reintroduction sites. Current information does not indicate Rozol use is limiting potential ferret reintroduction sites.

Effect of Take

The Service has determined that two mortalities per year of dispersing ferrets due to Rozol use is not likely to jeopardize the continued existence of the black-footed ferret or materially affect ferret reintroduction sites because dispersing ferrets are not known to regularly return to the reintroduction site. It is acknowledged that for every Rozol ferret mortality reported, there are likely to be multiple ferret mortalities not found or reported. Because the ferret mortalities are expected to occur to dispersing ferrets unlikely to contribute to the success of the reintroduction site, such losses are not anticipated to compromise the survival and recovery of the ferret.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of the ferret resulting from the proposed action:

1. The EPA will ensure Rozol will not be used in current and future ferret reintroduction areas.

2. If an applicator or the EPA becomes aware that a ferret is known to occupy a black-tailed prairie dog colony outside of a reintroduction area, Rozol cannot be used on that colony until the ferret or ferrets have been relocated. The reintroduction site manager should be contacted

3. The EPA or an applicator must notify the Service if ferrets or carcasses thereof are found during any Rozol use related activities.

4. The EPA in cooperation with Liphatech shall develop and maintain a system to track Rozol used for black-tailed prairie dog control and report to the Service the amounts sold/used in each of the ten states.

5. The EPA will ensure that if a previously unknown wild ferret population is discovered, Rozol use will not be used on that population.

6. The EPA shall initiate or require studies to evaluate secondary toxicity of the EPA registered prairie dog rodenticides to ferrets.

7. The EPA shall initiate or require studies to demonstrate whether the label requirements that are intended to prevent secondary poisoning of non-target animals is preventing routes of secondary exposure.

Terms and Conditions

Compliance with the following terms and conditions must be achieved in order to be exempt from the prohibitions of section 9 of the ESA. These terms and conditions implement the Reasonable and Prudent Measures described above. These terms and conditions are nondiscretionary. The EPA must report to the Service's South Dakota Ecological Services Field Office on the implementation of these terms and conditions.

To implement RPM 1:

- The EPA shall modify the existing Rozol label to require that Rozol applicators access the EPA County Bulletin website to find out the location of black-footed ferret reintroduction sites before dispersing Rozol. The South Dakota Ecological Services Field Office shall be given an opportunity to review and approve changes that are intended to minimize take of black-footed ferrets.

- The EPA shall maintain and update the EPA County Bulletin website so that a current listing of ferret reintroduction sites and Rozol prohibited use areas are available to the public.

- The EPA shall ensure that the ferret conservation measures described in this biological opinion are implemented and adhered to.

To implement RPM 2 and 3:

- The EPA shall develop and implement a reporting system to notify the Service in the event of a ferret or other listed species found during Rozol use related activities. If the reporting system involves a label change, the South Dakota Ecological Services Field Office shall be given an opportunity review and approve changes.

- The EPA shall ensure sufficient time (three weeks minimum) is allocated for relocating ferrets prior to use of Rozol on black-tailed prairie dog colonies that are known to have ferrets.

To implement RPM 4:

- The EPA shall develop and implement a system of reporting for distributors and applicators that tracks the amounts of Rozol sold and used in each state and project the amount of black-tailed prairie dog acres poisoned.

- The EPA shall report that information to the Service by January 31 after the end of each calendar year.

To implement RPM 5:

1. The EPA shall modify the EPA County Bulletin website to include the location of wild extant black-footed ferret populations if discovered in the future.

To implement RPM 6:

1. The EPA shall initiate and complete studies within three years that evaluate secondary toxicity of the FIFRA registered prairie dog rodenticides to black-footed ferrets.

To implement RPM 7:

1. The EPA shall initiate and complete studies within three years to determine measures necessary to prevent exposure to ferrets and other nontarget wildlife evaluates whether the label restrictions intended to prevent secondary are successful.

2. The EPA shall initiate and complete studies within three years that evaluates the effectiveness of anticoagulant labels that require multiple return visits to anticoagulant poisoned prairie dog towns to retrieve dead and dying prairie dogs.

3. The EPA shall develop a reporting form for applicators and landowners to use that can be return to the EPA and identify the time and date of return visits, which wildlife species were located, disposition of wildlife found, i.e. whether the prairie dogs were removed from the colony, if Rozol was found on the surface and other information that can be used to assess the routes of exposure to nontarget wildlife.

4. The EPA shall modify the Rozol label to reflect study results that may prevent Rozol exposure to nontarget species.

This incidental take statement exempts take of ferrets protected by the ESA that may be incurred by the proposed action, provided the September 10, 2010, Rozol label is followed. Noncompliance with the Rozol label that results in take of ferrets is not covered by this incidental take statement; end users who do not comply with label requirements are not afforded take coverage and are subject to prosecution under section 9 of the ESA.

The Service believes that no more than two ferrets per year will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The EPA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Ferrets

Upon locating a dead, injured or sick ferret or other listed species initial notification must be made to the Service's Law Enforcement Offices located in the state where the animal is found within three working days of its finding.

The National Black-Footed Ferret Coordinator must also be notified within three working days at: U.S. Fish and Wildlife Service, P.O. Box 190, Wellington, CO 80549. Phone: 970-897-2730 x 224, Fax: 970-897-2943 Mobile: 720-626-5260

Written notification must be made within five calendar days of locating a dead ferret and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office and a copy to the Ferret Coordinator Office above. Care must be taken in handling sick or injured animals to ensure effective treatment or in the case of dead specimens, it can be frozen to aid in preservation.

Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following conservation activities that are within the EPA's authorities and can benefit ferret recovery:

1. The EPA should become a member of the Black-footed Ferret Recovery Implementation Team due to congressionally delegated responsibilities for regulating rodenticides and recovering federally threatened and endangered species. Prairie dog rodenticide registrations under FIFRA are significant actions that can adversely affect ferrets and other listed species. The EPA participation on the Black-footed Ferret Recovery Implementation Team would provide an avenue to understand the ramifications of rodenticide use on ferret habitat along with an opportunity to work with recovery partners to ensure EPA actions avoid working at cross purposes with ferret recovery.

2. The EPA should monitor the registered rodenticides used on the three species of prairie dogs in the ferrets' range and report the amounts of prairie dog rodenticides sold, used, and the expected prairie dog acreage poisoned per state per year.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

3. GRAY WOLF

Status of the Species/Critical Habitat

Gray wolves from three separate populations are relevant to this consultation: 1) the Northern Rocky Mountains Distinct Population Segment which encompasses the eastern one-third of Washington and Oregon, a small part of north-central Utah, and all of Montana, Idaho, and Wyoming; 2) the Western Great Lakes Distinct Population Segment which has a core area occurring in Michigan, Wisconsin, and Minnesota and a peripheral zone including eastern North Dakota, eastern South Dakota, northern Iowa and a small portion of northern Illinois; and 3) the reintroduced Mexican gray wolf, a subspecies, reintroduced into an experimental population (under section 10j of the ESA) area that includes portions of central Arizona, central and southern New Mexico, and a minute portion of western Texas, south of New Mexico.

In 1974-1976, the Service listed three subspecies of gray wolf (Northern Rocky Mountain gray wolf (*Canis lupus irremotus*), eastern timber wolf (*Canis lupus lycaon*) (Service 1974), and Mexican wolf (*Canis lupus baileyi*)) (Service 1976)) under the ESA, but in 1978 revised those regulations to list the entire gray wolf species as endangered, except in Minnesota where it was listed as threatened, in the coterminous United States (Service 1978). At that time the Service also designated critical habitat in Isle Royale, Michigan, and parts of northern Minnesota (Service 1978). Since then the Service has implemented numerous actions relative to the gray wolf including development of recovery plans, identification of Distinct Population Segments and Nonessential Experimental Populations, initiation of reintroductions and other recovery actions, and development of regulatory changes that have been subject to litigation in numerous federal courts. For additional details and maps of these wolf recovery areas see: 1) Final Rule To Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife (Service 2009f), 2)

Endangered and Threatened Wildlife and Plants; Revising the Listing of the Gray Wolf (*Canis lupus*) in the Western Great Lakes (Service 2011f), and 3) Final Rule; Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico (Service 1998).

Currently, gray wolves in the Northern Rocky Mountain Distinct Population Segment (including Montana and Idaho, as well as portions of eastern Oregon, eastern Washington, and north-central Utah, but excluding Wyoming) are removed from the List of Endangered and Threatened Wildlife and no longer receive protections under the ESA (Service 2011g). Management of wolf populations in Montana and Idaho has been transferred to state authority. Wyoming has a management plan contingent upon necessary additional changes to Wyoming State law; Wyoming is anticipated to adopt the necessary statutory and regulatory changes within the next several months, at which point wolves in Wyoming may be removed from the List of Endangered and Threatened Wildlife under the ESA after rulemaking has occurred (Service 2011h). Until then, wolves in Wyoming are protected by the ESA and considered a Nonessential Experimental Population designated under section 10(j) which has increased the Service's flexibility and discretion in managing the gray wolf reintroduced population. These wolves are treated as threatened, allowing for special regulations providing exceptions to the take prohibitions under section 9 of the ESA.

A final rule to remove wolves in the Western Great Lakes Distinct Population Segment from the list of Endangered and Threatened Wildlife was published in the Federal Register on December 28, 2011 (Service 2011f), effective January 27, 2012. Management of wolf populations in Minnesota, Wisconsin and Michigan is now under the purview of those states.

Mexican gray wolves currently retain their original Nonessential Experimental Population, section 10(j) status, and are protected by the ESA within the parameters established for that reintroduction effort (Service 1998). Mexican gray wolves have been released annually into this population, and this practice will likely continue until natural reproduction sustains wild population growth.

While the open rangeland habitat of the black-tailed prairie dog does not coincide with the typical habitats (forested landscapes) used by gray wolf populations in the United States today, the ranges of the two species overlap when individual gray wolves disperse from their core populations. Those dispersing individuals are most relevant to this analysis. When wolves disperse from their packs and occur in other areas outside the boundaries of any Distinct Population Segment or Nonessential Experimental reintroduction area, their status under the ESA changes; they take on the listing status of the gray wolf in that area (wolves occurring in western North and South Dakota, Nebraska, Colorado, and other areas are considered endangered). Those wolves will remain protected by the ESA regardless of recent delisting actions in the Northern Rocky Mountain and Western Great Lakes Distinct Population Segments, unless the Service makes additional regulatory changes in the future. Those wolves within Nonessential Experimental area boundaries (Wyoming, Arizona/New Mexico) retain ESA protections, but with the management parameters established with the section 10(j) rulemaking.

Critical habitat has been designated for the gray wolf, but not within the action area. Due to a lack of overlap with the black-tailed prairie dog range, the Service agrees with the EPA no critical habitat will be impacted by the proposed action; therefore gray wolf designated critical habitat is not described herein.

Species description

Gray wolves (*Canis lupus*) are the largest wild members of the dog family (Canidae). Adult gray wolves range from 18–80 kilograms (40–175 pounds) depending upon sex and region (Mech 1974). Smaller sizes tend to be found in the southern portion of wolf range and larger sizes in the northern portion. Females weigh slightly less than males. Wolves reach adult size by one year of age. Wolves' fur color is frequently a grizzled gray, but it can vary from pure white to coal black.

Life History

Elements considered relevant to this consultation are described below. Additional detailed information on the biology of this species is available in numerous documents within the literature cited of this document (e.g.''Biology and Ecology of Gray Wolves'' section of the April 1, 2003, final rule to reclassify and remove the gray wolf from the list of endangered and threatened wildlife in portions of the conterminous United States (Service 2003).

Range and habitat. Within North America, gray wolves formerly ranged from coast to coast with the exception of the mid-Atlantic states and the Southeast (areas occupied by the red wolf), and perhaps parts of California. They have historically been found in almost all habitat types, including the prairie and rangelands of the central United States where, coinciding with human settlement, most populations of wolves were extirpated by the early 1900's. In the coterminous 48 states today, they are found in the mostly forested lands of Minnesota, Wisconsin, Michigan, Montana, Idaho, and Wyoming, with the addition of the Mexican subspecies reintroduction area in New Mexico, Arizona and a small part of western Texas. Once thought to need wilderness areas to survive, wolves can successfully occupy a wide range of habitats, though they tend to more readily occupy heavily forested areas and landscapes with low road densities (Mladenoff *et al.* 1995). In Minnesota and Wisconsin, wolves are proving themselves more tolerant of human disturbance than previously thought and their range has expanded to include areas that are a mix of forest and agriculture. Essentially, wolves can live almost anywhere if they have abundant wild prey and excessive numbers are not taken by humans.

Prey items. Wolves are predators of primarily medium and large mammals. They may not eat for a week or more but are capable of eating 20 pounds of meat in a single meal. Wild prey species in North America include animals such as white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), moose (*Alces alces*), elk (*Cervus canadensis*), and other large ungulates. Wolves will also prey on mid-sized mammals, such as snowshoe hare (*Lepus americanus*) and beaver (*Castor canadensis*), with small mammals, birds, and large invertebrates sometimes being taken (Mech 1974, Stebler 1944, Wisconsin Department of Natural Resources 1999).

Social nature and territory size. Wolves are social animals, normally living in packs of 2 to 12 wolves (but that number can vary considerably; pack sizes ranging into the 30's have been documented). The pack defends a territory that can be as large as 50 square miles or even extend up to 1,000 square miles in areas where prey is scarce. The pack consists of a breeding (top-ranking or alpha) pair, their pups from the current year, offspring from the previous year, and occasionally an unrelated wolf. Unrelated wolves are typically individuals dispersing from other packs.

Dispersal. As indicated by the territory size described above, wolves often cover large areas and may travel as far as 30 miles a day. Although they trot at approximately 5 miles per hour (m.p.h.), wolves can attain speeds as high as 40 m.p.h. By three years of age, many wolves disperse from the pack they were born into to find mates and expand into new areas. The animals have extraordinary dispersing ability, traveling over 600 miles, sometimes over large areas of inhospitable terrain. A wolf in Sweden with a Global Postitioning System (GPS) collar travelled a straight line distance of >1,092 kilometers (682 miles) with an actual travel distance of over >10,000 kilometers (6,000 miles) in just under a year (Wabakken *et al.* 2008). A wolf that dispersed from Gardiner, Montana to western Colorado, where she was illegally killed by 1080 Compound poison in March 2009, travelled a straight line distance of 400 miles in six months but daily GPS locations showed she actually walked over 3,000 miles (Service *et al.* 2011).

Considerable information on wolf dispersal was obtained during 1993-2008, when 1,681 radiocollared wolves (858 males and 823 females) in the Northern Rocky Mountain Distinct Population Segment were tracked (Jimenez *et al.* 2011). The large sample size distinguishes that study; however, most of what was documented mirrored that already found by others (Fritts and Mech 1981, Boyd and Pletscher 1999, Mech 1987, Gese and Mech 1991, Boyd *et al.* 1995). Ten percent of the Northern Rocky Mountain wolf population dispersed annually; 297 known dispersals by 281 wolves were documented (some wolves dispersed and returned to their original pack up to three times). Many other dispersal events likely occurred during the Northern Rocky Mountain dispersal study, but were undetected because only about 30 percent of the Northern Rocky Mountain wolf population was radio-collared by 2008 and it is difficult to detect lone dispersing wolves. Most wolves tended to move southward, but 55 dispersals occurred in an easterly direction. The dispersals could occur anytime during the year, but increases were noted in the fall with the peak occurring in January, and 58 percent (n=153) of all dispersals occurred between October and February (i.e. during the timeframe Rozol may be applied) (Jimenez *et al.* 2011, unpublished data). Light and Fritts (1999) studied 10 wolf mortality records in North and South Dakota between 1981 and 1992 and found that nine occurred in winter.

Dispersal distance by individual wolves in the Northern Rocky Mountain wolves study (Jimenez *et al.* 2011, unpublished data) was not as great as the species' potential, described above; mean dispersal distance for males was 98.1 kilometers (61 miles) and was not significantly different (P=0.11) than female dispersal distance at 87.7 kilometers (54.5 miles). However, in 10 instances, the wolves moved > 186 miles which were considered to be unusually long distances (Jimenez *et al.* 2011, unpublished data). About 20 confirmed Northern Rocky Mountain wolf dispersal events from 1992 through 2010 have been over 190 miles with four wolves travelling beyond the Northern Rocky Mountain Distinct Population Segment border (Service *et al.* 2011).

The eastern edge of the Northern Rocky Mountain Distinct Population Segment is about 400 miles from the western edge (eastern Minnesota) of the Western Great Lakes Distinct Population Segment core area and is separated from it by hundreds of miles of unsuitable habitat in those Great Plains states (Service 2009g**)**. This propensity to disperse and the distances that have been recorded are the factors that lead the Service to believe gray wolves could encounter Rozol-poisoned prairie dogs and be exposed.

Dispersing wolves can have a lower survival rate than individuals that do not leave their packs (Jimenez *et al*. 2011, unpublished data), and those that disperse often die in proportionately higher numbers from human causes than those that do not disperse (Boyd and Pletscher 1999). Of 281 dispersing wolves in the Northern Rocky Mountain study, 166 (59 percent) survived dispersal to pair with another dispersing wolf to form new packs or join new packs (Jimenez *et al*. 2011, unpublished data). The unusually long-distance dispersers typically do not find mates or survive long enough to form packs or breed in the United States (Service 2009f). Human causes of mortality among dispersing wolves include illegal shootings, trapping, poisonings (e.g. M-44's intended for coyotes), and vehicle collisions. Despite human-caused mortalities, populations have continued to increase in both numbers and range in both the Northern Rocky Mountain and Western Great Lakes Distinct Population Segments. The Mexican wolf population has struggled to overcome this issue; 66 percent of all documented mortalities as of December 31, 2010 were human-caused, and these high mortality rates may reduce dispersing wolves below levels noted for other studied wolf populations (Service 2011i).

Of the 10 wolf mortalities documented in North and South Dakota from 1981-1992, eight were mistakenly shot as coyotes, one was beaten to death after being chased by dogs, and another was shot by a hunter after the wolf allegedly attacked the man's horse as he was riding it (Light and Fritts 1999).

Dispersing wolves have been noted in Colorado in recent years with mortalities in 2004 and 2009. A wolf killed by a car in Sturgis, South Dakota in 2006 was determined to have been from the Northern Rocky Mountain Distinct Population Segment. A wolf from the Western Great Lakes Distinct Population Segment was killed in Nebraska in 2003. A wolf (origin unknown) killed via cyanide gun (M-44) intended for coyotes was documented in Harding County, South Dakota, in 2001. Other instances of mortality were noted in the Service's May 5, 2011, Proposed Rule To Revise the List of Endangered and Threatened Wildlife for the Gray Wolf (*Canis lupus*) in the Eastern United States, Initiation of Status Reviews for the Gray Wolf and for the Eastern Wolf (*Canis lycaon*) (Service 2011j):

- *an adult male shot near Devil's Lake, North Dakota in 2002,*
- *another adult male shot in Richland County in extreme southeastern North Dakota in 2003,*
- *a wolf was shot in Roberts County, South Dakota in January 2009,*
- *another wolf was found dead in a foothold trap that was set as part of an ongoing USDA Wildlife Service's coyote control operation in southeastern Eddy County, North Dakota.*

Relatively high road and human densities in the black-tailed prairie dog range and the absence of forested cover and high likelihood of conflicts with livestock make wolves highly vulnerable to human-caused mortality, precluding recolonization in these areas (Light and Fritts 1999). Dispersing wolves are likely to encounter many forms of threats when they leave their core areas and high wolf mortality rates in the black-tailed prairie dog range are likely irrespective if Rozol is being used. We currently have no documented Rozol-related mortalities of gray wolves.

Population Dynamics

Gray wolves are known to live up to 13 years in the wild and 15 years in captivity. Wolves typically breed as 2-year olds and may annually produce young until they are over 10 years old. Litter sizes range between one to 11 pups, but generally include four to six pups (Service 2003). Normally a pack has a single litter annually, but producing two or three litters in one year has been documented in Yellowstone National Park (Service *et al.* 2002). The breeding season for wolves is from late January through March; the further south, the earlier the breeding season.

Breeding members of wolf packs can be quickly replaced either from within or outside the pack. Pups can be reared by another pack member should their parents die (Packard 2003, Brainerd *et al.* 2008, Mech 2006). Consequently, wolf populations can rapidly recover from severe disruptions, such as very high levels of human-caused mortality or disease. After severe declines, wolf populations can more than double in just two years if mortality is reduced; increases of nearly 100 percent per year have been documented in low-density suitable habitat (Fuller *et al.* 2003, Service *et al.* 2008, 2009f). Additionally, their extraordinary dispersal ability helps explain why wolves can recolonize even distant vacant suitable habitat relatively quickly and why their populations are resistant to extirpation (Mech and Boitani 2003, Adams *et al.* 2008).

Starting with an estimated 55 individuals that naturally colonized northwestern Montana in 1993, the Northern Rocky Mountain population grew an average of 25 percent annually between 1993 and 2008, with the assistance of reintroduction efforts in Wyoming and Idaho. At the end of 2009, the population estimate had grown to at least 1,706 wolves in 242 wolf packs, and 115 breeding pairs (Bangs 2010). In 2010, that number was slightly down to 1,651 (Service *et al*. 2011).

The Western Great Lakes Distinct Population Segment today is estimated to contain over 4,000 wolves with the majority occurring in Minnesota. The Minnesota wolf population increased from an estimated 1,000 individuals in 1976 to 2,921 as of 2007-2008, and the estimated wolf range in the State has expanded by approximately 225 percent (Service 2011j). Wolves were considered extirpated from Wisconsin in 1960, but began to recolonize in the 1970s and an increase in the late 1980's has continued into 2011; the current population estimate there is 782 wolves (Service 2011k, 2011f). With exception of Isle Royale, wolves were extirpated from Michigan prior to the gray wolf listing, but wolves began to return in the late 1980's (Beyer *et al.* 2009), and wolf packs have continued to spread throughout Michigan's Upper Peninsula. Wolves are now found in nearly every county of Michigan's Upper Peninsula (Huntzinger *et al.* 2005, Service 2011j), and 87 individuals were estimated to occur in Michigan in 2010-11 (Service 2011f).

The Mexican wolf reintroduction began in 1998 with the release of 11 individuals in the Blue Range Wolf Recovery Area of New Mexico and Arizona. The population has increased with a minimum end-of-year count peak of 59 wolves in 2006, via natural reproduction, translocations and initial releases. At the end of 2009, the wild population totaled a minimum of 42 individuals (Service 2010d).

With a minimum of 1,651 wolves in the Northern Rocky Mountain Distinct Population Segment in 2010 (Service *et al*. 2011), an estimated 4,390 in the Western Great Lakes Distinct Population Segment (assuming the number of wolves in Minnesota has not changed substantially since 2007-2008, the date of the most recent estimate available for this analysis) (Service 2011f), and a 2009 estimate of the Mexican wolf population at 42 (Service 2010d), the total minimum estimate of wolves in these areas combined is approximately 6,083. Wolf population levels in the range of the black-tailed prairie dogs are limited to dispersing wolves.

Status, Trends, and Distribution

In both the Northern Rocky Mountain and Western Great Lakes Distinct Population Segments, wolf numbers are trending upward, but at slower rates than has been documented in the past. Available habitat appears to be reaching carrying capacity. The total population in the Northern Rocky Mountain Distinct Population Segment today is about five times higher than the minimum population recovery goal and three times higher than the minimum breeding pair recovery goal (Service 2009f); the population has exceeded numeric and distributional recovery goals for about a decade. The Northern Rocky Mountain wolf population occupies nearly 100 percent of the recovery areas recommended in the 1987 recovery plan (Service 1987) and nearly 100 percent of the primary analysis areas (the areas where suitable habitat was predicted to exist and the wolf population would live) analyzed for wolf reintroduction in central Idaho and the greater Yellowstone area (Service 1994). As mentioned above, wolves in the Northern Rocky Mountain Distinct Population Segment have been delisted in Montana, Idaho, Wyoming, Eastern Oregon, and Eastern Washington, and are proposed to be delisted in Wyoming in the near future.

Relatively slow growth to stable populations in Minnesota, Wisconsin, and Michigan in recent years is indicative that available habitat is being filled in the Western Great Lakes Distinct Population Segment. Wolves in the Western Great Lakes Distinct Population Segment greatly exceed the recovery criteria (Service 1992) for (1) a secure wolf population in Minnesota, and (2) a second population outside Minnesota and Isle Royale consisting of 100 wolves for five successive years. Based on the criteria set by the Eastern Wolf Recovery Team in 1992 and reaffirmed in 1997 and 1998 (Service 2011j), the proposed Distinct Population Segment contains sufficient wolf numbers and distribution to ensure their long-term survival within the Distinct Population Segment and this population has been delisted (Service 2011f).

As mentioned above, the Mexican gray wolf population in New Mexico and Arizona has struggled to remain viable and numbers remain very low. The Nonessential Experimental Population is currently not self-sustaining.

The number of dispersing wolves from recovered wolf populations may currently be at its peak due to high wolf recovery numbers. As states take over wolf management, they will likely seek to achieve lower, but still viable, wolf population levels, thus the number of dispersing wolf may decrease under state management plans. However, the Service believes there will still be some dispersing wolves from existing populations into areas where Rozol may be applied for prairie dog control. Areas within the black-tailed prairie dog range where the wolf remains protected are the locations where exposure to Rozol may occur that results in take of gray wolves.

Reasons for Listing. The decline and near extirpation of wolves from the lower 48 states in the early part of the 20th century was caused by a number of factors including extreme control programs designed to eliminate the species. Factors in the eastern timber wolfs' decline included intensive human settlement, direct conflict with domestic livestock, lack of understanding of the animal's ecology and habits, and fears and superstitions regarding wolves and extreme control programs designed to eradicate it (Mech 1970, Service 1987) These were a common thread among wolf populations in other areas of the United States as well. Land development (loss of habitat), impacts to prey base, poisoning, trapping and hunting were also factors identified in the decline (Service 1987). Mech (1995) indicates that primarily inadequate prey density and a high level of human persecution limit wolf distribution. In short, human-caused mortality is identified as the most significant issue to the long-term conservation status of wolves. Managing this source of mortality (i.e., overutilization of wolves for commercial, recreational, scientific and educational purposes and human predation) remains the primary challenge to maintaining a recovered wolf population into the foreseeable future (Service 2009f).

Analysis of the species likely to be affected

Any gray wolves protected by the ESA that disperse from known populations in existing (typically forested) occupied habitats into open rangelands where the black-tailed prairie dog exists (within the 10 states where Rozol may be applied) are the individuals of concern with the potential to be adversely affected by the proposed action. Wolves in Nonessential Experimental Populations receive protections of the ESA per their specific rulemaking parameters. Wolves occurring outside of existing Distinct Population Segments, delisted areas, or Nonessential Experimental Populations take on the ESA status of the area they are in, and will remain so until future regulatory changes are made.

As mentioned previously under the "Conservation Measures" section, in order to provide some protections for the Mexican gray wolf, the EPA and Liphatech agreed to preclude Rozol use from Catron, Grant, Hidalgo, and Sierra Counties of New Mexico, which are part of the Blue Range Wolf Recovery Area. Prairie dogs occur in these counties, but are primarily Gunnison's prairie dog (*Cynomys gunnisoni*); the black-tailed prairie dog is not common in these areas (Johnson *et al.* 2003), and prohibiting Rozol use on black-tailed prairie dog will further reduce possible impacts to those reintroduction efforts. Dispersing wolves from the Mexican gray wolf reintroduced population are few, and individuals are typically translocated or killed. Thus, while Rozol use may still occur within the greater Nonessential Experimental Population area boundary, key areas of the reintroduction area will not have Rozol use. This conservation measure is anticipated to greatly minimize the risk of Rozol use on the Mexican gray wolf.

Some level of wolf dispersal is expected from other recovered wolf populations and the potential for endangered wolves to encounter Rozol in the proposed 10-state area of application exits. Documented gray wolf mortalities in the action area since 1981 (20 records were located for this analysis over a span of 31 years in the states of North & South Dakota (17), Colorado (2) and Nebraska(1)) have averaged approximately 0.65 wolves/year. These are documented wolf mortalities, but it is unknown how many gray wolves may disperse into the action area and not be reported.

Environmental Baseline

Status of the Species within the Action Area

Gray wolves are not uniformly protected under the ESA throughout the range of the black-tailed prairie dog. Some wolf populations have already been, or soon may be, delisted. The exact number of dispersing wolves that may occur in the range of the black-tailed prairie dog where Rozol is proposed for use cannot be determined with certainty. The Service does not know of wolf populations in the range of the black-tailed prairie dog except for the reintroduction efforts in southwestern New Mexico. The Service recognizes dispersing wolves can occur in the black-tailed prairie dog range and could be exposed to Rozol use.

Factors Affecting Species Environment within the Action Area

Throughout the range of the wolf, generally three factors dominate wolf population dynamics: food, people, and source populations (Fuller *et al.* 2003). Among those three factors and within the black-tailed prairie dog range, people likely have the greatest influence on dispersing wolves. Traveling wolves must cross numerous stretches of roads and may be struck by vehicles. In addition to such vehicle-caused mortality, road access to wolf habitat generally increases the risk of other human-related mortality of wolves, including shooting and trapping (Mech *et al.* 1988; Fuller 1989). When individual wolves appear in areas not known to harbor packs, they are often mistaken for coyotes and shot. Wolves become particularly vulnerable to this type of mortality when they occur in open rangelands, far from the protective cover of forested areas they usually inhabit. Cases of livestock depredation by dispersing wolves have also been documented, and those wolves are often killed as well. Ongoing animal damage control activities by the United States Department of Agriculture and/or state agencies in the action area that target coyotes may instead kill wolves in accordance with established wolf depredation plans. While these factors affecting dispersing wolves are not expected to influence the existing healthy wolf populations from which they came, in the dispersal areas wolves may not survive long due to human-caused mortality.

Effects of the Action

According to the BA (page 107), chlorophacinone exposure to the gray wolf is expected as the wolf range overlaps black-tailed prairie dog and gray wolf prey items may include animals poisoned by Rozol including small mammals, birds and large invertebrates. The EPA determined that adverse direct effects to the gray wolf are likely based on calculated Risk Quotients that included 24.82 for exposure to non-target animals and 9.59 for exposure to black-tailed prairie dogs (Table 1.1, page 21 of the BA). The EPA further estimates that the gray wolf would only have to consume less than one poisoned mouse or less than one poisoned black-tailed prairie dog every day for five days to exceed a 0.1 Level of Concern for endangered species (EPA 2010b, Appendix B). On page 21 of the BA (Table 1.1), the EPA states that "growth and reproductive effects cannot be precluded due to the absence of chronic data; however, growth and reproductive effects are not expected because mortality typically occurs as a result of acute exposure." Table 1.1 of the BA also describes potential indirect effects due to the loss of prey base. The Service agrees that Rozol use on black-tailed prairie dogs could adversely affect dispersing wolves.

The effects to dispersing gray wolves in the action area are most likely to be indirect, i.e. secondary poisoning via consumption of Rozol-poisoned live animals or carcasses. It is suspected that wolves would consume dead or dying prairie dogs if they are encountered above ground, and may also excavate and consume prairie dogs that are buried or die underground. The frequency at which a dispersing wolf might encounter a Rozol-poisoned area is unknown and would depend on a variety of factors such as the prevalence of Rozol use in the area, the type of habitat traveled by the wolf, the distance traversed, and the availability of other prey items.

Although there are no previous reports of gray wolf exposure to chlorophacinone rodenticides, other canines including kit foxes and coyotes, in addition to an American badger have been found dead in association with a Rozol application (Ruder *et al.* 2011). Although these animals are smaller than a wolf, they are all opportunistic predators and scavengers like wolves. If multiple dead and dying prairie dogs and other non-target small mammals were available for consumption, a wolf would likely take advantage of that situation. Effects of chlorophacinone exposure to the gray wolf when individuals do encounter a Rozol-poisoned prairie dog colony would likely be similar to those seen in dogs suffering from anticoagulant rodenticide toxicosis, which include shortness of breath, hemoptysis (i.e., the spitting up of blood from the lungs), pallor (i.e., reduced amount of oxyhaemoglobin in skin), and lethargy (Sheafor and Couto 1993, Murray and Tseng 2008). The EPA's use of an adjusted LD 50 of 0.03 mg/kg to evaluate risk to gray wolves is much more conservative than using the chlorophacinone LD50 range of 50 - 100 mg/kg for dogs (EPA 2010b).

The Service agrees with the EPA that a wolf that encounters a Rozol-poisoned black-tailed prairie dog colony could receive a lethal dose from consuming poisoned prairie dogs. The extent of effects and severity of response by a gray wolf to consumption of Rozol-poisoned animals would depend in part on the amount of Rozol ingested over time because most animals experience greater adverse effects from multiple doses of chlorophacinone. Repeat exposure could occur if a dispersing wolf remains near a Rozol-poisoned prairie dog colony and obtains multiple meals from it. Receiving a lethal dose may take more than one poisoned prairie dog. Sublethal effects may occur if a wolf leaves a prairie dog town before consuming a lethal dose or if timing is such that it does not find enough Rozol-poisoned animals to consume. However, little information is available regarding sublethal effects, and Rozol is known to be an effective anticoagulant. It seems likely that death would be the likely result for a gray wolf that ingests Rozol, either directly through hemorrhaging or sub-lethal impairment of behavior (e.g. breeding, feeding, sheltering) that eventually leads to its demise.

It is the Service's opinion that indirect effects to the gray wolf due to the loss of prey base from use of Rozol are not significant as defined under the ESA because prairie dogs are not known to be a significant dietary item for the gray wolf, which normally does not inhabit black-tailed prairie dog areas. Dispersing individuals are anticipated to come upon black-tailed prairie dog colonies only opportunistically as they travel.

Species' Response to the Action

Because the number of wolves dispersing into the action area is anticipated to be very low (as indicated above, we are aware of 20 gray wolf mortalities over 31 years in the action area), population-level effects are not anticipated. Lethal control of wolves in North and South Dakota, has been determined to have no adverse effects on the long-term viability of wolf populations in the delisted Western Great Lakes Distinct Population Segment, because the existence of a wolf or a wolf population in the Dakotas would not make a meaningful contribution to the maintenance of the current viable, self-sustaining, and representative metapopulation of wolves in the Western Great Lakes Distinct Population Segment (Service 2011j). The same may be said for wolves dispersing from the Northern Rocky Mountain Distinct Population Segment. The potential impact to the Mexican gray wolf population is not expected to be great, given the EPA's adopted conservation measure to exclude counties within the core reintroduction area and the ongoing intensive management that essentially inhibits dispersal of Mexican gray wolves. Individual gray wolves lost to Rozol poisoning are not anticipated to incur population level effects to the species. In the absence of human induced mortalities and presence of adequate prey, gray wolves are a resilient species, demonstrating relatively fast recovery rates after population declines.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The level of human activities in the action area today is anticipated to continue and perhaps increase as human populations continue to expand. Farming and ranching is prevalent in the range of the black-tailed prairie dog and will continue into the foreseeable future. The Service anticipates high mortality rates for gray wolves that disperse in the black-tailed prairie dog range. Such wolves occurring outside of their current cores ranges are likely to be intentionally or unintentionally killed via such mechanisms as vehicle collisions, poisoning, and shooting which will likely prevent recolonization of significant areas of the black-tailed prairie dog range. Cumulatively, wolf populations have continued to rise in the face of these factors.

Conclusion Regarding Jeopardy

After reviewing the current status of gray wolf, the environmental baseline for the action area, the effects of the proposed use of Rozol to control black-tailed prairie dogs in 10 western states and the cumulative effects, it is the Service's biological opinion that the action as proposed is not likely to jeopardize the continued existence of the gray wolf. Critical habitat has been designated, but does not occur in or near the action area; therefore, none will be affected. Our conclusion was based primarily on the following factors:

- Gray wolves dispersing into the action area are a very small portion of existing gray wolf populations.
- Dispersing wolves are not considered critical to recovery of wolf populations in the United States and cumulatively, gray wolf populations have continued to increase despite losses of dispersing individuals.
- Gray wolf populations are considered recovered by the Service in the Northern Rocky Mountain and Western Great Lakes Distinct Population Segments; delisting has occurred, and future delisting in Wyoming is proposed.
- The conservation measure by the EPA to preclude Catron, Grant, Hidalgo, and Sierra counties in New Mexico from Rozol use are protective of the Mexican gray wolf.

Incidental Take Statement

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. *Take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. *Harm* is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. *Harass* is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of the incidental take statement.

The measures described below are non-discretionary and must be undertaken by the EPA so that they become binding conditions of any grant or permit issued to Liphatech, as appropriate, for the exemption in section 7(o)(2) to apply. The EPA has a continuing duty to regulate the activity covered by this incidental take statement. If the EPA (1) fails to assume and implement the terms and conditions, or (2) fails to require Liphatech to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the EPA must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement (50 CFR § 402.14(i)(3)).

Amount or Extent of Take Anticipated

The Service anticipates dispersing wolves from source populations may occur in the black-tailed prairie dog range at an average rate of 0.65 wolves/year (essentially one or two every other year), based on documented mortalities outside of existing Distinct Population Segments. This is considered a conservative number as additional dispersers have likely occurred and gone undetected. Other forms of mortality can affect these wolves before any exposure to Rozol occurs. However, if wolves ingest poisoned prey, evidence suggests the wolves are likely to die. The exact number of wolves that may encounter a Rozol-poisoned prairie dog town with dead and dying prey is not determinable; however, we conclude that the number would be very low. The Service anticipates that one ESA-protected gray wolf every three years could be taken as a result of this proposed action. Due to the long-distance dispersal capabilities of gray wolves, this take could conceivably occur in Rozol-poisoned prairie dog towns throughout the action area but the risk is likely greatest in those states within proximity to the source populations of the recovered Northern Rocky Mountain and Western Great Lakes Distinct Population Segments (e.g. North and South Dakota, Nebraska, Colorado).

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. The take is also not anticipated to have any population level effects to recovered source populations of gray wolves that disperse into the action area. Rozol use on black-tailed prairie dog towns, and any resulting take of gray wolves, will likely not substantially change the mortality rates of long-distance dispersing wolves, as these individuals are already at high risk of encountering other known factors of wolf mortality during their travels. Thus, Rozol-poisoning is likely a compensatory form of mortality, not resulting in an overall increase in total mortality of gray wolves.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of gray wolves:

- The EPA shall report, or require applicators to report, all sickened, dying, or dead gray wolves (regardless of their status under the ESA) poisoned as a result of Rozol use on black-tailed prairie dog colonies.

- The EPA shall develop means to reduce the amount of Rozol-poisoned black-tailed prairie dogs and non-target species available for gray wolf consumption.

Little information is available regarding the use of black-tailed prairie dog colonies by dispersing gray wolves. The analysis herein presumes gray wolves could and would consume Rozol-poisoned dead and dying prairie dogs if they happen upon them, as well as available non-target species, but additional information on such instances would better inform the risks to individuals of this species. The Service anticipates this would necessitate a reporting requirement for Rozol end-users that is currently not specified, but would be a reasonable expectation given the existing requirements of the Rozol label to return post-application to collect above-ground bait and dispose of dead or dying animals.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the EPA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement RPM 1:

- The EPA shall modify the Rozol label to require that applicators report all dead/dying/impaired listed species including gray wolves located on, or in the vicinity of, Rozol-poisoned black-tailed prairie dog towns, post-application for as long as the product remains effective. This includes development of means to collect that information. Any wolves found shall be left in place, photographed if possible, and reported to local U.S. Fish and Wildlife Service Law Enforcement personnel immediately. Specimens should be collected by authorized individuals as soon as possible when located, and kept cool or frozen to facilitate later examination for Rozol poisoning. These requirements shall be added to the Rozol label upon the 2012 proposed use of Rozol to control black-tailed prairie dogs in the ten states covered by this consultation.

To implement RPM 2:

- The EPA shall work with the Service to develop a search protocol that would be adequate to reduce the risk of secondary poisoning to gray wolves by improving detection of black-tailed prairie dogs and non-target species on the surface. Compliance with the current September 10, 2010 label (Appendix) does not preclude the risk of secondary poisoning of non-targets like the gray wolf. The Service does not know of a practicable method to ensure poisoned animals are removed from a colony before secondary poisoning can occur. The Service recommends EPA engage research institutions and evaluate methods to prevent secondary poisoning of non-target animals when Rozol is used on black-tailed prairie dogs.

This incidental take statement exempts take of gray wolves protected by the ESA that may be incurred by the proposed action, provided the September 10, 2010, Rozol label is followed. Noncompliance with the Rozol label that results in take of gray wolves is not covered by this incidental take statement; end users who do not comply with label requirements are not afforded take coverage and are subject to prosecution under section 9 of the ESA.

The Service believes that no more than one wolf every three years will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The EPA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

2. NORTHERN APLOMADO FALCON

Status of the Species/Critical Habitat

The northern aplomado falcon (*Falco femoralis septentrionalis*) is one of three subspecies of the aplomado falcon and is the only one of those recorded in the United States. This subspecies was listed by the Service as an endangered species on February 25, 1986 (Service 1986). It once extended from Trans-Pecos Texas, southern New Mexico and southeastern Arizona, to Chiapas and the northern Yucatan along the Gulf of Mexico, and along the Pacific slope of Central America north of Nicaragua (Service 1990). Northern aplomado falcons were fairly common in suitable habitat throughout these areas until the 1940s. However, they subsequently declined rapidly and became extirpated from the United States after 1952. The last documented nesting pair of wild northern aplomado falcons in the United States was in Luna County, New Mexico, in 1952.

The decline of the northern aplomado falcon was caused by widespread shrub encroachment resulting from control of range fires and intense overgrazing (Service 1986, Burnham *et al.* 2002), and large-scale agricultural development in grassland habitats used by the northern aplomado falcon (Heady 1994, Keddy-Hector 2000). Pesticide exposure was likely a significant cause of the subspecies' extirpation from the United States with the initiation of widespread use of organochlorine pesticides, such as DDT (dichlorodiphenyltrichloroethane) and DDE (dichlorodiphenyldichloroethylene), after World War II, which coincided with the northern aplomado falcon's disappearance (Service 1986). Northern aplomado falcons in Mexico in the 1950s were heavily contaminated with DDT residue, and these levels caused a 25 percent decrease in eggshell thickness (Kiff *et al.* 1980). Such high residue levels can often result in reproductive failure from egg breakage (Service 1990). Use of organophosphate insecticides may also threaten northern aplomado falcons because insects and small, insectivorous birds are the species preferred prey items (Keddy-Hector 2000). Collection of northern aplomado falcons and their eggs may have also been detrimental to the subspecies in some localities. However, populations of birds of prey are generally resilient to localized collection pressure (Service 1990).

The species appears to be non-migratory throughout its range. Nesting chronology is somewhat variable, with egg-laying recorded from January to September, although eggs are usually laid during the months of March to May. Northern aplomado falcons do not build their own nests, but use nest sites constructed by corvids (e.g., Chihuahuan ravens (*Corvus cryptoleucus)*) or large raptors. Thus, northern aplomado falcons are dependent on nesting activities of other stick nest-building birds and their habitat requirements. Nest sites are found in structures such as multi-stemmed yuccas (*Yucca torreyi* and *Yucca elata*) and large mesquite trees (*Prosopis* spp.), as well as other trees.

Northern aplomado falcons feed on a variety of prey, including birds, insects, rodents, small snakes, and lizards. Ligon (1961) suggested that the food habits of northern aplomado falcons "consisted almost wholly of small reptiles, lizards, mice, other rodents, grasshoppers, and various other kinds of insects, rarely small birds except in winter when other food is lacking." Therefore, in winter, factors affecting habitat suitability for migratory bird species may also affect the suitability of the habitat for northern aplomado falcons, which in turn can affect the potential for survival of northern aplomado falcons (Service 2002b). In eastern Mexico, small birds accounted for 97 percent of total prey biomass, but insects represented 65 percent of prey individuals (Hector 1985). In one study, 82 bird species were found in prey remains; of these, the most common were meadowlarks (*Sturnella* spp.), common nighthawks (*Chordeiles minor*), northern mockingbirds (*Mimus polyglottos*), western kingbirds (*Tyrannus verticalis*), brown-headed cowbirds (*Molothrus ater*), Scott’s oriole (*Icterus parisorum*), mourning doves (*Zenaida macroura*), cactus wrens (*Campylorhynchus brunneicapillus*), and pyrrhuloxia (*Cardinalis sinuatus*), suggesting a preference for medium-sized songbirds (Service 2002b). Documented invertebrate prey includes grasshoppers, beetles, dragonflies, cicadas, crickets, butterflies, moths, wasps, and bees (Service 1990). Differences in prey abundance and nest site availability can cause differences in home range size. Based on several studies, the Service estimates northern aplomado falcon home range size to be approximately 34 square km^2 (8,401 acres) (Service 1990, 2002b). For management purposes, this area can be described by a circle with a radius of 3.2 km (2 mi) around a particular habitat feature (e.g. a nest site).

Northern aplomado falcon habitat is variable throughout its range and includes palm and oak savannahs, various desert grassland associations, and open pine woodlands. Within these variations, the essential habitat elements appear to be open terrain with scattered trees, relatively low ground cover, an abundance of insects and small to medium-sized birds, and a supply of nest sites (Service 1990). In Mexico, reported habitat includes palm and oak savannas, open tropical deciduous woodlands, wooded fringes of extensive marshes, various desert grassland associations, and upland pine parklands (Service 1990). The historical range of the northern aplomado falcon in Texas, New Mexico and Arizona occurs within the Chihuahuan Desert, which is comprised of three basic community types: desert scrub, desert grasslands, and woodlands. The species' historical range also occurs in the coastal prairies of southern Texas.

Northern aplomado falcons are primarily associated with open grasslands that include scattered mesquite and/or yuccas, although small patches of scrub and woodlands may be used (Service 2006f). Existing data suggest that the ecological status of Chihuahuan Desert grasslands currently occupied by northern aplomado falcons is high seral to potential natural community, or climax with significant basal cover of grass species. Montoya *et al*. (1997) reported occupied nesting habitat as having basal ground cover ranging from 29 to 70 percent with a mean of 46 percent. Woody plant density ranged from 5 to 56 plants per acre, with a mean of 31 plants per acre. Dominant woody plant species, comprising 74 percent of this community, were Mormon tea (*Ephedra viridis*), soaptree yucca (*Yucca elata*), sacahuista (*Nolina microcarpa*), mesquite, senecio (*Senecio* spp.), creosotebush (*Larrea tridentata*), and baccharis (*Baccharis* spp.). Site-specific habitat assessments should be conducted to further define whether the site of a given project or activity occurs within suitable habitat for this species.

In recent times, the intense overgrazing that resulted in shrub encroachment into grasslands has moderated, and improved range management techniques have been developed, including decreased stocking rates, stock rotation, prescribed burning, and other brush control methods (Archer 1994, Heady 1994, Burnham *et al*. 2002). Furthermore, the use of DDT was banned in the United States in 1972 and in Mexico in 2000. Present threats to the northern aplomado falcon, including long-term drought, and continued replacement of grassland communities with shrubs in Chihuahuan Desert grasslands. Additionally, large-scale conversion of grasslands to agriculture, and the increased presence of the great-horned owl (*Bubo virginianus*), which preys upon the northern aplomado falcon, may be limiting recovery of this subspecies (Macías-Duarte *et al.* 2004, Service 2006b). In contrast to these current threats, northern aplomado falcons appear to be relatively tolerant of human presence. They have been observed to tolerate approach to within 100 m (328 ft) of their nests by researchers, have nested within 100 m (328 ft) of highways in eastern Mexico (Keddy-Hector 2000), and are frequently found nesting in association with well-managed livestock grazing operations in Mexico and Texas (Burnham *et al.* 2002). Burnham *et al.* (2002) concluded that northern aplomado falcons would be able to coexist with most current land-use practices in the United States on the broad scale.

A recovery plan for the northern aplomado falcon was finalized by the Service in 1990 (Service 1990). The objective of the Aplomado Falcon Recovery Plan is to ensure that the northern aplomado falcon is no longer threatened by habitat loss, pesticide contamination, or human persecution. Implementation of the steps outlined in the Recovery Plan could lead to downlisting the northern aplomado falcon from endangered to threatened by 2030.

To address reestablishment of northern aplomado falcons in the United States, reintroduction of nestling northern aplomado falcons was identified by the Recovery Plan as a recommended methodology. To further aid reestablishment, reintroduction sites are carefully selected to optimize habitat suitability. Northern aplomado falcon reintroductions have been ongoing in southern Texas since 1985 on National Wildlife Refuges and private land under Safe Harbor Agreements. Consequently, by 2005, reintroductions had resulted in at least 44 pairs of northern aplomado falcons in southern Texas and adjacent Tamaulipas, Mexico, where no pairs had been recorded since 1942 (Jenny *et al.* 2004). The first nesting pair of northern aplomado falcons in south Texas subsequent to releases did not occur until 1995; however, by 2005, the Texas pairs had successfully fledged more than 244 young (Juergens and Heinrich 2005). In 2007, The Peregrine Fund found that 29 out of 32 territories surveyed in southern Texas were occupied (Heinrich 2010). There are likely more breeding pairs present in this area than what has been documented, considering areas of habitat that are inaccessible for surveys. Reintroduction of captive-bred northern aplomado falcons began in west Texas in 2002. The Peregrine Fund reported up to 10 breeding pairs were found in west Texas in 2009, including pairs that successfully reproduced (Heinrich 2010).

Reintroduction of captive-bred northern aplomado falcons began in New Mexico with the release of 11 birds in 2006 on the privately-owned Armendaris Ranch near Truth or Consequences. In 2007, a pair of northern aplomado falcons from this first year of reintroductions produced two fledglings on the ranch. In 2007, a total of 41 birds were released in New Mexico on private, State, Bureau of Land Management, and Department of Defense lands. Releases are planned to continue through 2015, with up to 150 northern aplomado falcons released in New Mexico each year.

To date, 686 young falcons have been released in west Texas and 305 falcons in southern New Mexico in unfragmented native grasslands. Northern aplomado falcons in New Mexico and Arizona are included in a non-essential experimental population designation under section 10(j) of the Act (Service 2006f). Northern aplomado falcons have been reintroduced in Texas on private lands using Safe Harbor Agreements, and their regulatory status under the Act is endangered.

Currently, there are approximately 36 aplomado falcon pairs in the U.S., which constitute less than two-thirds of the minimum number of 60 self-sustaining breeding pairs in suitable parts of the southwestern U.S. recommended by the 1990 Recovery Plan for reclassification of the subspecies to threatened status.

Environmental Baseline

Formal surveys and reliable sightings submitted to USFWS show that a small number of falcons have been sighted in the United States during every decade since the 1960s (Service 2006f). In addition, a resident pair of northern aplomado falcons in Luna County, New Mexico, bred successfully in 2002, fledging three young. These were the first known aplomado falcons produced in either New Mexico or Arizona since the subspecies' extirpation as a breeding species in the 1950's. Another pair was reported near this site in 2002, but no nest was located and only one of the pair was present two days later (Meyer and Williams 2005). The 2002 nest represented the first successful reproduction by naturally occurring northern aplomado falcons in the United States in 50 years. Meyers and Williams (2005) reported at least eight individual falcons in Luna County between 2000 and 2004. The species occurred historically in Hidalgo

County, and there have been five reports of northern aplomado falcons in or near the Animas Valley from the 1990s through the early 2000s (Meyer and Williams 2005).

Status of the Species within the Action Area

The action area for this consultation includes the historic range of the black-tailed prairie dog in the United States and counties adjacent to that range. The northern aplomado falcon is currently found in Texas and New Mexico, as well as Guatemala and Mexico. Therefore, the portion of the action area of concern for the northern aplomado falcon includes only New Mexico and Texas, where the range of this species coincides with the proposed use of Rozol to control black-tailed prairie dogs in the United States.

Northern aplomado falcons in New Mexico were designated a 10(j) nonessential experimental population to encourage landowners to support the reintroduction of falcons in the state. Several landowners have supported reintroduction and manage the introduction areas to promote falcons. Under the 10(j) rule, falcons do not have incidental take restrictions on private lands. In Texas, private landowners that have allowed releases of northern aplomado falcons on their property are party to a Safe Harbor Agreement (Service 1996, Service 2000a) that covers the entire area within 30 miles of each release site. Under the Safe Harbor Agreement program, participating landowners are permitted to take aplomado falcons incidental to future lawful land-use actions (such as prairie dog control), provided that the landowner maintains any established baseline responsibilities (Service 2000b). All northern aplomado falcon release sites and all recorded nests and falcon pairs within the action area in Texas occur on lands covered by the Safe Harbor Agreement (Montoya 2011, personal communication).

Factors Affecting Species Environment within the Action Area

The loss of or physical degradation of conditions in occupied habitat or in potential reintroduction sites would compromise the reintroduction program and recovery of the aplomado falcon. While the Nonessential Experimental Population in New Mexico and Arizona is not necessary for the continued survival of the species, it provides the benefit of an additional population in the event of a catastrophic loss of populations in Texas.

Sources of loss and degradation of nesting and roosting sites may include land use and human activities. The activities described below are common sources of stressors that affect the conservation of the northern aplomado falcon.

Land use. Land use activities affect the distribution, density, and species composition of the native vegetation communities on the landscape. Land clearing (including for facilities, roads, trails and utility corridors) eliminates the vegetation, livestock grazing reduces the biomass of desired species and promotes others (that may have differing densities on the ground as well), ground or surface water depletion eliminates riparian and marsh vegetation communities, and erosion can eliminate plants along the paths of gullies.

Livestock grazing. There has been considerable literature produced on the effects of livestock grazing on natural vegetation communities in the desert Southwest. Desert shrublands, grasslands, and woodlands in arid areas face certain threats from any land use that affects the surface and vegetation community.

Currently, the intense overgrazing that resulted in shrub encroachment in Chihuahuan Desert grasslands in New Mexico and Arizona has moderated, and improved range management techniques have been developed and implemented, including decreased stocking rates and stock rotation. Techniques to increase the incidence of beneficial fire, to restore and increase vegetative productivity, to control erosion, and to suppress brush encroachment have been widely implemented in this planning unit. Among these are managed fire (including prescribed burns), various types of erosion control structures, and various types of brush control measures (Archer 1994, Heady 1994, Burnham *et al*. 2002). In addition, livestock management on federal lands must now also consider other public resources. Within this planning unit, many private landowners and public land managers maintain well-managed livestock grazing programs that are compatible with northern aplomado falcon nesting and roosting and maintenance of reintroduction habitat suitability.

Road construction, maintenance, and use. Construction and maintenance of access roads has a significant effect on the landscape. Roads and trails provide for foot or vehicle access to the landscape for a variety of purposes that often have other effects on soils, water features, vegetation communities, and wildlife.

Communications towers and power lines. Although the effect of communication towers and power lines on the northern aplomado falcon is not well documented, these structures can have an adverse effect on bird species in general, and raptors in particular, due to collision or electrocution. Although birds can collide with any part of a communication tower, causing injury or death, they are most likely to collide with unmarked guy wires, which can be difficult to see. Northern aplomado falcons may also collide with power lines, which is also more likely if they are unmarked. Power lines that are uninsulated may electrocute northern aplomado falcons if they try to use them to perch on or collide with them. Northern aplomado falcons may be particularly vulnerable to collision with such objects, as they tend to "engage in high-speed, low-level, reckless pursuits of swift avian prey" (Keddy-Hector 2000).

Organochlorine and organophosphate pesticide contamination. In the past, organochlorine compounds (DDE/DDT) were heavily used in pesticide applications in the agricultural areas surrounding northern aplomado falcon habitat in south Texas. It is unclear to what degree residual chemicals may still be present in the species' prey base, although some evidence indicates this may be a lingering threat (Mora *et al.* 1997, Hector-Keddy 2000). In addition, organophosphate insecticides may threaten the species through adverse effects on its primary prey base of insects and small insectivorous birds, particularly in agricultural areas of south Texas.

Effects of the Action

The Risk Quotient calculated by the EPA for the northern aplomado falcon, based on the LC50 value of 56 mg active ingredient per kilogram diet, was 0.104 for consumption of non-target animals. A Level of Concern of 0.1 for the Risk Quotient is set for listed species. Because the Risk Quotient of 0.104 exceeds the Level of Concern, the EPA determined there is potential for risk of acute adverse effects to northern aplomado falcons from exposure to Rozol (EPA 2010b). The BA states that the northern aplomado falcon would have to consume five poisoned mice or less than one poisoned black-tailed prairie dog to reach the Level of Concern, and are more likely to consume mice than black-tailed prairie dog. The BA also states that because no avian reproduction studies have been conducted, risk cannot be precluded at any level.

While there is no avian reproductive study to help estimate risk, external bleeding, fatigue, internal hemorrhaging, and increased blood coagulation has been reported in studies of secondary exposure to birds (see section on Inandione mode of action and toxicity above). Additionally, chlorophacinone is a first generation rodenticide, and consecutive intake over multiple days tends to reduce the amount that results in lethal dose. Thus, black-tailed prairie dog and non-target species such as mice can accumulate a “super dose” prior to expiring or becoming intoxicated and predated upon by birds such as the northern aplomado falcon. It could take less than five mice or one black-tailed prairie dog to intoxicate a northern aplomado falcon. However, due to its relatively small size, the aplomado falcon is not likely to take prey as large as a black-tailed prairie do, and the falcon is not known to scavenge.

As described in the general background section above, raptors such as the northern aplomado falcon may be especially sensitive to Rozol per our previous discussion in the Rozol Exposure and Effects Assessment section. Although toxicity data for chlorophacinone effects to raptors are lacking, toxicity tests with diphacinone indicate that some raptors are 20-30 times more sensitive than the two test species, bobwhite and mallard, required by the EPA for pesticide registration (Rattner et al. 2010a, 2011a, 2011b). Given the similarity of chlorophacinone to diphacinone, we believe that the northern aplomado falcon is more sensitive to Rozol than was estimated in the BA using bobwhite quail LC50 data. Therefore, acute and sub-acute risks to the northern aplomado falcon are likely higher than assessed in the BA.

If individual northern aplomado falcons were to enter a black-tailed prairie dog colony, exposure to chlorophacinone via consumption of primary consumers of Rozol bait may occur. Northern aplomado falcons may potentially consume both mammals and birds that have fed on Rozol bait. As mentioned previously, the evidence of Rozol exposure to horned larks and a meadowlark from a field application of Rozol (Vyas 2010a) indicate that predation of songbirds that have consumed Rozol bait is a likely route of exposure to northern aplomado falcons. In addition to small birds, which the falcon may prey on preferentially in the winter when other food is lacking, the food habits of the northern aplomado falcon consist of small reptiles, lizards, mice, other rodents, grasshoppers and other insect species. In eastern Mexico, small birds accounted for 97 percent of total prey biomass, but insects represented 65 percent of prey individuals (Hector 1985). In one study, 82 bird species were found in prey remains suggesting a preference for medium-sized songbirds, though birds over 500 g have been recorded (Service 2002b).

Following treatment with Rozol, northern aplomado falcons may experience repeated doses of Rozol-exposed prey. During a Rozol treatment, dead and dying primary consumers (i.e., black-tailed prairie dogs, other small mammals, birds) were visible in colonies nine days after treatment and were still present when the study ended at day 29 post-treatment (Vyas 2010a). Additionally, Vyas (2011c, personal communication) reported that raptors preferentially fed at prairie dog colonies treated 1499with Rozol compared to untreated colonies. This effect has been observed in predators previously. Hunt *et al.* (1992) reported that kestrels preferentially caught prey displaying aberrant behavior following pesticide exposure compared to healthy prey. The northern aplomado falcon may also be attracted to Rozol-treated prairie colonies if they provide a source of easy meals of either rodents or birds species.

Northern aplomado falcons experiencing secondary exposure to chlorophacinone are likely to experience mortality or sublethal effects which may result in behavioral changes affecting feeding, breeding, or sheltering activities of individuals. The effects of toxicity could be influenced by other stressors such as previous exposure and retention of pesticides, including other anticoagulants.

Because raptors may be highly sensitive to Rozol, non-target exposure is also likely to reduce the availability of large raptor nests that northern aplomado falcons require for nesting. As described above, northern aplomado falcons do not build their own nests, but use nests constructed by corvids or large raptors. These large predators can successfully predate or scavenge prairie dogs that have eaten Rozol-contaminated bait. When these predators are killed by exposure to Rozol, the number of stick nests available to aplomado falcons for nesting is also reduced. This may cause northern aplomado falcons to expend more time, energy, and risk to locate suitable nesting substrate.

Actual exposure is expected to be minimal due to the low density of black-tailed prairie dog colonies within the falcon's range. In addition, in areas where the falcon has been reintroduced in Texas, landowners have signed cooperative agreements with the Service and The Peregrine Fund to maintain falcon habitat at or above baseline levels and are responsible to notify these organizations before performing land use practices that may adversely affect the falcon. For these reasons, we expect the frequency of northern aplomado falcons encountering Rozol-treated black-tailed prairie dog colonies to be low, and few falcons would experience sublethal effects or mortality from consuming Rozol-exposed prey.

However, we also anticipate that detection of Rozol-poisoned falcons will be rare. The birds are highly mobile; debilitated, dying, or dead falcons, particularly when they move away from Rozol-poisoned prairie dog colonies, are likely to go unreported. Rozol has been used for black-tailed prairie dog control in Texas since 2006 under a Special Local Needs label. While we are unaware of any incidents involving Rozol and the northern aplomado falcon, we recognize the vastness of the area involved and the difficulty in locating Rozol affected raptors such as northern aplomado falcon.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Human activities may affect the northern aplomado falcon and result in direct and indirect mortality, habitat loss, or reduction of habitat suitability. Anthropogenic uses of northern aplomado falcon habitat include ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development (e.g., roads, power lines). These activities have the potential to reduce the quality of northern aplomado falcon nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. As black-tailed prairie dog colonies are not considered to be important habitat for northern aplomado falcon foraging, it is not anticipated that Rozol use as proposed in this action will preclude recovery of this species even when combined with other anthropogenic threats. In addition, cooperative agreements with landowners in reintroduction areas allows for the monitoring and potential avoidance of take within reintroduction areas.

Conclusion Regarding Jeopardy

After reviewing the current status of northern aplomado falcon, the environmental baseline for the action area, the effects from the use of Rozol, and the cumulative effects, it is the Service's biological opinion that the use of Rozol as proposed is not likely to jeopardize the continued existence of the northern aplomado falcon. No critical habitat has been designated for this species; therefore, none will be affected.

The reasons for this determination are:

- The aplomado falcon may prey on non-target organisms that feed on Rozol grain bait, but it is unlikely that this would occur regularly or predictably.

- In areas where the falcon has been reestablished in Texas, landowners have signed cooperative agreements with the Service and The Peregrine Fund to maintain falcon habitat at or above baseline levels, and are responsible to notify these entities before performing land use practices that may adversely affect the falcon.

- At this time, the Service does not have information to indicate Rozol-use in black-tailed prairie dog colonies will preclude survival or recovery of the northern aplomado falcon.

Incidental Take Statement

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the EPA so that they become binding conditions of any grant, permit or registration that may be issued, for the exemption in section 7(o)(2) to apply. The EPA has a continuing duty to regulate the use of Rozol for black-tailed prairie dog control to receive coverage by this incidental take statement. If the EPA (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the label and County Bulletins the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take to northern aplomado falcon, the EPA must report the amount of Rozol sold, black-tailed prairie dog acreage estimated to be poisoned per state, the numbers and species of non-target animals reported and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)).

Amount or Extent of Take Anticipated

Take of the falcon is expected in the form of mortality or sub-lethal effects such as changes in behavior when falcons consume prey from a black-tailed prairie dog colony that has been poisoned with Rozol. The Service is unlikely to know when that might occur nor be able to accurately predict the number of falcons that may encounter black-tailed prairie dog colonies or non-target prey that have been exposed to Rozol. It is unlikely that falcons will be found, therefore it is unlikely that many, if any, falcon mortalities due to Rozol will be reported to further inform the EPA and the Service on this issue.

We anticipate that falcons in Texas that encounter Rozol-exposed black-tailed prairie dog colonies or non-target prey will result in one or fewer falcon mortality per year. We further anticipate that one or fewer falcons in Texas will be harassed to a level that results in take through a reduction in available nest sites caused by Rozol mortality to large raptors and ravens. However, since this take is unlikely to be easily detected, two falcon mortalities or injuries attributable to Rozol use will be considered to be representative of the total amount of take exempted annually.

Effects of the Take

The Service has determined that two falcons in the form of one falcon mortality and one falcon harassed per year due to Rozol use are not likely to jeopardize the continued existence of the falcon. This amount of take is not likely to result in population level effects to the falcon nor reduce its chances for recovery.

Reasonable and Prudent measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of the northern aplomado falcon in Texas resulting from the proposed action. Landowners covered by Safe Harbor Agreements for the northern aplomado falcon are exempt from use restrictions identified in these reasonable and prudent measures.

The prohibitions against taking the northern aplomado falcon found in section 9 of the Act do not apply to the 10(j) non essential experimental population in New Mexico. However, the Service advises the EPA to consider implementing the reasonable and prudent measures, as described above, for this population.

The prohibitions against taking the northern aplomado falcon found in section 9 of the Act do not apply to the 10(j) non essential experimental population in New Mexico. However, the Service advises the EPA to consider implementing the reasonable and prudent measures, as described above, for this population.

1. Notify the Service if northern aplomado falcons or carcasses thereof are found during any Rozol use activities.

2. Maintain a system to track Rozol used for black-tailed prairie dog control and report to the Service the amounts sold/used in each of the ten states.

3. Within the range of the northern aplomado falcon, maintain the EPA County Bulletin website so that a current listing of counties with habitat for northern aplomado falcons is available to the public.

4. Within the range of the northern aplomado falcon, inform public users about the risks of Rozol to non-target organisms and how risks can be minimized.

5. Contribute to efforts to re-establish the northern aplomado falcon within its range in the U.S.

Terms and Conditions

Compliance with the following terms and conditions must be achieved in order to be exempt from the prohibitions of section 9 of the ESA. These terms and conditions implement the Reasonable and Prudent Measures described above. These terms and conditions are nondiscretionary.

The EPA must report to the Service's Species Lead for the falcon in the Texas and New Mexico Ecological Services Field Offices on the implementation of these terms and conditions.

To implement RPM 1:

- The EPA shall develop and implement a monitoring and reporting system to notify the Service in the event of a northern aplomado falcon or other listed species found during Rozol use activities.

To implement RPM 2:

- The EPA shall develop and implement a system of reporting for distributors and applicators that tracks the amounts of Rozol sold and used in each State and project the amount of black-tailed prairie dog acres poisoned.

- The EPA shall report the above information to the Service by January 31 after the end of each calendar year.

To implement RPM 3:

- Prior to Rozol application in the range of the falcon, the EPA shall include the following language in the EPA County Bulletins for counties with falcon habitat: Prairie dog colonies in this county may be occupied by the northern aplomado falcon. Rozol application may be harmful to the northern aplomado falcon. Please contact the U.S. Fish and Wildlife Service in New Mexico at 505-346-2525, and in Texas at 817-277-1100 to find out where northern aplomado falcons occur in the county before application.

To implement RPM 4:

- Prior to Rozol application in the range of the falcon, the EPA shall develop a brochure, reviewed by the Service, about the risks of Rozol to non-target organisms and how risks can be minimized.

- When the above brochure is finalized, the EPA shall immediately disseminate the brochure and provide expert assistance about this information to landowners with suitable habitat for the northern aplomado falcon.

To implement RPM 5, the EPA shall:

- Prior to Rozol application in the range of the falcon, coordinate with the New Mexico Ecological Services Field Office to assist in recovery efforts for the northern aplomado falcon by contributing to research, monitoring, and/or falcon reintroductions.

This incidental take statement exempts take of northern aplomado falcons protected by the ESA that may be incurred by the proposed action, provided the September 10, 2010, Rozol label is followed. Noncompliance with the Rozol label that results in take of northern aplomado falcons is not covered by this incidental take statement; end users who do not comply with label requirements are not afforded take coverage and are subject to prosecution under section 9 of the ESA.

The Service believes that no more than two aplomado falcon per year in Texas will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The EPA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to use their existing authorities to further the purposes of the ESA by carrying out programs or activities to conserve endangered or threatened species. Conservation recommendations are discretionary activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop biological information. The Service recommends the following conservation activities that are within the EPA's authorities and can benefit northern aplomado falcon recovery:

1. The EPA should initiate or require studies to evaluate secondary toxicity of the EPA registered prairie dog rodenticides to northern aplomado falcons, other raptors, and ravens.

2. The EPA should initiate or require studies to evaluate the effectiveness of anticoagulant labels that require multiple return visits to anticoagulant-poisoned prairie dog towns to retrieve dead and dying prairie dogs. The Service was unable to locate any information, and the EPA provided none to indicate this label requirement is accomplishing its intended task of reducing secondary poisoning of non-target animals. There is information to indicate it is not preventing secondary poisoning of non-target animals.

3. The EPA should initiate or require studies to evaluate what conditions or methods would prevent anticoagulant poisoned prairie dogs from secondarily poisoning non-target animals.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the EPA's September 30, 2010, request for formal consultation regarding federally listed species and critical habitat impacts relative to the registration and application of Rozol to control black-tailed prairie dogs in ten western states. This BO does not cover Rozol use on any other prairie dog species. Expansion of Rozol use to prairie dog species other than the black-tailed would necessitate reinitiation of formal consultation. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded (or take occurs of species for which the Service currently does not anticipate adverse effects from the proposed action); 2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or extent not considered in this BO; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this BO; 4) future information indicates that Rozol use by itself or in combination with other factors is precluding ferret recovery, then the EPA and the Service shall reinitiate consultation to determine appropriate measures to allow ferret recovery to proceed; or 5) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any activities causing such take must cease pending reinitiation. If none of these reinitiation triggers are met within the next 15 years, then reinitiation will be required in 2027 because the Opinion only covers the action for 15 years.

REFERENCES CITED

Adams, L. G., R. O. Stephenson, B. W. Dale, R. T. Ahgook, and D. J. Demma. 2008. Population dynamics and harvest characteristics of wolves in the central Brooks Range, Alaska. Wildlife Monographs 170.

Albert, C. A., L. K. Wilson, P. Mineau, S. Trudeau, and J. E. Elliott. 2010. Anticoagulant rodenticides in three owl species from western Canada, 1988-2003. Archives of Environmental Contamination and Toxicology 58(2): 451-459.

Anderson, E., S. C. Forrest, T. W. Clark, and L. Richardson. 1986. Paleobiology, biogeography, and systematics of the black-footed ferret, *Mustela nigripes* (Audubon and Bachman), 1851. *In* Great Basin Naturalist Memoirs No. 8, The Black-footed Ferret. S.L. Wood, editor. Brigham Young University, Utah. Pp. 11-62.

Anteau, M., M. H. Sherfy, and M. T. Wiltermuth. 2011. *In Review*. Intra-territory nest-site selection of piping plovers (*Charadrious melodus*) in a diverse reservoir habitat. PLoS ONE .

Archer, S. 1994. Woody plant encroachment into Southwestern grasslands and savannas: Rates, patterns and proximate causes. *In* Ecological Implications of Livestock Herbivory in the West. M. Vavra, W.A. Laycock and R. Piper, editors. Society for Range Management, Denver, Colorado. 297 pp. Pages 13-68.

Bakeman, M. E. 1997. Conclusions and recommendations from the report on habitat findings of the Preble's meadow jumping mouse. Unpublished report to the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife. 13 pp. + tables and figures.

Bangs, E. 2010. April 26, 2010, Memo from Ed Bangs, Wolf Recovery Coordinator for Northern Rocky Mountain Distinct Population Segment, to Region 6, Regional Director. Subject: Service review of the 2009 wolf population in the Northern Rocky Mountain Distinct Population Segment.

Berny, P. J., T. Buronfosse, F. Buronfosse, F. Lamarque, and G. Lorgue. 1997. Field evidence of secondary poisoning of foxes (*Vulpes vulpes*) and buzzards (*Buteo buteo*) by bromadiolone, a four-year survey. Chemosphere 35:1817-1829.

Beyer, D. E., R. O. Peterson, J. A. Vucetich, and J. H. Hammill. 2009. Wolf population changes in Michigan. *In* Recovery of gray wolves in the Great Lakes Region of the United States. A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. Springer, New York, New York, USA. Pages 65–85.

Biggins, D. E. 2006. The symposium in context. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 3-5.

Biggins, D. E., J. G. Sidle, D. B. Seery, A. E. Ernst. 2006. Estimating the abundance of prairie dogs. *In* J. L. Hoogland, editor. Conservation of the Black-tailed Prairie Dog. Island Press Washington, D.C. Pp. 94-107.

Biggins, D. E., B. J. Miller, T. W, Clark, and R. P. Reading. 1997. Management of an endangered species: the black-footed ferret. *In* Principles of Conservation Biology. G.K. Meffe and C.R. Carroll, editors. Pp. 420-436.

Boyd, D. K. and D. H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in the Central Rocky Mountains. Journal of Wildlife Management 63(4): 1094-1108.

Boyd, D. K., P. C. Paquet, S. Donelson, R. R. Ream, D. H. Pletscher, and C. C. White. 1995. Transboundary movements of a colonizing wolf population in the Rocky Mountains. *In* Ecology and Conservation of Wolves in a Changing World. L. N. Carbyn, S. H. Fritts, and D. R. Seip, editors. Canadian Circumpolar Institute, Occasional Publication No. 35. Edmonton, Alberta. 642 pp. Pages 135–140.

Brainerd, S. M., H. Andren, E. E. Bangs, E. Bradley, J. Fontaine, W. Hall, Y. Illiopoulos, M. Jimenez, E. Jozwiak, O. Liberg, C. Mack, T. Meier, C. Niemeyer, H. C. Pedersen, H. Sand, R. Schultz, D. W. Smith, P. Wabakken, and A. Wydeven. 2008. The effects of breeder loss on wolves. Journal of Wildlife Management 72:89–98.

Bruening, J. J. 2007. Field efficacy of Kaput-D prairie dog bait for controlling black-tailed prairie dogs (*Cynomys ludovicianus*). Genesis Laboratories, Study Number N07004. 108 pp.

Bruesh, T. 2009. Understanding the true cost of treatment: proper prairie dog management saves time and money. 8014-4 (9/24/09). Liphatech Inc., Milwaukee, WI. 6 pp.

Bryson, P. D. 1996. Comprehensive review in toxicology for emergency clinicians, third edition. Taylor & Francis, Washington, D.C. 848 p.

Burnham, W., J. P. Jenny, W. R. Heinrich, G. Hunt, A. Montoya, B. D. Mutch, and C. E. Sandfort. 2002. Proposal: restoration of the northern aplomado falcon in New Mexico. The Peregrine Fund, Boise, Idaho. 27 pp.

Clark, T. W. 1989. Conservation biology of the black-footed ferret *Mustela nigripes*. Wildlife Preservation Trust Special Scientific Report No. 3. 175 pp.

Clark, T. W., S. C. Forrest, L. Richardson, D. E. Casey, and T. M. Campbell. 1986. Description and history of the Meeteetse black-footed ferret environment. *In* Great Basin Naturalist Memoirs No. 8, The Black-footed Ferret. S. L. Wood, editor. Brigham Young University, Utah. Pp. 72-84.

Colorado Division of Parks and Wildlife. 2011. NDIS (Natural Diversity Information System) mapping. Available on line at <http://ndis.nrel.colostate.edu/>

Colvin, B., P. Hegdal, and W. Jackson. 1988. Review of non-target hazards associated with rodenticide use in the USA. OEPP/EPPO Bulletin 18:301-308.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2009. COSEWIC assessment and status report on the Eskimo Curlew *Numenius borealis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 39 pp. <http://publications.gc.ca/collections/collection_2011/ec/CW69-14-176-2010-eng.pdf>

Corcoran, J. 2011. Arizona black-footed ferret reintroduction conservation subcommittee annual report for 2010.

Cully, J. F. Jr., T. L. Johnson, S. K. Collinge, and C. Ray. 2010. Disease limits populations: plague and black-tailed prairie dogs. Vector Borne Zoonotic Disease 10:7-16.

Davis, W. B. and D. J. Schmidly. 1994. The Mammals of Texas. Texas Parks and Wildlife Press, Austin, 338pp. http://www.nsrl.ttu.edu/tmot1/cynoludo.htm

de Yong, R. 2009. Sept. 14 letter from Montana Department of Agriculture to the Debbie Edwards, U.S. Environmental Protection Agency. Request for explanation regarding registration of Rozol Prairie Dog Bait. 1 pp.

Defenders of Wildlife (DOW). 2009. July 15 letter to Lisa Jackson, U.S. Environmental Protection Agency. Notice of Intent to sue for violations of the Endangered Species Act concerning registrations of Rozol and Kaput-D prairie dog Baits. National Headquarters, Washington D.C. 8 pp.

Defenders of Wildlife and Audubon of Kansas (DOW and AOK). 2009a. July 10 Petition for review in the U.S. Court of Appeals for the District of Columbia. 7 pp.

Defenders of Wildlife and Audubon of Kansas (DOW and AOK). 2009b. September 23 Complaint for declaratory and injunctive relief to the U.S. Court of Appeals for the District of Columbia. 18 pp.

Elphick, C. S., D. L. Roberts, and J. M. Reed. 2010. Estimated dates of recent extinctions for North American and Hawaiian birds. Biological Conservation 143: 617-624.

Environment Canada. 2007. Recovery Strategy for the Eskimo Curlew (*Numenius borealis*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. 19 pp.

Erickson W. and D. Urban. 2004. Potential risks of nine rodenticides to birds and nontarget mammals: a comparative approach. Office of Pesticides Programs Environmental Fate and Effects Division. U.S. Environmental Protection Agency, Washington, D.C. 230 pp.

Ernst, A. E., A. L. Clark, and D. R. Gober. 2006. A habitat-based technique to allocate black-footed ferret recovery among jurisdictional entities. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 89-95.

European Commission. 2009. Chlorophacinone product-type 14 (rodenticides) draft assessment report. 89 pp. <http://circa.europa.eu/Public/irc/env/bio_reports/library?1=/assessment_directive/chlorophacinonepdf/_EN_1.0_&a=d.>

Fargey, P. 2010. News Release: Government of Canada celebrates first wild-born black-footed ferrets in Grasslands National Park. Parks Canada. 2 pp.

Fisher, D. D. and R. M. Timm. 1987. Laboratory trial of chlorophacinone as a prairie dog toxicant. Proceedings of the Great Plains Wildlife Damage Control Workshop 8:67-69.

Forgacs, T. W. 2010. Rozol prairie dog bait: availability of "intoxicated" prairie dogs. Liphatech, Inc., Milwaukee, Wisconsin. 141 pp.

Forrest, S. C., T. W. Clark, L. Richardson, and T. M. Campbell III. 1985. Black-footed ferret habitat: some management and reintroduction considerations. Wyoming Bureau of Land Management Wildlife Technical Bulletin No. 2. 49 pp.

Fritts, S. H. and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected wolf population in northwestern Minnesota. Wildlife Monographs No. 80:1-79.

Fuller, T. K. 1989. Population dynamics of wolves in North-Central Minnesota. Wildlife Monographs No. 105:1-41.

Fuller, T. K., L. D. Mech, and J. F. Cochrane. 2003. Wolf population dynamics. *In* Wolves: Behavior, Ecology, and Conservation. L. D. Mech and L. Boitani, editors. University of Chicago Press, Chicago, 448 pp. Pages 161-191.

Gage, K. L., and M. Y. Kosoy. 2006. Recent trends in plague ecology. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 213-231.

Garelle, D., P. Marinari, and C. Lynch. 2006. Black-footed ferret species survival plan. American Zoo and Aquarium Association Population Management Center. 29 pp.

Gese, E. M. and L. D. Mech. 1991. Dispersal of wolves (*Canis lupus*) in northeastern Minnesota, 1969-1989. Canadian Journal of Zoology 69:2946-2955.

Godbey, J. L., E. Biggins, and D. Garrelle. 2006. Exposure of captive black-footed ferrets to plague and implications for species recovery. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 233-237

Golden, N. H. and J. Gober. 2010. Prairie dogs pesticides and protected species: concerns for anticoagulant use in a sensitive ecosystem. Proc. 24th Vertebr. Pest Conf. R. M. Timm and K. A. Fagerstone, editors. Published at University of California, Davis. Pp. 181-185.

Graber, J. W. 1961. Distribution, habitat requirements, and life history of the Black-capped Vireo (*Vireo atricapillus*). Ecological Monographs 31:313-336.

Grenier, M. 2011. Wyoming black-footed ferret reintroduction conservation subcommittee annual report for 2010.

Grenier, M., R. Schell, N. Whitford, and B. Oakleaf. 2007. Black-tailed prairie dog monitoring in Wyoming, completion report. *In* Threatened, Endangered, and Nongame Bird and Mammal Investigations. A. O. Cerovski, editor. Pp. 123-130.

Griebel, R. G. 2010. Wall Ranger District boundary and interior management zone report 2009 Monitoring Report. Unpublished Report. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, Nebraska National Forest, Wall Ranger District, Wall, South Dakota. Pp. 6.

Gryzbowski, J. A. 1995. Black-capped Vireo (*Vireo atricapillus*). The Birds of North America, No. 181, A. Poole, and F. Gill, editors, The Birds of North America, Inc., Philadephia, Pennsylvania.

Hanebury, L. R. and D. E. Biggins. 2006. A history of searches for black-footed ferrets. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 47-65.

Hazardous Substances Data Bank (HSDB). 2003. Chlorophacinone. Hazardous Substances Databank Number: 6432. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

Heady, H. F. 1994. Summary: ecological implications of livestock herbivory in the west. *In* Ecological Implications of Livestock Herbivory in the West. M. Vavra, W.A. Laycock and R. D. Piper, editors. Society for Range Management, Denver, Colorado. 297 pp. Pp. 289 – 297.

Hector, P. 1985. The diet of the aplomado falcon (*Falco femoralis*) in eastern Mexico. The Condor 87(3):336-342.

Heinrich, W. 2010. The Peregrine Fund. Northern aplomado falcon restoration. Fiscal Year 2010 Report. The Peregrine Fund, Boise, ID.

Henderson, F. R., P. F. Springer, and R. Adrian. 1969 (revised 1974). The black-footed ferret in South Dakota. South Dakota Deptartment of Game, Fish & Parks Technical Bulletin No. 4. 37 pp.

Hill, E. F. 1993. Acute and subacute toxicology in evaluation of pesticide hazard to avian wildlife. *In* Wildlife Toxicology and Population Modeling. R. J. Kendall, and T. E. Lacher, editors. Lewis Publishers, Boca Raton, Florida. Pp. 45-67.

Hillman, C. N. and T. W. Clark. 1980. Mustela nigripes. *In* Mammalian Species No. 126. The American Society of Mammalogists. 3 pp.

Hillman, C. N., and R. L. Linder. 1973. The black-footed ferret. *In* Proceedings of the black-footed ferret and prairie dog workshop, Sept. 4-6, 1973. R. L. Linder and C. N. Hillman, editors. South Dakota State University, Brookings. 208 pp. Pp. 10-20.

Hoffman, D. J. 2003. Wildlife toxicity testing. *In* Handbook of Ecotoxicology. D. J. Hoffman, B. A. Rattner, G. A. Burton Jr, and J. Cairns Jr, editors. Lewis Publishers, Boca Raton, Florida. Pp 75-110.

Hunt, K. A., D. M. Bird, P. Mineau, and L. Shutt. 1992. Selective predation of organophosphate-exposed prey by American kestrels. Animal Behavior 43:971-976.

Huntzinger, B. A., J. A. Vucetich, T. D. Drummer, and R. O. Peterson. 2005. Wolf recovery in Michigan, 2002-05 summary report. Michigan Technological University, Houghton, Michigan, USA.

Hutchins, M, R.J. Wiese, and J. Bowdoin. 1996. Black-footed ferret recovery program analysis and action plan. American Zoo and Aquarium Association. 137 pp.

Jackson, W. B. and A. D. Ashton. 1992. A review of available anticoagulants and their use in the United States. Proceedings of the Fifteenth Vertebrate Pest Conference 15:156-160.

Jenny, J. P., W. Heinrich, A. B. Montoya, B. Mutch, C. Sandfort, and W. G. Hunt. 2004. From the field: progress in restoring the aplomado falcon to southern Texas. Wildlife Society Bulletin 32:276-285.

Jimenez, M. D., E. E. Bangs, D. W. Smith, D. K. Boyd, C. M. Mack, J. Holyan, S. Nadeau, C. A. Sime, V. J. Asher, E. H. Bradley, and K. Laudon. 2011. In prep. Wolf dispersal in the northern Rocky Mountains in western United States: 1993-2008. Journal of Wildlife Management.

Johnson, K., T. Neville, and L. Pierce. 2003. Remote sensing survey of black-tailed prairie dog towns in the historical New Mexico range. NMNHP Publication No. 03-GTR-248. New Mexico Natural Heritage Program, Biology Department, University of New Mexico, Albuquerque, New Mexico.

Jorde, D. and G. Lingle. 1988. Kleptoparasitism by bald eagles wintering in south-central Nebraska. Journal of Field Ornithology 59(2):183-188.

Juergens, P. and B. Heinrich. 2005. Northern aplomado falcon restoration operations report-2005. The Peregrine Fund, Boise, Idaho. 9pp.

Kansas Department of Wildlife and Parks. 2000. Eskimo curlew (*Numenius borealis*). Threatened and Endangered Species . 1 p. <http://kdwpt.state.ks.us/news/Services/Threatened-and-Endangered-Species/Threatened-and-Endangered-Species/Species-Information/ESKIMO-CURLEW>

Keane, S. E. 2002. Effects of herring gulls and blackbacked gulls on breeding piping plovers, South Monomoy Island, Massachusetts. Master's Thesis. Virginia Polytechnic Institute and State University. Blacksburg, Virginia. 237 pp.

Keddy-Hector, D. P. 2000. Aplomado Falcon (*Falco femoralis*). *In* The Birds of North America: Life Histories for the 21st Century, No. 549. A. Poole and F. Gills, editors. Philadelphia, Pennsylvania. 20 pp.

Keinath, D.A. 2001. Habitat associations of Preble's meadow jumping mice in Wyoming: a GIS model and descriptive analysis. Report prepared for U. S. Fish and Wildlife Service, Cheyenne, Wyoming. Prepared by Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Kempema, S. L. F, C. Marsh, and K. Marsh. 2009. Colony acreage and distribution of the black-tailed prairie dog in South Dakota, 2008. South Dakota Department of Game, Fish and Parks Wildlife Division Report 2009-02.

Kiff, L. F., D. B. Peakall, and D. P. Hector. 1980. Eggshell thinning and organochlorine residues in the bat and aplomado falcon in Mexico. Proceedings of the International Ornithological Congress 17:949-952.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north-central Washington. Canadian Journal of Zoology 68:845-851.

Kotliar, N. B., B. J. Miller, R. P. Reading and T. W. Clark. 2006. The prairie dog as a keystone species. *In* Conservation of the black-tailed prairie dog. J. L. Hoogland, editor. Pp. 53-65.

Kotliar, N. B., B. W. Baker, A. D. Whicker, and G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. Environmental Management 24:177-192.

Kozol, A. J. 1990. The natural history and reproductive strategies of the American burying beetle, *Nicrophorus americanus*. Report to Service, Hadley, Massachusetts. Unpublished Master's Thesis.

Lee, C. D. and S. E. Hygnstrom. 2007. Field efficacy and hazards of rozol bait for controlling black-tailed prairie dogs (*Cynomys ludovicianus*). Laboratory Project Identification 06076. Kansas State University Research and Extension, Manhattan, Kansas, and University of Nebraska, Lincoln, Nebraska. 56 pp.

Lee, C. D., P. Gibson, and J. Wilson. 2005. In-burrow application of rozol to manage black-tailed prairie dogs. Wildlife Damage Management Conferences -- Proceedings. Paper 123. 6 pp.

Light, D. S. and S. H. Fritts. 1999. Gray wolf (*Canis lupus*) occurrences in the Dakotas. American Midland Naturalist 132:74-81.

Ligon, J.S. 1961. New Mexico Birds and Where to Find Them. University of New Mexico Press, Albuquerque, New Mexico. 360 pp.

Liphatech, Inc. 2010. November 18 letter from Thomas Schmit to Arthur-Jean Williams, U.S. Environmental Protection Agency Office of Pesticide Programs Environmental Fate and Effects Division. Review of EPA's chlorophacinone effects determination. Milwauke, Wisconsin.

Liphatech, Inc. 2009. University field efficacy trials. 8013-4 (9/23/09). Liphatech Inc., Milwaukee, Wisconsin. 5 pp.

Liphatech, Inc. 2006. Restricted use pesticide 24(c) special local needs supplemental label for Rozol distribution and use within Nebreaka. EPA SLN No. NE-060001. 1 pp.

Lockhart, J. M., E. T. Thorne, and D. R. Gober. 2006. A historical perspective on recovery of the black-footed ferret and the biological and political challenges affecting its future. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 6-19.

Luce, R.J. 2006. Areas where habitat characteristics could be evaluated to identify potential black-footed ferret reintroduction sites and develop conservation partnerships. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp. 69-88.

Macías-Duarte, A., A. B. Montoya, W. G. Hunt, A. Lafon-Terrazas, and R. Tafanelli. 2004. Reproduction, prey and habitat of the aplomado falcon (*Falco femoralis*) in desert grasslands of Chihuahua, Mexico. The Auk 121:1081-1093.

Matchett, M.R., D.E. Biggins, V. Carlson, B. Powell, and T. Rocke. 2010. Enzootic plague reduces black-footed ferret (*Mustela nigripes*) survival in Montana. Vector Borne Zoonotic Disease 10:27-35.

Mech, L. D. 2006. Estimated age structure of wolves in northeastern Minnesota. Journal of Wildlife Management 70:1481-1483.

Mech, L. D. 1995. The challenge and opportunity of recovering wolf populations. Conservation Biology 9(2): 270-278. Jamestown, North Dakota. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/mammals/cowolf/index.htm> (VERSION 16JUN2000).

Mech, L. D. 1987. Age, season and social aspects of wolf dispersal from a Minnesota pack, p. 55-74 *in* B. D. Chepko-Sade and Z. Halpin, editors Dispersal patterns. University of Chicago Press, Chicago. 342 p.

Mech, D. L. 1974. Canis lupus. Mammalian Species, No. 37. American Society of Mammalogists. 6pp.

Mech, L. D. 1970. The Wolf: The Ecology and Behavior of an Endangered Species. Natural History Press (Doubleday Publishing Co., N.Y.) 389 pp. (Reprinted in paperback by University of Minnesota Press, May 1981).

Mech, L. D. and L. Boitani. 2003. Wolf social ecology. Pp. 1-34 *in* L.D. Mech and L. Boitani, editors Wolves: Behavior, Ecology, and Conservation. University of Chicago Press, Chicago. 448 pp.

Mech, L. D., S. H. Fritts, G. L. Radde, and W. J. Paul. 1988. Wolf distribution and road density in Minnesota. Wildlife Society Bulletin 16: 85-87.

Mendenhall, V. M. and L. F. Pank. 1980. Secondary poisoning of owls by anticoagulant rodenticides. Wildlife Society Bulletin 8:311-315.

Merson M. H. and R. E. Byers. 1985. Weathering and the field efficacy of pelletized rodenticide baits in orchards. Crop Protection 4(4):511-519.

Meyer, R. A. and S. O. Williams, III. 2005. Recent nesting and current status of aplomado falcon (*Falco femoralis*) in New Mexico. American Birds 59:352-356.

Mineau, P., B. Jobin, and A. Baril. 1994. A critique of the avian 5-day dietary test (LC50) as the basis of avian risk assessment. Canadian Wildlife Service Technical Report Series 215. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario, Canada.

Mladenoff, D. J., T. A. Sickley, R. G. Haight, and A. P. Wydeven. 1995. A regional landscape analysis and prediction of favorable gray wolf habitat in the northern Great Lakes region. Conservation Biology 9:279-94.

Montana Natural Heritage Program. 2011. Unpublished map produced by the MT Natural Heritage Program's Natural Heritage Tracker website <http://mtnhp.org/Tracker/NHTMap.aspx>. Produced on October 20, 2011 by Katrina Dixon, U.S. Fish and Wildlife Service, Ecological Services, Montana Field Office. Helena, Montana.

Montoya, A. B., P. J. Zwank, and M. Cardenas. 1997. Breeding biology of aplomado falcon in desert grasslands of Chihuahua, Mexico. Journal of Field Ornithology 68(1):135-143.

Mora, M. A., M. C. Lee, J. P. Jenny, T. W. Schultz, J. L. Sericano, and N. J. Clum. 1997. Potential effects of environmental contaminants on recovery of the aplomado falcon in south Texas. Journal of Wildlife Management 61:1288-1296.

Murray M. and F. Tseng. 2008. Diagnosis and treatment of secondary anticoagulant rodenticide toxicosis in a red-tailed hawk (Buteo jamaicensis). Journal of Avian Medicine and Surgery 22(1):41–46.

Odell, E. A., F. M. Pusateri, and G. C. White. 2008. Estimation of occupied and unoccupied black-tailed prairie dog colony acreage in Colorado. Journal of Wildlife Management 72(6): 1311-1317.

Packard, J. M. 2003. Wolf behavior: reproductive, social, and intelligent. *In* Wolves: Behavior, Ecology, and Conservation. L. D. Mech and L. Boitani, editors. University of Chicago Press, Chicago. 448 pp. Pages 35-65.

Pitt, W. C, J. D. Eisemann, C. E. Swift, R. Sugihara, B. Dengler-Germain, and L. Driscoll. 2005. Diphacinone residues in free-ranging wild pigs following aerial broadcast of a rodenticide bait in a Hawaiian Forest. Unpublished Report QA-1077, National Wildlife Research Center, Fort Collins, Colorado. 37 pp.

Primus, T. M. 2007. Determination of chlorophacinone residues in prairie dog whole body and liver tissues. Project Number QA-1405. U.S. Department of Agriculture National Wildlife Research Center. Fort Collins, CO. 58 pp.

Pulich, W. M. 1976. The Golden-cheeked warbler: a bioecological study. Texas Parks and Wildlife Department, Austin, Texas. <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B07W>

Radvanyi, A., P. Weaver, C. Massari, D. Bird, and E. Broughton. 1988. Effects of chlorophacinone on captive kestrels. Bulletin of Environmental Contamination and Toxicology 41:441-448.

Rattner, B. A., K. E. Horak, K. M. Eisenreich, R. S. Lazarus, J. D. Eisemann, and J. J. Johnston. 2011a. Comparative toxicity and risk evaluation of the anticoagulant rodenticide diphacinone in various species of birds. Society of Environmental Toxicology and Chemistry Europe 21st Annual Meeting. Abstract 311 ET10B-2. May 15-19, 2011, Milan, Italy.

Rattner, B. A., K. E. Horak, S. E. Warner, D. D. Day, C. U. Meteyer, S. V. Volker, J. D. Eisemann and J. J. Johnston. 2011b. Acute toxicity, histopathology, and coagulopathy in American kestrels (*Falco sparverius*) following administration of the rodenticide diphacinone. Environmental Toxicology and Chemistry 30(5):1213-1222.

Rattner, B. A., K. E. Horak, S. E. Warner, D. D. Day, and J. J. Johnston. 2010a. Comparative toxicity of diphacinone to northern bobwhite (*Colinus virginianus*) and American kestrels (*Falco sparverius*). Proceedings, 24th Vertebrate Pest Conference, Sacramento, Californai, USA, February 22- 25, 2010. Pp 145-152.

Rattner, B. A., K. E. Horak, S. E. Warner, and J. J. Johnston. 2010b. Acute toxicity of diphacinone in northern bobwhite: Effects on survival and blood clotting. Ecotoxicology and Environmental Safety 73:1159-1164.

Reigart, R. J., J. R. Roberts. 1999. Recognition and management of pesticide poisonings. Fifth Edition. U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances. EPA 735-R-98-003. 243 pp.

Relyea, R. and J. Hoverman. 2006. Assessing the ecology in ecotoxicology: a review and synthesis in freshwater systems. Ecology Letters 9:1157-1171.

Rudebeck, G. 1950. The choice of prey and modes of hunting of predatory birds with special reference to their selective effect. Oikos 2(1):65-88.

Ruder, M. G., R. H. Poppenga, J. A. Bryan II, M. Bain, J. Pitman, and M. K. Keel. 2011. Intoxication of nontarget wildlife with rodenticides in Northwestern Kansas. Journal of Wildlife Diseases 47(1):212-216.

Sarabia, J., I. Sánchez-Barbudo, W. Siqueira, R. Mateo, E. Rollán, M. Pizarrod. 2008. Lesions associated with the plexus venosus subcutaneus collaris of pigeons with chlorophacinone toxicosis. Avian Diseases 52(3):540-543.

Savarie, P. J., D. J. Hayes, R. T. McBride, and J. D. Roberts. 1979. Efficacy and safety of diphacinone as a predacide. *In* Avian and Mammalian Wildlife Toxicology. E. E. Kenaga, editor. STP 693 American Society for Testing Materials, Philadelphia, Pennsylvania. Pp. 69-79.

Schwarz, M. S. and J. Gober. 2011. Review and management recommendations for study titled “retention time of chlorophacinone in the tissues of black-tailed prairie dogs exposed to chlorophacinone bait.” U.S. Fish and Wildlife Service Contaminants Report 6F56. Pierre, South Dakota. 16 pp. with attached Witmer report. <http://www.fws.gov/mountain-prairie/contaminants/papers/r6ecpubs.htm>

Seery, D. and D. Matiatos. 2000. Response of wintering buteos to plague epizootics in prairie dog towns. Western North American Naturalist 60:420-425.

Seymour, K. L. 1989. *Panthera onca*. Mammalian Species 340:1–9.

Sharps, J. C. and D. W. Uresk. 1990. Ecological review of black-tailed prairie dogs and associated species in western South Dakota. Great Basin Naturalist 50(4):339-345.

Sheafor, S. E, and C. G. Couto. 1999. Anticoagulant rodenticide toxicity in 21 dogs. Journal of the American Animal Hospital Association 35:38–46.

Shenk, T. and M. Sivert. 1999. Movement patterns of Preble’s meadow jumping mouse (Zapus hudsonius preblei) as they vary across time and space. Colorado Division of Wildlife. Fort Collins, Colorado. 35 pp.

Smith, G. A. and M. V. Lomolino. 2004. Black-tailed prairie dogs and the structure of avian communities on the shortgrass plains. Oecologia 138:592–602.

Staples, W. R. 1995. Lynx and coyote diet and habitat relationships during a low hare population on the Kenai peninsula, Alaska. Unpublished Master’s Thesis, University of Alaska, Fairbanks, Alaska.

Stebler, A. M. 1944. The status of the wolf in Michigan. Journal of Mammalogy 25(1):37-43.

Stone W. B., J. C. Okoniewski, and J. R. Stedelin. 2003. Anticoagulant rodenticides and raptors: recent findings from New York, 1998-2001. Bulletin of Environmental Contamination and Toxicology 70:34-40.

Stone, W. B., J. C. Okoniewski, and J. R. Stedelin. 1999. Poisoning of wildlife with anticoagulant rodenticides in New York. Journal of Wildlife Diseases 35:187-93.

Sullins, M. 1990. Use of chlorophacinone treated bait for management of black-tailed prairie dogs in Montana. Montana Department of Agriculture Environmental Management Division. Helena, Montana. 3 pp.

Tipton H., V. Dreitz, P. Doherty Jr. 2008. Occupancy of mountain plover and burrowing owl in Colorado. Journal of Wildlife Management 72(4):1001-1006.

Tosh, D. G., R. F. Shore, S. Jess, A. Withers, S. Bearhop, W. Ian Montgomery, and R. A. McDonald. 2011. User behaviour, best practice and the risks of non-target exposure associated with anticoagulant rodenticide use. Journal of Environmental Management 92(6):1503-8.

Trainor, A. M., T. M. Shenk, and K. R. Wilson. 2007. Microhabitat characteristics of Preble's meadow jumping mouse high-use areas. Journal of Wildlife Management 71:469-477.

Truett, J. C. 2002. Aplomado falcons and grazing: invoking history to plan restoration. Southwestern Naturalist 47:379-400.

U.S. Army Corps of Engineers (USCOE). 2011. Missouri River recovery least tern and piping plover Data Management System (TP DMS). <https://rsgis.crrel.usace.army.mil/intro/dms.dmsintro.main> (limited access website).

U.S. District Court (USDC). 2011a. Memorandum opinion. Civil Action No. 09-1814 (ESH). U.S District Court for the District of Columbia. 38 pp.

U.S. Environmental Protection Agency (EPA). 2011a. August 8 final cancellation order by Lois Rossi for Rozol use in Montana, New Mexico, North Dakota, and South Dakota. Office of Pesticide Programs. <http:/www.epa.gov/pesticides/regulating/rozol.html>

U.S. Environmental Protection Agency (EPA). 2011b. October 17 letter from Anita Pease (USEPA) to Mike Thabault (USFWS) responding to USFWS letter initiating formal section 7 consultation on registration of Rozol Prairie Dog Bait for use on black-tailed prairie dogs. 4pp.

U.S. Environmental Protection Agency (EPA). 2011c. December 13 letter from John Hebert to Service and Liphatech outlining conservation measures for inclusion in the section 7 formal consultation and subsequent emails confirming Rozol use restrictions on future ferret reintroduction sites. 11 pp.

U.S. Environmental Protection Agency (EPA). 2011d. Ecological Committee on FIFRA Risk Assessment Methods (ECOFRAM) Terrestrial Work Group Report: IV. Effects Assessment. <http://www.epa.gov/oppefed1/ecorisk/ecofram/effectsassess.htm>

U.S. Environmental Protection Agency (EPA). 2010a. August 3 memorandum from Angel Chiri to Jennifer Gaines. Subject: Benefits Assessment for Chlorophacinone (Rozol) Use to Control Black-TailedPrairie Dogs, DP 374422. Office of Chemical Safety and Pollution Prevention. Washington D.C. 16 pp.

U.S. Environmental Protection Agency (EPA). 2010b. Formal Endangered Species Act section 7 consultation initiation package to U.S. Fish and Wildlife Service. Includes Sept 30 letter to Gary Grazer from Arthur Jean B Williams requesting consultation and the "Risks of chlorophacinone use on black-tailed prairie dogs to federally endangered and threatened species" and supporting materials (BA). Environmental Fate and Effects Division, Office of Pesticide Programs. 369 pp. <http://www.epa.gov/oppfead1/endanger/litstatus/effects/#chlorophacinone>

U.S. Environmental Protection Agency (EPA). 2010c. Nov 16 letter from Steven Bradbury to Martha Kauffman, World Wildlife Fund. Response to WWF's June 5th letter that formally rejects suspension of rozol petition. Office of Chemical Safety and Pollution Prevention. Washington D.C. 28 pp.

U.S. Environmental Protection Agency (EPA). 2009a. May 13 notice of pesticide registration for Rozol Prairie Dog Bait. EPA Reg. Number 7173-286. Office of Pesticide Programs. Washington D.C. 7 pp.

U.S. Environmental Protection Agency (EPA). 2009b. September 3 reply letter to World Wildlife Fund, Inc., regarding registration of Rozol Prairie Dog Bait. U.S. Environmental Protection Agency Office of Prevention, Pesticides and Toxic Substances, Washington D.C. 2 pp.

U.S. Environmental Protection Agency (EPA). 2008. May 21 conference call notes for May 19 call on secondary poisoning risks from the use of chlorophacinone on prairie dogs. 3 pp.

U.S. Environmental Protection Agency (EPA). 2007. January 19 meeting notes for Pesticides and Wildlife Meeting. 109 SW 9th Street, Topeka, KS. 4 pp.

U.S. Environmental Protection Agency (EPA). 1998a. Reregistration eligibility decision (RED): rodenticide cluster. EPA 738-R-98-007. Office of Prevention, Pesticides and Toxic Substances. Washington D.C. 319 pp.

U.S. Environmental Protection Agency (EPA). 1998b. Guidelines for ecological risk assessment. EPA/630/R-95/002F. Washington, D.C. 818 pp.

U.S. Environmental Protection Agency (EPA). 1995. Great Lakes water quality initiative technical support document for wildlife criteria. EPA-820-B-95-009. Office of Science and Technology, Office of Water. Washington, D.C. 62 pp.

U.S. Environmental Protection Agency (EPA). 1991. February 26 request for formal Section 7 consultation with supplemental information provided to the U.S. Fish and Wildlife Service. U.S. Environmental Protection Agency, Wahsington D.C. 300 pp.

U.S. Fish and Wildlife Service (Service). 2011a. July 13, 2011, Paul Souza (USFWS) signed declaration to District of Columbia Court to provide draft biological opinion to USEPA on Dec. 10, 2011. 4 pp.

U.S. Fish and Wildlife Service (Service). 2011b. Veterinary medical examination report. Lab Case # 11-000105. National Fish and Wildlife Forensics Laboratory, Ashland, Oregon. 5 pp.

U.S. Fish and Wildlife Service (Service). 2011c. September 9 letter responding to U.S. Environmental Protection Agency on their request to initiate formal consultation under the ESA. 18 pp.

U.S. Fish and Wildlife Service (Service). 2011d. Nov. 22 draft declaration of Gary Grazer to the District of Columbia Court to provide draft biological opinion to USEPA on Jan. 16, 2012. 5 pp.

U.S. Fish and Wildlife Service (Service). 2011e. Eskimo curlew (*Numenius borealis*) 5-year review: summary and evaluation. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B01A>

U.S. Fish and Wildlife Service (Service). 2011f. Endangered and Threatened Wildlife and Plants; Revising the Listing of the Gray Wolf (*Canis lupus*) in the Western Great Lakes. Federal Register 76(249): 81666 – 81726.

U.S. Fish and Wildlife Service (Service). 2011g. Endangered and Threatened Wildlife and Plants; Reissuance of Final Rule to Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife. Federal Register 76(87):25590-25592.

U.S. Fish and Wildlife Service (Service). 2011h. Endangered and Threatened Wildlife and Plants; Removal of the Gray Wolf in Wyoming from the Federal List of Endangered and Threatened Wildlife and Removal of the Wyoming Wolf Population's Status as an Experimental Population. Federal Register 76(193): 61782-61823.

U.S. Fish and Wildlife Service (Service). 2011i. Mexican Wolf Blue Range Reintroduction Project Statistics, Causes of documented Mexican wolf mortalities in the Blue Range Wolf Recovery Area, Arizona and New Mexico, 1998-2010. Accessed online December, 2011, at: <http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW_mortality.pdf.>

U.S. Fish and Wildlife Service (Service). 2011j. Endangered and Threatened Wildlife and Plants; Proposed Rule to Revise the List of Endangered and Threatened Wildlife for the Gray Wolf (*Canis lupus*) in the Eastern United States, Initiation of Status Reviews for the Gray Wolf and for the Eastern Wolf (*Canis lycaon*). Federal Register 76(87):26086-26145.

U.S. Fish and Wildlife Service (Service). 2011k. Fact sheet: gray wolf recovery in Minnesota, Wisconsin, and Michigan. December 2011. Accessed online January 5, 2010 at: <http://www.fws.gov/midwest/wolf/aboutwolves/pdf/R3wolfrec.pdf.>

U.S. Fish and Wildlife Service (Service). 2011m Proposed Rule for Endangered and Threatened Wildlife and Plants; Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog. Federal Register 76(183):58441-58455.

U.S. Fish and Wildlife Service (Service), Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Wildlife Resources, and USDA Wildlife Services. 2011. Rocky Mountain Wolf Recovery 2010 Interagency Annual Report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Ecological Services, 585 Shepard Way, Helena, Montana. 59601.

U.S. Fish and Wildlife Service (Service). 2010a. September 23 letter from Jeffrey Towner to Debbie Edwards, U.S. Environmental Protection Agency, Office of Pesticide Programs. Unrealistic and impractical label requirements as characterized by North Dakota field tour of black-tailed prairie dog towns and meetings with applicators. 2 pp.

U.S. Fish and Wildlife Service (Service). 2010b. Post-delisting monitoring plan for the bald egle (*Haliaeetus leucocephalus)* in the contiguous 48 states. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Midwest Regional Office, Twin Cities, Minnesota. 75 pp.

U.S. Fish and Wildlife Service (Service). 2010c. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the White-tailed Prairie Dog as Threatened or Endangered. Federal Register 75(104):30338-30363.

U.S. Fish and Wildlife Service (Service). 2010d. Mexican wolf recovery program: progress report #12, reporting period: January 1 – December 31, 2009. Accessed online December 2011 at: <http://www.fws.gov/mountain-prairie/species/mammals/wolf/annualrpt10/index.html>

U.S. Fish and Wildlife Service (Service). 2009a. September 8 letter from Bryan Arroyo to Debbie Edwards, U.S. Environmental Protection Agency, Office of Pesticide Programs. Recommendation to EPA to withdraw Rozol registration and not issue registration for Kaput prairie dog bait. Washington D.C. 9 pp.

U.S. Fish and Wildlife Service (Service). 2009b. Endangered and Threatened Wildlife and Plants; 12-Month finding on a Petition to List the Black-tailed Prairie Dog as Threatened or Endangered. Federal Register 74(231):63343-63366.

U.S. Fish and Wildlife Service (Service). 2009c. Veterinary medical examination report. Lab Case # 09-000049. National Fish and Wildlife Forensics Laboratory, Ashland, Oregon. 11 pp.

U.S. Fish and Wildlife Service (Service). 2009d. Final environmental assessment: proposal to permit take as provided under the Bald and Golden Eagle Protection Act. Division of Migratory Bird Management. Washington, D.C. 199 pp.

U.S. Fish and Wildlife Service (Service). 2009e. Piping plover (*Charadrius melodus*) 5-year Review: summary and evaluation. U.S. Fish and Wildlife Service, Ecological Services, Northeast Region, Hadley, Massachusetts and Midwest Region East Lansing Field Office, Michigan. 214 pp.

U.S. Fish and Wildlife Service (Service). 2009f. Endangered and Threatened Wildlife and Plants; Final Rule To Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife. Federal Register 74(62):15123-15188.

U.S. Fish and Wildlife Service (Service). 2009g. Endangered and Threatened Wildlife and Plants; Final Rule To Identify the Western Great Lakes Populations of Gray Wolves as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife. Federal Register 74(62):15070-15123.

U.S. Fish and Wildlife Service (Service). 2008a. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. <http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf>

U.S. Fish and Wildlife Service (Service). 2008b. Black-footed ferret (*Mustela nigripes*) 5-year status review: summary and evaluation. 38 pp.

U.S. Fish and Wildlife Service (Service). 2008c. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Gunnison's Prairie Dog as Threatened or Endangered. Federal Register 73(24): 6660-6684.

U.S. Fish and Wildlife Service (Service). 2007a. Veterinary medical examination report. Lab Case # 07-000015. National Fish and Wildlife Forensics Laboratory, Ashland, Oregon. 11 pp.

U.S. Fish and Wildlife Service (Service). 2007b. Chiricahua leopard frog (*Rana chiricahuensis*) recovery plan. Region 2, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service (Service). 2006a. January 13 letter to Greg Ibach, Nebraska Department of Agriculture. Request to not issue a section 24(c) special local needs registration for use of Rozol Pocket Gopher Bait for control of black-tailed prairie dogs. U.S. Fish and Wildlife Service Ecological Services, Nebraska Field Office. Grand Island, Nebraska.

U.S. Fish and Wildlife Service (Service). 2006b. January 24 letter to Larry Gabriel, South Dakota Department of Agriculture. Request to not issue a section 24(c) special local needs registration for use of Rozol Pocket Gopher Bait for control of black-tailed prairie dogs. USFWS Ecological Services, South Dakota Field Office. Pierre, South Dakota.

U.S. Fish and Wildlife Service (Service). 2006c. February 10 letter to Greg Ibach, Nebraska Department of Agriculture. Response and second request to not issue a section 24(c) special local needs registration for use of Rozol Pocket Gopher Bait for control of black-tailed prairie dogs. U.S. Fish and Wildlife Service Ecological Services, Nebraska Field Office. Grand Island, Nebraska.

U.S. Fish and Wildlife Service (Service). 2006d. October 10 letter to Laura Quakenbush, Colorado Department of Agriculture. Request to not issue a section 24(c) special local needs registration for use of Rozol Pocket Gopher Bait for control of black-tailed prairie dogs. USFWS Ecological Services, Colorado Field Office. Grand Junction, Colorado.

U.S. Fish and Wildlife Service (Service). 2006e. May 5 letter to Anne Lindsay, Office of Pesticide Programs, U.S. Environmental Protection Agency. Request to disapprove Section 24(c) special local needs registration for use of Rozol Pocket Gopher Bait for control of black-tailed prairie dogs. U.S. Fish and Wildlife Service Mountain-Prairie Region, Denver, Colorado.

U.S. Fish and Wildlife Service (Service). 2006f. Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Northern Aplomado Falcons in New Mexico and Arizona. Federal Register 71(143):42298-42315.

U.S. Fish and Wildlife Service (Service). 2006g. Biological Opinion for the Implementation of the Fire Management Plan at the San Bernardino and Leslie Canyon National Wildlife Refuges, January 23, 2006. U.S. Fish and Wildlife Service Arizona Ecological Services Field Office, Phoenix, Arizona. 46 pp.

U.S. Fish and Wildlife Service (Service). 2004. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Mexican Spotted Owl; Final Rule. August 31, 2004. Federal Register 69(168):53182-53297.

U.S. Fish and Wildlife Service (Service). 2003. Endangered and Threatened Wildlife and Plants; Final Rule To Reclassify and Remove the Gray Wolf From the List of Endangered and Threatened Wildlife in Portions of the Conterminous United States; Establishment of Two Special Regulations for Threatened Gray Wolves. Federal Register 68(62):15804-15875.

U.S. Fish and Wildlife Service (Service). 2002a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover. Federal Register 67(176):57637-57717.

U.S. Fish and Wildlife Service (Service). 2002b. Biological opinion for the continuation of livestock grazing on the Coronado National Forest. Dated October 24, 2002. U.S. Fish and Wildlife Service Arizona Ecological Services Field Office, Phoenix, Arizona. 228 pp.

U.S. Fish and Wildlife Service (Service). 2000a. Notice of Availability to review Peregrine Fund request to amendment its incidental take permit for aplomado falcons. Federal Register 65(54): 14999. <http://www.fws.gov/policy/library/2000/00fr14999.html>

U.S. Fish and Wildlife Service (Service). 2000b. Amended biological opinion: habitat conservation plan for the reintroduction of the aplomado falcon into south Texas. June 1, 2000. Clear Lake Ecological Services Office, Clear Lake, Texas.

U.S. Fish and Wildlife Service (Service). 1998. Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico. Federal Register 63(7):1752-1772.

U.S. Fish and Wildlife Service (Service). 1996. Availability of an Environmental Assessment and Receipt of Application for Incidental Take Permit for The Peregrine Fund's Aplomado Falcon Reintroduction Program in Texas. Federal Register 61(139):37488-37489.

U.S. Fish and Wildlife Service (Service). 1995. Recovery Plan for the Mexican Spotted Owl. Albuquerque, New Mexico.

U.S. Fish and Wildlife Service (Service). 1994. The reintroduction of gray wolves to Yellowstone National Park and central Idaho. Final Environmental Impact Statement. Denver, Colorado. 608 pp.

U.S. Fish and Wildlife Service (Service). 1993. Section 7, Endangered Species Act Biological Opinion on the effects of 16 vertebrate control agents on threatened and endangered species. Washington D.C. 198 pp.

U.S. Fish and Wildlife Service (Service). 1992. Recovery Plan for the Eastern Timber Wolf. Twin Cities, Minnesota. 73 pp.

U.S. Fish and Wildlife Service (Service). 1991. Black-capped Vireo (*Vireo atricapillus*) Recovery Plan. Austin, Texas. pp. vi + 74.

U.S. Fish and Wildlife Service (Service). 1990. Aplomado Falcon Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. v + 58 pp.

U.S. Fish and Wildlife Service (Service). 1988. Black-footed ferret recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 154 pp.

U.S. Fish and Wildlife Service (Service). 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 119 pp.

U.S. Fish and Wildlife Service (Service). 1986. Endangered and Threatened Wildlife and Plants; Determination of the Northern Aplomado Falcon To Be an Endangered Species. Federal Register 51(37):6686-6690.

U.S. Fish and Wildlife Service (Service). 1978. Endangered and Threatened Wildlife and Plants; Reclassification of the Gray Wolf in the United States and Mexico, with Determination of Critical Habitat in Michigan and Minnesota, Final Rule. Federal Register 43(47): 9607-9615.

U.S. Fish and Wildlife Service (Service). 1976. Endangered and Threatened Wildlife and Plants; Determination That Two Species of Butterflies Are Threatened Species and Two Species of Mammals Are Endangered Species. Federal Register 41(83):17736-17741.

U.S. Fish and Wildlife Service (Service). 1974. Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife. Federal Register 39(3):1157-1185.

U.S. Fish and Wildlife Service (Service). 1970. Conservation of Endangered Species and Other Fish or Wildlife. Federal Register 35(106): 8491-8498.

U.S. Fish and Wildlife Service (Service). 1967. Native Fish and Wildlife. Endangered Species. Federal Register 32(48):4001

U.S. Fish and Wildlife Service (Service), Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Wildlife Resources, and USDA Wildlife Services. 2011. Rocky Mountain Wolf Recovery 2010 Interagency Annual Report. C. A. Sime and E. E. Bangs, Eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601.

U.S. Fish and Wildlife Service (Service), Montana Fish, Wildlife & Parks; Idaho Fish and Game; and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, 585 Shepard Way, Helena, Montana 59601.

U.S. Fish and Wildlife Service (Service), Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2002. Rocky Mountain Wolf Recovery 2001 Annual Report. T. Meier, editor U.S. Fish and Wildlife Service, Ecological Services, 100 N. Park, Suite 320, Helena, Montana. 59601. 43 pp.

Van Den Berg, G. and W. T. Nauta. 1975. Effects of anti-inflammatory 2-aryl-1,3-indandiones on oxidative phosphorylation in rat liver mitochondria. Biochemical Pharinamacology 24(7):815-821.

Vyas, N.B. and Rattner, B.A. 2012. Critique on the use of the standardized avian acute oral toxicity test for first generation anticoagulant rodenticides. Human and Ecological Risk Assessment.18 in press.

Vyas N. B. 2010a. Annual report 2010: characterization of avian hazards following chlorophacinone (Rozol®) use for prairie dog control. U.S. Geological Survey, Patuxent Wildlife Research Center. 39 pp.

Vyas N. B. 2010b. Rozol poisoning of black-tailed prairie dog. Video. Taken by U.S. Geological Survey on April 9, 24 days after application. Edited by U.S. Fish and Wildlife Service and posted at:< <http://www.fws.gov/filedownloads/ftp_region6_upload/Rozol/pd%20short%20clip%20with%20audio.wmv>

Vyas N.B., Spann J.W., Hulse C.S., Borges S.L., Bennett R.S., Torrez M., Williams B.I., Leffel R. 2006. Field evaluation of an avian risk assessment model. Environmental Toxicology and Chemistry 25: 1762-71.

Vyas, N. B. 1999. Factors influencing estimation of pesticide related wildlife mortality. Toxicology and Industrial Health15:186- 191.

Wabakken, P., H. Sand, I. Kojola, B. Zimmermann, J. M. Arnemo, H. C. Pedersen, and O. Liberg. 2007. Multistage, long-range natal dispersal by a global positioning system-collared Scandinavian wolf. Journal of Wildlife Management 71(5):1631-1634.

Wehtje, W. 2011. Aransas Wood Buffalo Population Radio-Marked Whooping Crane Fall 20120 Migration Report. The Crane Trust, Inc. Wood River, Nebraska. Pp 1-14.

Western Association of Fish and Wildlife Agencies (WAFWA). 2009. July 30 letter from Donald Koch, to Secretary Salazar, Department of Interior. Request for assistance to have the U.S. Environmental Protection Agency suspend use of Rozol use on black-tailed prairie dogs. Cheyenne, Wyoming. 13 pp.

Wilson, D. E. and S. Ruff. 1999. The Smithsonian book of North American mammals. Smithsonian Institution Press, Washington and London. Pp. 168-175.

Wisconsin Department of Natural Resources. 1999. Wisconsin wolf management plan - October 27, 1999. Madison, WI 74 pp.

Wisely, S. M. 2006. The genetic legacy of the black-footed ferret: past, present, and future. *In* Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J. E. Roelle, B. J. Miller, J. L. Godbey, and D. E. Biggins, editors. U.S. Geological Survey. Pp 37-43.

Witmer G. 2011. Retention time of chlorophacinone in the tissues of black-tailed prairie dogs exposed to chlorophacinone bait. Final Report: QA-1682. USDA/APHIS/WS National Wildlife Research Center, Fort Collins, Colorado. 59 pp.

World Wildlife Fund (WWF). 2009. June 5 letter from Martha Kauffman and Steve Forrest to Lisa Jackson, Environmental Protection Agency regarding Rozol registration. Northern Great Plains Ecoregion, Bozeman, Montana. 3 pp.

Wyoming Natural Diversity Database (WYNDD). 2011. Predicted distribution based on inductive modeling of environmental suitability. See <http://www.uwyo.edu/WYNDD/data-dissemination/range-distribution/distribution-models.html>

Yoder, C. A. 2008. Acute oral toxicity (LD50) of chlorophacinone in black-tailed prairie dogs (*Cynomys ludovicianus*). Unpublished report, QA-1446. National Wildlife Research Center, Fort Collins, Colorado. 86 pp.

Personal Communications

Ernst, A. 2008. Email exchange between Andrea Ernst and Pete Gober, Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services, South Dakota Field Office. August 4, 2008. Habitat suitability and availability relative to black-footed ferrets.

Jones, D. R. 2011. Email exchange and phone conversation between David R. Jones, Senior Scientist, Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. EPA, Washington, D.C.; and Matt Schwarz, Environmental Contaminants Biologist, U.S. Fish and Wildlife Service, Ecological Services, South Dakota Field Office, Pierre, South Dakota. November 04, 2011. Discussed environmental fate of chlorophacinone as Rozol.

Montoya, A. 2011. Email between Angel Montoya, Partners Program biologist, and Pat Zenone, Ecological Services biologist, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico. November 30, 2011. Status of northern aplomado falcons outside of Safe Harbor area in Texas.

Pavelka, G. 2008. Email exchange between Gregory A. Pavelka, Wildlife Biologist, U.S. Army Corps of Engineers, Yankton, South Dakota , and Carol Aron, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Ecological Services, North Dakota Field Office, Bismarck, North Dakota. December 8, 2012. Inquiry regarding the distance that piping plovers will nest from water on Missouri River Reservoirs.

Someson, R. 2012. Email between Russell A. Someson, Natural Resource Specialist, Lake Oahe Project, U.S. Army Corps of Engineers, Pierre, South Dakota, and Carol Aron, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Ecological Services, North Dakota Field Office, Bismarck, North Dakota. Confirmation of 2011 verbal exchange regarding lack of piping plover use of black-tailed prairie dog colonies.

Vyas, N. 2011a. Email exchange and phone conversation between Nimish B. Vyas, Research Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland, and Matt Schwarz, Fish and Wildlife Biologist (Contaminants), U.S. Fish and Wildlife Service, Ecological Services, South Dakota Field Office, Pierre, South Dakota. June 13, 2011. Discussed shortfalls of the EPA's required five-day LC-50.

Vyas, N. 2011b. Email exchange and phone conversation between Nimish B. Vyas, Research Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland and Matt Schwarz, Fish and Wildlife Biologist (Contaminants), U.S. Fish and Wildlife Service, Ecological Services, South Dakota Field Office, Pierre, South Dakota. October 3, 2011. Discussed unpublished data on chlorophacinone concentrations in samples collected for Vyas (2010) study.

Vyas, N. 2010. Email exchange and phone conversation between Nimish B. Vyas, Research Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland, and Matt Schwarz, Fish and Wildlife Biologist (Contaminants), U.S. Fish and Wildlife Service, Ecological Services, South Dakota Field Office, Pierre, South Dakota. September 30, 2010. Discussed meadowlark histopathology results from Vyas (2010) study.

APPENDIX

September 10, 2010, Label for Rozol® Prairie Dog Bait

PRECAUTIONARY STATEMENTS

Hazard to Humans and Domestic Animals

CAUTION: Harmful if swallowed or absorbed through the skin because it may reduce the clotting ability of blood and cause bleeding. Keep away from children, domestic animals and pets. Do not get in eyes on skin or on clothing. All handlers (including applicators) must wear shoes plus socks, and gloves. Any person who retrieves carcasses or unused bait following application of this product must wear gloves.

USER SAFETY REQUIREMENTS: Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash hands thoroughly after applying bait and before eating, drinking , chewing gum, using tobacco or using the toilet and change into clean clothing.

FIRST AID: Have label when obtaining treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor.

If on skin: Take off contaminated clothing. Rinse skin with plenty of cool water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

TREATMENT FOR PET POISONING: If animal eats bait, call veterinarian at once.

NOTE TO PHYSICIAN OR VETERINARIAN: Anticoagulant Chlorophacinone: If swallowed, this material may reduce the clotting ability of the blood and cause bleeding. **For humans or dogs** that have ingested this product and/or have obvious poisoning symptoms (bleeding or prolonged prothrombin times), give Vitamin K_1 intramuscularly or orally.

ENVIRONMENTAL HAZARDS: This product is toxic to fish and wildlife. Dogs and other predatory and scavenging mammals and birds might be poisoned if they feed upon animals that have eaten this bait. Do not apply directly to water, or to areas where surface water is present. Do not contaminate water by cleaning of equipment or disposal of wastes. Runoff also may be hazardous to aquatic organisms in water adjacent to treated areas.

ENDANGERED SPECIES CONSIDERATIONS: NOTICE: It is a Federal offense to use any pesticide in a manner that results in the death of an endangered species. Use of this product may pose a hazard to endangered or threatened species. Do not use this product within prairie dog towns in the range of the black-footed ferret without first contacting endangered species specialists at a U.S. Fish and Wildlife Service office. Applicators may obtain information regarding the occurrence of endangered species and use limitations for this product by calling EPA's "Endangered Species Hotline" at 1-800-447-3813 to obtain an "Interim Measures" pamphlet for your county. You may also consult your local agricultural extension office or state pesticide lead agency to determine if there are any requirements for use of this product.

RESTRICTED USE PESTICIDE

DUE TO HAZARD TO NONTARGET ORGANISMS

For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's Certification.

rozol®

PRAIRIE DOG BAIT

Active Ingredient: chlorophacinone	0.005%
Inert Ingredients	99.995%
Total	100.000%

EPA Reg. No. 7173-286   EPA Est. No. 7173-WI-1

KEEP OUT OF REACH OF CHILDREN

CAUTION: See side panel for additional precautionary statements.

LIPHATECH®

Liphatech, Inc.
3600 W. Elm Street
Milwaukee, WI 53209
(414) 351-1476

NET WEIGHT:

ACCEPTED
SEP 10 2010
Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 7173-286

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

READ THIS LABEL and follow all use directions and precautions. Only use for sites, pests, and application methods specified on this label.

IMPORTANT: Do not expose children, pets, or other nontarget animals to rodenticides. To help prevent accidents:

1. Store product not in use in a location out of reach of children and pets.
2. Dispose of product container, unused, spoiled and unconsumed bait as specified on this label.

Use restrictions: This product may only be used as follows:

1. **Sites/Pests:** Black-Tailed Prairie Dogs (*Cynomys ludovicianus*) on rangeland and adjacent noncrop areas.
2. **States:** Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming.
3. **Application Method:** Hand application of bait, at least 6 inches down prairie dog burrows. This product may only be used in underground applications. **Do not apply bait on or above ground level. Treat only active burrows.**
4. **Treatment Period:** Apply between October 1 and March 15 of the following year, when animals will most readily take the grain bait.
5. **Non-Applicators:** Do not allow children, pets, domestic animals or persons not involved in the application to be in the area where the product is being applied.
6. **Grazing Restriction:** Do not allow livestock to graze in treated areas for 14 days after treatment and when no bait is found above ground.

Site Assessment: Before applying this product, identify active prairie dog burrows by visual observation. The openings of active burrows will generally be free of leaves, seeds, other debris or spider webs, and will show freshly turned earth, and have prairie dog feces nearby.

Application: Apply 1/4 cup (53 grams or nearly 2 ounces) of bait at least 6 inches down active prairie dog burrows. **Make sure no bait is left on the soil surface at the time of application.** Applicator must retrieve and dispose of any bait that is spilled above ground or placed less than 6 inches down the burrow entrance.

Follow-up: Prairie dogs that have eaten this bait will begin to die off in 4 to 5 days after they eat a lethal amount. The applicator must return to the site within 4 days after bait application, and at 1 to 2 day intervals, to collect and properly dispose of any bait or dead or dying prairie dogs found on the surface. All carcasses found above ground must be collected and disposed of properly. Continue to collect and dispose of dead or dying prairie dogs and search for nontarget animals for at least two weeks, but longer if carcasses are still being found at that time. Carcass collections should occur in late afternoon, near sundown, to reduce the potential of nocturnal animals finding carcasses and dying animals. Bury carcasses on site in holes dug at least 18 inches deep or in inactive burrows (no longer being used by prairie dogs or other species) to avoid non-target animal scavenging. Burial includes covering and packing the hole or burrow with soil. If burial is not practical (due to frozen ground, etc) and other disposal methods are allowed by state and local authorities, collected carcasses may be disposed of by such other methods as insure that the carcasses are inaccessible to scavengers.

Reapplication: If prairie dog activity persists several weeks or months after the bait was applied, a second application may be made, by treating burrows in the same manner, time period and procedure as the first application. Follow all application, site assessment and follow-up directions and use restrictions as found above.

WARRANTY: To the extent consistent with applicable law, seller makes no warranty, expressed or implied, concerning the use of this product other than indicated on the label. Buyer assumes all risk of use and/or handling of this material when such use and/or handling is contrary to label instructions. (081910)

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal. **Pesticide Storage:** Store only in original container in a cool, dry place inaccessible to children and pets. Keep containers closed and away from other chemicals. **Pesticide Disposal:** Wastes resulting from the use of this product may be placed in trash or delivered to an approved waste disposal facility. **Container Handling:** Nonrefillable container. Do not reuse or refill this container. Dispose of empty container by placing in trash, at an approved waste disposal facility or by incineration or, if allowed by state and local authorities, by burning. If burned stay out of smoke.