# Final Biological Opinion For Kaput® Prairie Dog Bait Registered Under Section 3 of the Federal Insecticide, Fungicide and Rodenticide Act



Photo Credit: U.S. Fish and Wildlife Service

**Prepared by:**
**U.S. Fish and Wildlife Service**
**Endangered Species Program, Headquarters**
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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AOK | Audubon of Kansas |
| BO | Biological Opinion |
| BTPD | Black-tailed prairie dog |
| CPW | Colorado Division of Parks and Wildlife |
| CFR | Code of Federal Regulations |
| DDE | dichlorodiphenyldichloroethylene |
| DDT | dichlorodiphenyltrichloroethane |
| DOW | Defenders of Wildlife |
| DPS | Distinct Population Segment |
| EEC | Estimated Environmental Concentration |
| EPA/USEPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| FIFRA | Federal Insecticide, Fungicide and Rodenticide Act |
| GPS | Global Positioning System |
| IPM | Integrated Pest Management |
| ITS | Incidental Take Statement |
| LC | Lethal Concentration |
| LD | Lethal Dose |
| LOC | Level of Concern |
| MBTA | Migratory Bird Treaty Act |
| MRID | Master Record Identification |
| NEP | Nonessential Experimental Population |
| NRM | Northern Rocky Mountains |
| PCE | Primary Constituent Element |
| RPM | Reasonable and Prudent Measure |
| RQ | Risk Quotient |
| Service/USFWS | U.S. Fish and Wildlife Service |
| SLN | Special Local Needs |
| TRV | Toxicity Reference Value |
| USCOE | U.S. Corps of Engineers |
| USDC | U.S. District Court of Columbia |
| WGL | Western Great Lakes |
| WYNDD | Wyoming Natural Diversity Database |

# BIOLOGICAL OPINION

## I. INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) 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 and 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.

## II. BACKGROUND

Kaput®-D Prairie Dog Bait (Kaput®-D) is a product registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947, as amended (7 U.S.C. §136 et seq.). Under the FIFRA, use of a pesticide may be restricted by how it is registered and by its use label. A pesticide use label provides pesticide applicators with directions that consist of legal requirements that may specify when, how, and where a pesticide is applied. Pesticides that are federally registered by the Environmental Protection Agency (EPA) as restricted-use are limited to use by pesticide applicators that are certified, often by passing a written exam, in accordance

with national standards. Section 24(c) of the FIFRA allows States to register an additional use of a federally registered pesticide product, or a new end use product to meet special local needs (SLNs).

Kaput®-D is an anticoagulant (hinders the clotting of blood) containing the active ingredient diphacinone. Kaput®-D was registered on October 25, 2012 (USEPA Registration No. 72500-22) under Section 3 of FIFRA for use on black-tailed prairie dogs (BTPDs) (*Cynomys ludovicianus*) in 10 States: Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. The EPA regulates pesticide use via administration of the FIFRA, and registration of pesticides by the EPA is subject to compliance with Section 7 of the ESA. In a letter dated October 25, 2012, the EPA requested initiation of ESA Section 7(a)(2) formal consultation under 50 CFR Part 402.46, Optional Formal Consultation Procedures for the FIFRA. To initiate formal consultation, the EPA provided the following documents to the Service:

- Transmittal Letter (PDF) from Donald Brady, Director, Environmental Fate and Effects Division to Gary Frazer, Assistant Director for Endangered Species, U.S. Fish and Wildlife Service (October 25, 2012) (2 pp.)

- Ecological Risk Assessment for the Section 3 New Use Registration of Diphacinone (PC 067701) for use on Black-tailed Prairie Dogs (*Cynomys ludovicianus*) (June 28, 2012) (60 pp.)

- Kaput®-D Prairie Dog Bait Label; EPA Registration No. 72500-22; October 25, 2012 (4 pp.)

- Commitment by Scimetrics LTD. Corp. (Scimetrics) (registrant for Kaput®-D Prairie Dog Bait) to abide by the same restrictions outlined in the Final Biological Opinion for Rozol® Prairie Dog Bait; August 10, 2012 (5 pp.)

The "Diphacinone Ecological Risk Assessment (Kaput®-D Assessment)" was provided to the Service in lieu of a biological assessment for the proposed action and is titled "*Ecological Risk Assessment for the Section 3 New Use Registration of Diphacinone for use on Black Tailed Prairie Dogs"* (USEPA 2012a). The Kaput®-D Assessment did not provide species or critical habitat effects determinations when submitted to the Service. In 2010, the EPA initiated formal consultation with the Service on a similar anticoagulant rodenticide [chlorophacinone; trade name Rozol® Prairie Dog Bait (Rozol®)(USEPA 2010a)] and subsequently the Service issued a final biological opinion ("Final Biological Opinion for Rozol® Use on Black-tailed Prairie Dogs Registered under Section 3 of the Federal Insecticide, Fungicide and Rodenticide Act") on April 9, 2012 (USFWS 2012a). During the informal consultation process on Kaput®-D, the EPA and Service came to the agreement that the manner in which Kaput®-D is used and where it is used is identical to that of Rozol®. The area of potential use (within the range of the BTPD), application methods, and the use season (October 1 to March 15) are identical. In addition, the exposure pathway in which listed species and/or non-target species may be exposed to the grain baits are also identical. The only apparent difference between the two products is the toxicity of the two active ingredients (diphacinone vs. chlorophacinone). After discussions with the EPA, it was determined that the proposed action may affect the same listed species and critical habitats described in the Rozol® Biological Assessment (Rozol® Assessment) ('Nation-wide

Effects Determination for Chlorophacinone Relative to the Use of Rozol® Prairie Dog Bait," USEPA 2010a), pending any new listings or status changes in existing listings.

Because of the similarity of the proposed action to the EPA's registration of Rozol®, we have relied upon information in both the EPA's Rozol® Assessment and the Service's biological opinion for Rozol® in our current analysis. In the Rozol® Assessment, the EPA made adverse effects determinations for 21 federally listed species and adverse modification determinations for 7 critical habitat designations. After Service review, we found that the California condor (*Gymnogyps californianus*), the Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*), the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*), and the Salt Creek tiger beetle critical habitat do not overlap with the current range of the proposed use of Kaput®-D on BTPDs. Since the completion of the Rozol® Assessment, critical habitat for the Chiricahua leopard frog [*Lithobates (Rana) chiricahuensis*] has been designated (USFWS 2012b) and gray wolves in the Northern Rocky Mountain Distinct Population Segment (DPS) USFWS 2011a, USFWS 2012c) and the Western Great Lakes DPS (USFWS 2011b) have been delisted. This delisting also included gray wolf critical habitat in Michigan and Minnesota. Subsequently, the analysis in this BO addresses 18 listed species and 7 designated critical habitats (Table 1).

**Table 1. Federally listed species and critical habitats analyzed within this BO.**

| | Common Name | Scientific Name | Federal Status | Critical Habitat Designated/Analyzed? |
|---|---|---|---|---|
| **1** | American Burying Beetle | *Nicrophorus americanus* | Endangered | Not Designated |
| **2** | Black-capped Vireo | *Vireo atricapilla* | Endangered | Not Designated |
| **3** | Black-footed Ferret | *Mustela nigripes* | Endangered, Nonessential Experimental (Portions of AZ, CO, MT, SD, UT, and WY) | Not Designated |
| **4** | Canada Lynx | *Lynx canadensis* | Threatened, Candidate (NM) | Designated/Analyzed |
| **5** | Chiricahua Leopard Frog | *Lithobates* [*Rana*] *chiricahuensis* | Threatened | Designated/Analyzed |
| **6** | Eskimo Curlew | *Numenius borealis* | Endangered | Not Designated |
| **7** | Golden-checked Warbler | *Dendroica chrysoparia* | Endangered | Not Designated |
| **8** | Gray Wolf | *Canis lupus* | Endangered, Nonessential Experimental (WY, AZ, NM) | Not Designated |
| **9** | Grizzly Bear | *Ursus arctos horribilis* | Threatened | Not Designated |
| **10** | Gulf Coast Jaguarundi | *Herpailurus* (=*Felis*) *yagouaroundi cacomitli* | Endangered | Not Designated |
| **11** | Jaguar | *Panthera onca* | Endangered | Not Designated |
| **12** | Mexican Spotted Owl | *Strix occidentalis lucida* | Threatened | Designated/Analyzed |
| **13** | New Mexican Ridge-nosed rattlesnake | *Crotalus willardi obscurus* | Threatened | Designated/Analyzed |
| **14** | Northern Aplomado Falcon | *Falco femoralis septentrionalis* | Endangered, Nonessential Experimental (NM) | Not Designated |
| **15** | Ocelot | *Lepardus pardalis* | Endangered | Not Designated |
| **16** | Piping Plover | *Charadrius melodus* | Threatened | Designated/Analyzed |
| **17** | Preble's Meadow Jumping Mouse | *Zapus hudsonius preblei* | Threatened | Designated/Analyzed |
| **18** | Whooping Crane | *Grus americana* | Endangered | Designated/Analyzed |

## III. CONSULTATION HISTORY

The background information below includes activities/actions that occurred leading up to the current consultation and issuance of this BO.

| Date | Activity |
|---|---|
| 2006/2007 | Kaput®-D is registered under Section 24(c), Special Local Needs, under the FIFRA for use on black-tailed prairie dogs in Colorado, Kansas, Nebraska, Texas and Wyoming. |
| December 21, 2007 | Service provides a letter to the EPA asking to disapprove the Section 24(c) Special Local Needs registration for use of Kaput®-D Prairie Dog Bait for control of black-tailed prairie dogs (USFWS 2007a). |
| May 21, 2008 | Scimetrics applies for an amendment to add BTPDs to the Section 3 registration of EPA Registration No. 72500-11 (Kaput® Field Rodent Bait B) (USEPA 2012b). |
| September 8, 2009 | Service provides a letter to the EPA asking that the agency not issue the FIFRA Section 3 registration for Kaput® for use on BTPDs until the EPA completes a formal consultation on the rodenticide with the Service (USFWS 2009a). |
| September 23, 2009 | EPA publishes in the Federal Register a Notice of Receipt of the amendment to add BTPDs to the Kaput® Field Rodent Bait B label (USEPA 2012b). |
| September 23, 2009 | Defenders Of Wildlife (DOW) and Audubon Of Kansas (AOK) file a complaint in the U.S. District Court of Columbia (USDC) alleging among other things that the EPA failed to conduct ESA Section 7 consultation for the use of Kaput® on BTPDs (DOW and AOK 2009b). |
| November 12, 2009 | Service provides a letter to the EPA recommending that the EPA disapprove the application by Scimetrics to add BTPD to the pesticide label for Kaput® Field Rodent Bait B. The letter describes concerns for potential impacts to non-target wildlife protected under the ESA, Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA). At the time, BTPD was being reviewed for Federal listing (USFWS 2009b). |
| June 14, 2011 | USDC issues a ruling on the DOW and AOK 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. |
| February 27, 2012 | Scimetrics submits an application for a new product, Kaput®-D Prairie Dog Bait to control BTPDs. This application was intended to replace the application to amend the label of Kaput® Field Rodent Bait B to include use on BTPDs (USEPA 2012b). |
| May 30, 2012 | EPA and Service discuss the upcoming registration of Kaput®-D. |
| October 25, 2012 | EPA submits a letter to the Service requesting formal ESA Section 7 consultation on Kaput®-D use on BTPDs (USEPA 2012a). |

# IV. DESCRIPTION OF THE ACTION

The proposed action by the EPA is the administration of the FIFRA Section 3 registration of the single product label for Kaput®-D (Registration No. 72500-22). Kaput®-D is manufactured by Scimetrics as loose-grain bait used to poison BTPDs in the 10 western States of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming.

All 10 States listed on the October 25, 2012, Kaput®-D label (see Appendix) are considered herein. The EPA's goal for reassessing registered pesticide active ingredients is to do so 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.

Scimetrics, the applicant for the Kaput®-D registration, has agreed to abide by the Conservation Measures, Reasonable and Prudent Measures and Terms and Conditions that were identified and incorporated into the Rozol® Assessment (USEPA 2010a), and as a result, the EPA has incorporated these measures (Conservation Measures, described below) as part of their proposed action. The action area and items relevant to use of the product, as directed by its label, were described in the EPA formal consultation initiation package (USEPA 2012a) and incorporated herein. Additionally, information regarding direct and indirect effects of the proposed action and potential exposure routes to federally listed species, as well as a review of the EPA's Kaput®-D Assessment, is provided in this BO. This information provides the context in which the subsequent individual species analyses were conducted.

## A. CONSERVATION MEASURES

Conservation measures are commitments by the EPA to avoid or minimize adverse impacts to federally threatened and endangered species and their associated critical habitats and as such are part of the proposed action that is analyzed in the effects analysis in this BO. These conservation measures were identified by the Service and agreed upon by the EPA and registrant during the formal consultation process for Rozol® Prairie Dog Bait. Since Rozol® and Kaput®-D are similar products with similar modes of action and toxicity, the EPA asked Scimetrics to incorporate the same conservation measures, as well as the reasonable and prudent measures, and terms and conditions from the Rozol® BO (collectively referred to as conservation measures herein) as part of their registration for Kaput®-D. Scimetrics agreed to include all of the proposed conservation measures (Scimetrics 2012). The species-specific conservation measures 1-9 will be included online as part of the EPA's Endangered Species Protection Bulletins (see: *Bulletins Live!* at http://www.epa.gov/espp/bulletins.htm). Measures identified on the EPA's *Bulletins Live!* are considered an extension of the Kaput®-D label thereby legally requiring applicators to adhere to them. Maps of each of the areas where Kaput®-D use will not be allowed or will be restricted, along with any associated relevant information will be included in the EPA's *Bulletins Live!* database. Label requirements will make clear that Kaput®-D use in these areas is restricted or prohibited. Noncompliance with these bulletins or the label would be a violation of the FIFRA.

## Species-Specific Conservation Measures

The following species-specific conservation measures are intended to avoid, reduce, and/or minimize the effects of the action on listed species and designated critical habitat. The conservation measures address one or more of the following: 1) temporal or geographic overlap of listed species and BTPD populations, 2) primary exposure (i.e., direct consumption of bait), and 3) secondary exposure[1] (i.e., predation and/or scavenging of other animals that have consumed bait).

### 1. Black-footed Ferret Conservation Measure

- Prohibit application of Kaput®-D within current black-footed ferret reintroduction sites (13 sites) and future reintroduction areas to reduce the level of impact to the black-footed ferret. The locations will be made available via the EPA's *Bulletins Live!* website. In addition, the EPA shall modify the EPA *Bulletins Live!* website to include the location of wild extant black-footed ferret populations if discovered in the future and prohibit the application of Kaput®-D within those populations.

- If an applicator or the EPA becomes aware that a black-footed ferret is known to occupy a BTPD colony outside of a reintroduction area, Kaput®-D cannot be used on that colony until the individual or individuals have been relocated. The EPA will ensure that if a previously unknown wild black-footed ferret population is discovered, Kaput®-D will not be used on that population.

- In the event that live/dead black-footed ferrets are found outside reintroduction sites, before, during, or after Kaput®-D application, the Black-footed Ferret Coordinator must be contacted immediately at (970) 897-2730, extension 224. Sufficient time must be allowed to capture and relocate black-footed ferrets before Kaput®-D application. Additional contact information for the Black-footed Ferret Coordinator is provided in the Incidental Take Statement section "*Disposition of federally listed species*."

### 2. Chiricahua Leopard Frog Conservation Measure

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

### 3. Grizzly Bear Conservation Measure

- Delay application of Kaput®-D in the State of Montana by 2 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 BTPD to reduce the risk of impacts to the grizzly bear.

[1] These measures may also address some instances of tertiary exposure, where non-target animals consume other animals that have preyed or scavenged on animals that have consumed bait.

- The areas in Montana where the timing delay applies includes all, 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. Jaguar Conservation Measure**

- Prohibit application of Kaput®-D within the southwestern New Mexico County of Hidalgo to reduce the risk of impacts to the jaguar.

**5. New Mexico Ridge-nosed Rattlesnake Conservation Measure**

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

**6. Mexican Gray Wolf Conservation Measure**

- Prohibit application of Kaput®-D 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 Kaput®-D 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 Kaput®-D in the fall by 1 month, until November 1, in areas where the range of the Preble's meadow jumping mouse overlaps with the range of the BTPD 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.

**9. Northern Aplomado Falcon Conservation Measure**

- Within the range of the northern aplomado falcon, the EPA shall maintain its County Bulletin (*Bulletins Live!*) website so that a current listing of counties with habitat for northern aplomado falcons is available to the public for educational purposes. The EPA shall include the following language in the EPA's County Bulletins (*Bulletins Live!*) for counties with falcon habitat to increase landowner awareness in these areas:

*Prairie dog colonies in this county may be occupied by the federally endangered northern aplomado falcon. Kaput®-D 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.*

- Prior to Kaput®-D application in the range of the northern aplomado falcon, the EPA shall inform public users about the risks of Kaput®-D to non-target organisms, such as the northern aplomado falcon and its prey, and how risks can be minimized. The EPA shall include content on the risks of Kaput®-D on its Endangered Species Protection Program website. This information will be developed in coordination with the Service, and will be in a format that can be printed as a hand-out for distribution to landowners with suitable habitat for the northern aplomado falcon. This information will also be electronically provided to states that include the northern aplomado falcon range for their use and dissemination during certified applicator training.

## Non-Species-Specific Conservation Measures

1. The Kaput®-D label will explicitly state that pesticide applicators are responsible for ensuring that carcass searches are performed in accordance with the label requirements.

    - Label requirements for carcass searches include the following language:

    *"Carcass searches must be performed using a line-transect method that completely covers the baited area. Detailed guidance on how to conduct a line-transect search is available online at [EPA website]. Transect center lines must be no more than 200 feet (about 60 meters) apart, and should be considerably less if searches are conducted in more densely vegetated sites. Transect lines may be traveled on foot or by vehicle at a rate not to exceed 4 mph. All dead or dying non-target animals must be reported to the National Pesticide Information Center 1-800-858-7378 as soon as possible. Any apparently injured or sick Federally listed species must also be immediately reported by calling 303 –236 - 7540 (if located in Kansas, Nebraska, the Dakotas, Montana, Colorado, or Wyoming) or 505 –248-7889 (if located in Texas, New Mexico or Oklahoma). The Black-footed Ferret Coordinator must also be contacted if ferrets are found during Rozol® Prairie Dog Bait applications or carcass searches at 970-897-2730 x 224."*

2. The EPA shall ensure that the best available information is applied to the Kaput®-D label in the future.

    - If information becomes available on more effective methods for search and removal protocols than the line-transect protocol specified on the label (described above), the EPA shall incorporate the best available information on the Kaput®-D label to reduce the availability of Kaput®-D -poisoned target and non-target animals on the surface after coordinating with the Service.

3. The EPA shall ensure that proper information regarding listed species and secondary poisoning risks is provided to Kaput®-D users.

    - The EPA shall submit to the Service, for review and approval prior to their use, materials to be used relative to the conservation measures (below) for the EPA's additional training during annual pesticide applicator recertification programs and Scimetrics' Kaput®-D Prairie Dog Bait Product Stewardship Program. At a minimum, the training materials shall include (in addition to the information provided below) a description of the listed species and their habitats; the general provisions of the ESA; the necessity for adhering to the provisions of the ESA; the penalties associated with violating the provisions of the ESA; the specific measures that are being implemented to use Kaput®-D in a manner compatible with the conservation of listed species; and the boundaries in which Kaput®-D can be lawfully applied.

    - The EPA and Scimetrics shall provide the Service with the opportunity to attend and participate in any education, outreach, and training sessions conducted as part of the EPA's efforts relative to the annual pesticide applicator recertification program and Scimetrics' Kaput®-D Prairie Dog Bait Product Stewardship Program.

4. EPA, in coordination with the Service and Scimetrics, will develop website content intended to achieve the following:

    a. Provide information on the importance of limiting the availability of dead and dying target and non-target wildlife in order to protect the listed species of concern;

    b. Describe the improved carcass search methods described in this Conservation Measure; and

    c. Include the website link as part of the Kaput®-D Prairie Dog Bait label once it is developed.

5. EPA will work with the State Lead Agencies to incorporate training sessions on secondary poisoning at their annual pesticide applicator recertification programs. The training will educate applicators on the meaning of secondary toxicity, the hazards of Kaput®-D, the basis for the carcass search requirements and other associated label restrictions and the importance of minimizing risk to non-target species. EPA staff may participate directly in these training sessions, through webinars, by helping to arrange for other knowledgeable persons to give presentations, or through a combination of each.

6. As a condition of registration, Scimetrics will maintain a stewardship program using the framework as described below:

**SCIMETRICS KAPUT®-D PRAIRIE DOG BAIT PRODUCT STEWARDSHIP PROGRAM**

**PURPOSE**

The Scimetrics Kaput®-D Prairie Dog Bait Product Stewardship Program is a commitment by Scimetrics to provide education and outreach materials and training to Kaput®-D Prairie Dog Bait users (e.g., certified applicators and landowners) on carcass search and survey methods described on the Kaput®-D Prairie Dog Bait label. The purpose of this program is to result in minimized take to the affected listed species of concern via reduction in the incidence of secondary poisoning.

**REQUIREMENTS**

**a.** On its Kaput®-D Prairie Dog Bait product website, Scimetrics will include a link to EPA's Kaput®-D Prairie Dog Bait bulletins, which provide geographically-based prohibitions on Kaput®-D Prairie Dog Bait use intended to protect listed species of concern.

**b.** Scimetrics will provide yearly training sessions to pesticide applicators in each of the 10 States where Kaput®-D Prairie Dog Bait will be registered. Scimetrics will provide these training sessions prior to the 2013 Kaput®-D Prairie Dog Bait use season. The training sessions will include information on proper dosing for Kaput®-D Prairie Dog Bait, presentation of the carcass search and line transect survey methods listed on the Kaput®-D Prairie Dog Bait label, and education on the meaning of secondary toxicity and the importance of minimizing secondary exposure to non-target species.

**c.** Once EPA, the Service, and Scimetrics have developed website content, Scimetrics will include a link to EPA's website on its Kaput®-D Prairie Dog Bait product website. In addition, Scimetrics will develop and distribute a brochure with information from the website to be distributed as part of its training sessions and other outreach initiatives.

7. The EPA, in cooperation with Scimetrics shall develop and maintain a system to track Kaput®-D produced for BTPD control and report to the Service the amounts distributed in each of the 10 states.

- Scimetrics and the EPA will provide information to the Service regarding the amount of Kaput®-D produced for BTPD control and the gross distribution per state for a period of 5 years. When Scimetrics and EPA provide such information to the Service, it will be marked, if appropriate, as Confidential Business or Commercial Information. After 5 years, the EPA, Scimetrics, and the Service will determine the need for continued reporting. The decision of whether to continue this reporting will be based upon the confidence that the available information provides the Service with an acceptable understanding of Kaput®-D sales for future projection over the course of the BO for the

registration of Kaput®-D. The factors that may be considered shall include (but shall not be limited to):

- Measures of the statistical confidence in the sales trend derived from the 5 years of reported data, and

- The nature of the trend function fitted to the available sales data.

    - For example, if the data suggest that the sales trend has reached some asymptote, the continuation of additional reporting may be unnecessary as the market has matured (other factors may be considered in this event). If the sales trend shows a logarithmic increase in sales, there may be a need to continue reporting to determine if this trend estimate is accurate. If the trend line shows a stable linear growth, the registrant my elect to terminate or continue reporting with the understanding that the trend line information up to that point would serve as the predictor of sales and treated acres for the remainder of the registration decision.

## B. KAPUT-D PRAIRIE DOG BAIT REGISTERED USE

The diphacinone concentration in Kaput®-D is 0.005 percent (mg a.i./kg-bait). According to Kaput®-D label instructions (Appendix), the product is to be applied by certified applicators to BTPD colonies in rangelands and adjacent non-crop areas by inserting ¼ cup (56 grams, approximately 2 ounces) by hand or by mechanical bait application machine at least 6 inches into active prairie dog burrows only between October 1 and March 15 of the following year, except as modified by the timing restrictions described previously in the species-specific conservation measures sections above, when the prairie dogs most readily consume grain bait. Any bait spilled above ground or placed less than 6 inches into the burrow is to be retrieved and disposed of by the applicator. When using a mechanical bait application machine, the machine should be designed, constructed and operated in a manner that ensures bait is properly placed at least 6 inches down prairie dog burrows. Mechanical bait application machines must be calibrated to ensure that the proper amount of bait is dispensed into each prairie dog burrow. Kaput®-D should not be used with any other anticoagulant prairie dog bait. For each treatment area, only one anticoagulant rodenticide active ingredient (currently, diphacinone or chlorophacinone) may be used per treatment period.

Prairie dogs that have eaten the bait will begin to die off 4 to 5 days after the first treatment. The label indicates that the applicator must return to the site within 4 days after bait application and at 1- to 2-day intervals for a minimum of two weeks (longer if carcasses are still being found) to collect and properly dispose of any bait or dead or dying prairie dogs found at the surface. Carcass collection should occur in late afternoon, near sundown, to reduce the potential of nocturnal animals finding carcasses and dying animals. All carcasses found above ground must be collected and disposed of properly. Carcasses should be buried 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 other methods to insure that the carcasses are inaccessible to scavengers. A second application may be made if prairie dog activity persists several weeks or months after the initial bait application.

Carcass searches must be performed using a line-transect method that completely covers the baited area. Transect center lines must be not more than 200 feet (about 60 meters) apart, and should be considerably less if searches are conducted in more densely vegetated sites. Transect lines may be traveled on foot or by vehicle at a rate not to exceed 4 mph. All dead or dying non-target animals must be reported to the National Pesticide Information Center (1-800-858-7378) as soon as possible. Any apparently injured or sick federally listed species must also be immediately reported by calling 303-236-7540 (if located in Kansas, Nebraska, the Dakotas, Montana, Colorado or Wyoming) or 505-248-7889 (if located in Texas, New Mexico or Oklahoma). The Black-Footed Ferret Coordinator must also be contacted if black-footed ferrets are found during Kaput®-D Prairie Dog Bait applications or carcass searches at 970-897-2730 x224. If live black-footed ferrets are found outside reintroduction sites, before, during or after Kaput®-D Prairie Dog Bait application, the Black-Footed Ferret Coordinator must be contacted immediately and sufficient time must be allowed for the Service to capture and relocate the black-footed ferret(s) before applying Kaput®-D Prairie Dog Bait.

## C. ACTION AREA

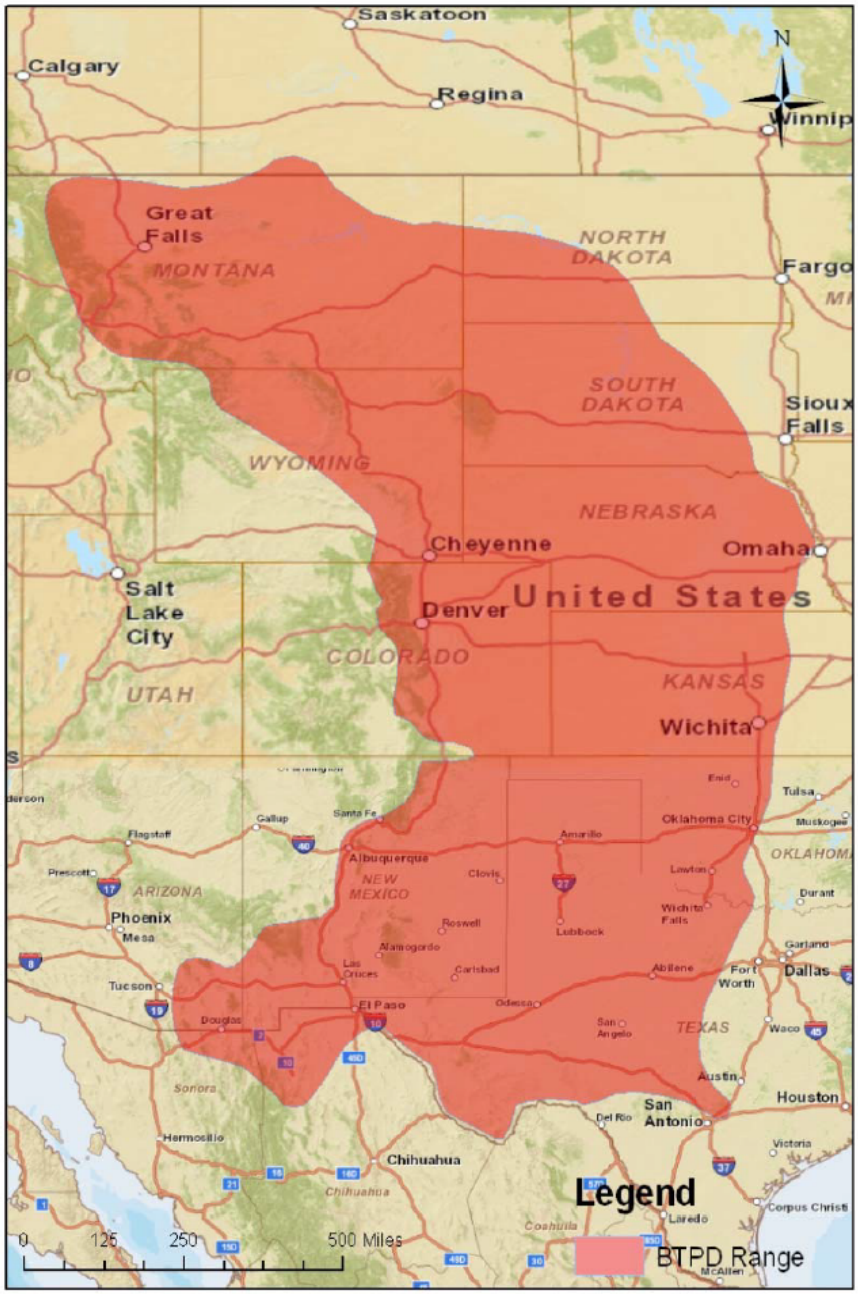
The action area is defined (50 CFR § 402.02) as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The EPA has identified the action area as follows:

> "*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 diphacinone 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 Rozol® Assessment (USEPA 2010a), the EPA provided a map of the historic BTPD range from NatureServe (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 BTPD range. Range maps available on the Service's website (http://www.fws.gov/endangered) for federally listed species and/or their critical habitats were overlaid by the EPA on that historic BTPD map to determine any overlap which was used in the EPA's Rozol® Assessment (USEPA 2010a) to inform "May Affect" determinations for federally threatened or endangered species and their critical habitats. As the EPA recognized in the Rozol® Assessment (USEPA 2010a), the historic range map of the BTPD 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 BTPD has contracted from its historic range so, in some areas, the species' current overlap with federally listed species has been reduced (USFWS 2009c). This consultation addresses Kaput®-D use within the 10 States identified in the October 25, 2012, Kaput®-D label (Appendix). Additionally, some of the conservation measures listed above further amend the EPA's action area by precluding Kaput®-D use in some areas. For the purposes of this consultation, and in accordance with the definition of "action area" provided above, the Service agrees with the EPA's broad action area.

**Figure 1. The historic range of the BTPD by NatureServe as presented in the EPA's Rozol® Assessment (USEPA 2010a).**

**Area of Concern for use of Kaput-D® Prairie Dog Bait**



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

The BTPD is considered a keystone species that has a unique and substantial influence on plant and animal communities and is 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 BTPD colonies (Sharps and Uresk 1990). The presence of mountain plovers (*Charadrius montanus*) and burrowing owls (*Athene cunicularia*), two species of conservation concern (USFWS 2008a), is also considerably higher on BTPD 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 can result in cascading effects through the grassland ecosystem that extend beyond the poisoned prairie dog towns.

The toxicity and exposure profile for Kaput®-D is similar to that of the chlorophacinone-based bait Rozol® (USEPA 2012a). Because of this, we rely on data for both chemicals to inform this analysis, especially concerning field studies and incident reports, where more data exist for Rozol® due to its longer history of use on BTPDs. As stated above, only one anticoagulant rodenticide is authorized for use for each season (i.e., users may apply either Kaput®-D or Rozol®, but not both to a BTPD town) so the magnitude of species' exposure is not expected to increase as a result of the registration of Kaput®-D.

## A. INDANDIONE MODE OF ACTION AND TOXICITY

Diphacinone, the active ingredient in Kaput®-D, is an anticoagulant chemical and, along with chlorophacinone, belongs to the indandione class of compounds. Chlorophacinone and diphacinone are the only indandione rodenticides currently registered for use in the United States under FIFRA, and the only two anticoagulant rodenticides currently registered for use on BTPDs. 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 and Rattner 2012). 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 7 days increased diphacinone toxicity by more than an order of magnitude compared to an acute oral toxicity test (Rattner et al. 2012, Vyas and Rattner 2012). Thus, the single dose $LD_{50}$ 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 diphacinone that have their greatest toxicity from repeated daily exposures. We believe that acute standardized toxicity test results for diphacinone 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 single feeding.

Laboratory data for diphacinone exposure to BTPDs are not available at this time, so species-specific values for LD50s, residues in tissue, time to onset of symptoms, and time to death are unavailable. Time-to-death can vary both inter- and intra-specifically, which individuals documented to survive up to 18 days after exposure to diphacinone (black rats, *Rattus rattus;* Swift 1998). BTPDs that were exposed to chlorophacinone exhibited much variability in their susceptibility to mortality and time to death, and most were symptomatic for at least 24 hours before death (Yoder 2008). BTPD signs from chlorophacinone exposure (e.g., loss of attentiveness, lethargy, swollen or closed eyes) were similar to those reported for individuals of other species exposed to diphacinone (Swift 1998, Yoder 2008, USEPA 2012a).

## B. DIPHACINONE ENVIRONMENTAL FATE

The number of days for diphacinone to degrade by 50 percent (half-life) has been reported by laboratory studies that evaluate degradation by soil and water. The half-life of diphacinone incorporated into sandy loam soil averaged 30 days in the single soil study available (USEPA 2012a). In water, the half-life of diphacinone was 44 days at pH 5, and remained relatively stable against simple hydrolysis at pH 7 and 9; thus, breakdown by exposure to water is not expected to be an important degradation process.

Persistence of rodenticide bait following application to the environment can be highly variable and influenced by factors such as temperature, weather, density of target and nontarget consumers, and caching (Golden et al. 2011). A small number of controlled studies have evaluated the field persistence of diphacinone and chlorophacinone rodenticide baits. A study that tested weather resistance of various pellets found that Ramik-brown pellets (0.005% diphacinone) showed good weather resistance (Merson and Byers 1985). Though efficacy of diphacinone was not tested after wet weather exposure, no difference in efficacy between wet and dry Rozol® pellets (0.005 % chlorophacinone) was found (Merson and Byers 1985). A

supplemental terrestrial field dissipation study reported no dissipation of chlorophacinone in Rozol® prairie dog bait 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, pers. comm. 2011). In this study, the ability to evaluate dissipation of chlorophacinone on grain samples was hampered by consumption of the grain, and it was concluded that the primary route of dissipation of chlorophacinone is through consumption of the treated grain (Jones, pers. comm. 2011).

Based on the information above, we agree with the EPA's assumption that the mobility from bait into soil or water is considered a negligible exposure pathway to non-target organisms (USEPA 2012a). We assume diphacinone remains undegraded in bait after applications and share the EPA's assumption that the only relevant dissipation of Kaput®-D occurs through its consumption.

## C. KAPUT®-D EXPOSURE AND EFFECTS ASSESSMENT

### 1. Primary Exposure

Direct ingestion of Kaput®-D (primary exposure) by non-target species can be expected for species that feed on grain. 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 BTPD holes. A field study was performed to evaluate nontarget exposure to the chlorophacinone bait Rozol®, which is subject to identical application requirements and restrictions as Kaput®-D in BTPD colonies (Vyas 2010a). In this study, bait was visible in many BTPD burrows that contained angled entrances (as opposed to vertical entrances), and horned larks appeared to be preferentially drawn to these burrows where they could easily feed on bait (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 et al. *in press*).

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). We currently lack information concerning applicator willingness to cease operations and collect misplaced bait or return to the colony days to weeks later to collect and dispose of bait found on the surface. Absent that information, it appears that 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 indicates applicators are collecting and disposing of bait found above ground.

Furthermore, bait applied to a colony may exceed the amount necessary to successfully poison prairie dogs, increasing availability to non-target species. On average, there are 3.9 active burrow entrances for each BTPD (Biggins et al. 2006). If each entrance is baited, the amount of bait applied will exceed the amount needed to poison each prairie dog by several times. If inactive burrows are mistakenly baited, then even further bait availability to both target and non-target animals 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, USFWS 2012a) on a plot with an estimated population of 348 BTPDs 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 lethality 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.

## 2. Secondary Exposure

Species that ingest animals that consume anticoagulant rodenticides 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 Diphacinone Residues" section below)*. Five of six domestic ferrets were killed after each ferret was fed four chlorophacinone-poisoned BTPDs over 8 days (Fisher and Timm 1987). While no similar data exist for ferrets fed diphacinone-poisoned BTPDs, a preliminary study examined the effects to domestic ferrets fed diphacinone-poisoned Norway rats (*Rattus norvegicus*, USEPA 2006). One of two ferrets fed rats poisoned with Kaput®-D pocket gopher bait (50 ppm diphacinone) died. In the same study, two ferrets exposed secondarily to PCQ Pelleted Rodent Bait (100 ppm diphacinone) died. As described further in the "Field Study Observations of Secondary Toxicity" section below, field observations indicate that the availability of BTPDs to secondary consumers is facilitated by prairie dogs spending time above ground after ingesting anticoagulant baits (USFWS 2007b, Golden and Gober 2010, Vyas 2010a). When subjected to poisoning, BTPDs 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 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), and scavengers, including some raptors, are attracted to easily obtained food sources, including poisoned prey (Chesser 1979, Vyas 1999, Vyas et al. 2003). Some avian predators such as ferruginous hawks are attracted to anticoagulant-treated prairie dog colonies, likely due to the increased presence of moribund and dead prairie dogs and perhaps other non-target species (Vyas 2010a). Thus, even though anticoagulant-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.

No studies have examined the longevity of moribund BTPDs on the surface following application of Kaput®-D. However, in studies performed for Rozol®, exposed prairie dogs were 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. As described earlier, lethality of diphacinone increases greatly with repeated exposure. 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 exposure and ultimately result in decreased growth, survival or reproductive effects.

The Kaput®-D Assessment and previous risk assessments by the EPA (Erickson and Urban 2004) indicate that mammals are at a greater risk from secondary diphacinone toxicity than birds; however, if sub-lethal effects are considered, then 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. For example, pulmonary hemorrhage is far more common in mammals than birds, but birds can have excessive external bleeding from minor superficial wounds, a condition not reported in mammals (Stone et al. 1999). Also, the first observed signs of secondary toxicity in raptors include fatigue such as wing-drooping (Radvanyi et al. 1988). For species such as raptors that rely upon speed and stamina to attain prey, fatigue induced from exposure to poisoned prey can result in decreased survival by impairing their ability to capture prey. Because of differences 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.

### 3. Surface Presence of Poisoned Black-tailed Prairie Dogs

The greatest pathway for effects to listed species from the proposed action comes from the presence of moribund or dead animals found on the surface of a prairie dog colony as a result of Kaput®-D poisoning. The Service is aware of three studies that inform the issue of dead and dying prairie dogs on the colony surface following application of the chlorophacinone bait Rozol®, although, no studies are available for Kaput®-D. Two of three Rozol® studies, repeatedly found dead and dying prairie dogs above ground on the surface of the prairie dog colony during multiple return 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 chlorophacinone application, may have contributed to decreased above-ground prairie dog activity (Forgacs 2010).

Instances of dead and dying prairie dogs found above-ground following application have also been reported to the Service's Law Enforcement Division (USFWS 2007b, 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 poisoned prairie dogs return to the surface and the altered state of awareness of poisoned prairie dogs (USFWS 2007b). 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® SLN 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 (USFWS 2007b), we believe prairie dogs and other animals exposed to Kaput®-D will also regularly return to the surface of a colony and be available to federally listed species, including the northern aplomado falcon and gray wolf, resulting in a secondary exposure risk pathway for these species.

### 4. Removal of Poisoned Black-tailed Prairie Dogs

Although the Kaput®-D label requires return visits to the colony to search for and remove dead and dying prairie dogs following application, the limited information on applicator behavior indicates that few, if any, moribund or dead prairie dogs are collected and disposed of in a manner that substantially reduces secondary exposure (USFWS 2010a, Tosh et al. 2011). This outcome 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 to a colony are not available (USFWS 2010a). During a 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 that they do not have the time, resources or inclination to conduct multiple return visits to treated prairie dog colonies to collect dead and dying prairie dogs, and that label requirements for two return visits to treated prairie dog towns were unrealistic and impractical (USFWS 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 Rozol® label in effect at that time (August 2010) to potentially many more visits. The EPA prefaced their inquiry to the ranchers in attendance that additional return 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; thus, requiring even more return visits would likely meet a similar fate. The Montana Department of Agriculture also questioned the practicality of the Rozol® label, to which the Kaput®-D label will be identical, especially the retrieval of live prairie dogs, and expressed their belief that most applicators will have difficulty with strict adherence to the label (de Yong 2009). Of particular note from that North Dakota meeting was that none of the attendees had ever picked up and disposed of live prairie dogs or their carcasses after a Rozol® application. At the time of the meeting, Rozol® had only been approved for use on prairie dogs for one season in North Dakota and South Dakota. Some attendees have since indicated that applicators did go back out to search per the label and did not find BTPDs on the surface, and surmised that above-ground BTPDs had been scavenged or died underground.

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. We are not aware of any similar anticoagulant use behavior studies conducted in the United States that would inform Kaput®-D applicator use behavior. However, we suspect that 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® and Kaput®-D labels render them 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. Quick searches that lack systematic protocols are expected to find fewer poisoned carcasses than those that include walking transects of specified width (e.g., Lee and Hygnstrom 2007, Vyas 2010a, Witmer et al. 1995). Furthermore, Vyas (2010a) observed dying BTPDs on his last search 29 days after a Rozol® application. Thus, applicators that cease carcasses searches after 2 weeks if no animals are found, as specified on the label, would miss later mortalities as indicated by Yoder (2008). We believe that diphacinone-exposed prairie dogs may be found dead or debilitated on the surface of a colony for at least a month following application and that searches, even as described on the label, are inadequate to consistently locate poisoned prairie dogs above ground and thus unlikely to prevent non-target exposure.

Though we note that follow-up search protocols may not always be followed, we believe that efficacy of any searches conducted will be enhanced by following a transect-style protocol as described on the label. A random search pattern has been found to produce low success in detecting target and non-target animals, and searcher efficacy is significantly increased if systematic searches, such as transect-line searches, are employed (Witmer et al. 1995, Lee and Hyngstrom 2007, Vyas 2010a). One study found that searcher effectiveness when using protocols for walking transects or circular subplots ranged from 24.5 – 36.2 percent compared to just 2.6 percent when using a random search pattern protocol (Witmer et al. 1995).

Many prairie dogs are likely scavenged prior to the opportunity for 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 1- to 2-day intervals, it is unlikely to outpace removal by scavengers. Further, poisoned animals are alive for an extended period of time (days to weeks) and non-target animals in particular, may move away from the application area before they die. We could locate no information to indicate that 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, they would be removed from the site since 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, black-footed ferrets, and other carnivores that can dig up prey or carrion.

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 BTPDs are likely to remain at the colony where they were poisoned and be available for consumption by federally listed species and other non-target species that federally listed species prey upon.

### 5. Field Study Observations of Secondary Exposure or Toxicity

As indicated previously, chlorophacinone and diphacinone toxicity share a similar mode of action and, where data exist, have a similar toxicity profile; thus, we consider information on secondary exposure to non-target species from chlorophacinone as relevant in evaluating Kaput®-D exposure. Four studies have evaluated diphacinone or chlorophacinone exposure to non-target species following applications to poison BTPDs (Bruening 2007, Lee and Hygnstrom 2007, Forgacs 2010, Vyas 2010a). These studies are discussed briefly below.

In a field study sponsored by Scimetrics, the registrant for Kaput®-D, sick and lethargic prairie dogs were observed above ground following a field application, and researchers observed a bald eagle flying off the treatment plot with a prairie dog in its talons (Bruening 2007). Field studies sponsored by Liphatech, the registrant of Rozol®, reported little to no evidence of secondary exposure and did not observe any scavenging by avian predators (Lee and Hygnstrom 2007, Forgacs 2010). Lee and Hygnstrom (2007) performed a study designed to assess the efficacy of chlorophacinone in killing BTPDs that included searches for carcasses only on and immediately around baited plots. They found 10 carcasses above ground [9 BTPDs and a cottontail rabbit (*Sylvilagus sp.*)] at a ratio of 1 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 after 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).

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 BTPDs and other wildlife (Vyas 2010a). Carcass searches were conducted over an area of approximately 43 acres for 14 days over a 29-day post-application period and recovered 2 intact 13-lined ground squirrels (*Spermophilus tridecemlineatus*), 9 intact BTPDs, 7 scavenged BTPDs, and 1 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 et al. *in press*). Meadowlarks are a recognized food source for the federally endangered northern aplomado falcon (USFWS 2002a). Raptors were also seen visiting the poisoned prairie dog colony and foraging on BTPDs (Vyas 2010a).

A Rozol® application in South Dakota on a prairie dog colony in 2005 found approximately 400-500 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). The South Dakota incident was investigated by the EPA and confirmed to be related to an application of Rozol®. At that time, Rozol® was not authorized for use in South Dakota and a subsequent investigation by the 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 (USFWS 2007b). The necropsy revealed that poisoning with chlorophacinone and physical trauma had occurred. The laboratory 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 bald 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 (USFWS 2011c). 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, BTPDs are often seen above ground in a moribund state of stupor that leaves them vulnerable to capture or predation (USFWS 2007b).

In January 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 (USFWS 2009d). Both raptors had a liver chlorophacinone concentration of 0.25 µg/g ww and were found in an area in Kansas where Rozol® was being used to control prairie dogs. 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 2011, another bald eagle carcass was opportunistically recovered in Nebraska 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 (USFWS 2011c). 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 bald eagle was recovered, and the law enforcement case is still under investigation.

Based on the reports described above (Lee and Hygnstrom 2007; USFWS 2007b, 2009d; Bruening 2007; Vyas 2010a), we conclude that diphacinone exposure to federally listed species and non-target animals is likely to occur where species overlap with field applications of Kaput®-D on BTPD colonies.

## D. REVIEW OF THE EPA'S RISK ASSESSMENT FOR KAPUT®-D

We believe that risk calculations in the EPA's assessment likely underestimate risk to non-target species (described in detail below). While we ultimately agree with EPA's risk conclusion, we present the following as feedback to the EPA for consideration in developing future effects determinations in order to avoid missing risk to listed species.

### a. 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 (TRV). The Kaput®-D Assessment provides RQ's less than 0.02 for avian species, which do not exceed the EPA's Level of Concern (LOC) of 0.1 (USEPA 2012a). The TRV used to calculate these RQs were based studies performed on bobwhite quail (*Colinus virginianus*), mallard (*Anas platyrhynchos*), and American kestrel (*Falco sparverius*). Although the inclusion of a sub-acute dietary $LC_{50}$ test value for the TRV (mallard value) is preferred to a single dose $LD_{50}$ value, this TRV is still likely to underestimate risk to avian species. As dietary $LC_{50}$ 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 a species such as the mallard, 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 or other non-target small animals. Though toxicity data are lacking for diphacinone effects to a wide breadth of species, recent investigations have found that sensitivity of raptors is much greater than predicted from test species used in pesticide registrations. Acute diphacinone toxicity tests indicate that American kestrels are over 20 times more sensitive than northern bobwhite quail and over 30 times more sensitive than mallard ducks, two test species required by the EPA for pesticide registration (Rattner et al. 2010a and 2011). Eastern screech-owls (*Megascops asio*) showed similar toxicity to kestrels, and sensitivity was greater increased when diphacinone was provided for daily consumption as compared to a single oral dose (Rattner et al. 2012). Golden eagles (*Aquila chrysaetos*) appear to be even more sensitive to diphacinone than kestrels (Savarie et al. 1979, Rattner et al. 2011). Though $LD_{50}$ values for

kestrels were considered in estimating risk, these TRVs likely underestimate risk to species from daily consumption.

Furthermore, the $LC_{50}$-based TRV does not account for potential sub-lethal effects of diphacinone that can decrease listed species' survival and/or reproduction. Accounting for sub-lethal effects from diphacinone 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 diphacinone as well as other environmental stressors such as adverse weather, food shortages, and predation (Vyas et al. 2006). The Kaput®-D Assessment identifies external bleeding, internal hemorrhaging, and increased blood coagulation time as sub-lethal effects to avian species from secondary exposure to diphacinone -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, indandione rodenticides uncouple oxidative phosphorylation, and studies have reported that the first observed signs of secondary toxicity in raptors can include fatigue such as wing-drooping (Radvanyi et al. 1988). Fatigue induced from diphacinone 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 those effects 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. 2011). Eastern-screech-owls fed diphacinone for 7 days exhibited sublethal responses such as coagulopathy and histopathological lesions at a small fraction (<5%) of the acute oral dose and had liver concentrations from 0.473 - 2.21 ug/g ww diphacinone (Rattner et al. 2012). 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 diphacinone 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, we recommend that the EPA exercise their authority under the 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 use of Kaput®-D in prairie dog towns (Schwarz and Gober 2011). Until such studies are completed to provide data on sublethal effects and subsequent reproduction and survival, it is difficult to evaluate the secondary toxicity risk of Kaput®-D exposure to federally listed species such as the northern aplomado falcon.

An acute exposure to listed species from a one-time feeding of diphacinone 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, there is high

potential for chronic effects to occur in birds because $LD_{50}$ and $LC_{50}$ 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 anticoagulant rodenticides from other use patterns, as well as repeated exposures to chlorophacinone and diphacinone from applications to BTPDs on multiple sites as species forage over large home ranges and migrate. Previous studies indicate that anticoagulant rodenticides have a wide geographic use for general rodent control 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.

### b. Prairie Dog Diphacinone Residues

No data exist for diphacinone residues in poisoned BTPDs. In its risk assessment, the EPA uses a maximum carcass whole-body residue value of 3.4 μg/g ww based on residues in California ground squirrels (*Otospermophilus beecheyi)* in evaluating secondary risk to species that consume poisoned BTPDs; however, this value may underestimate exposure. EPA highlights many of the uncertainties in using this data, including partial decomposition of bodies in the field, opportunistic collection of carcasses that may miss the full range of body burdens, and scavenger/predator preference for individual organs that may contain higher concentrations of rodenticide than whole-body.

The use of whole-body diphacinone residues, as opposed to diphacinone residues in liver, may underestimate secondary exposure risk to non-target wildlife, particularly scavenging and predating birds. Concentration of diphacinone in internal organs, such as liver, may contain much greater concentrations than whole-body samples. Eight BTPD 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.

**Figure 2. BTPDs (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.**



### c. Risk Quotient Calculations and Uncertainty

We 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. Several lines of evidence regarding Kaput®-D exposure and associated effects suggest that the calculated RQs should be greater to account for uncertainty and missing data. For example, as calculated in the Kaput®-D Assessment, the RQ derived from the ground squirrel whole-body concentrations does not exceed the LOC for secondary toxicity to avian species (USEPA 2012a). Not only are greater exposure estimates warranted that increase the EEC based on consumption of diphacinone concentrations in liver, but the TRV is also overestimated when TRV values are based on acute toxicity and surrogate species. Both an increased EEC and decreased TRV would result in a greater RQ. Further, the EPA's RQ calculations in the assessment do not specifically address uncertainty from the influence of environmental stressors that can make non-target animals 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 (USEPA 1995 and 2011a). For Kaput®-D, 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 (USEPA 1995). In the case of diphacinone, studies 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, 2012). Reported mortality incidents involving raptors described herein support the likelihood that these taxa are likely to be killed from exposure to Kaput®-D in its use in BTPD colonies. 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 Kaput®-D, chronic exposure to anticoagulant rodenticides is likely for predatory and scavenging species and can cause death or sub-lethal effects that may hasten death when combined with other stressors (Stone et al. 1999). These effects have been documented to occur in raptors at diphacinone concentrations below those which would produce lethality in a laboratory setting and therefore must be considered as distinct endpoints (Rattner et al. 2012). 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 1998a). For example, the EPA appropriately determined that birds are at risk for adverse effects, including mortality, by qualitatively examining the uncertainty inherent in the RQ, as well as other lines of evidence such as incident reports.

## E. WILDLIFE MORTALITY INCIDENTS

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, USFWS 2007b, EPA 2010b, Ruder et al. 2011, Rattner et al. 2012), 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 of the bait. Although a lack of incident reporting is likely a factor in addressing risk uncertainty (Erickson and Urban 2004), wildlife mortality incidents involving diphacinone exposure reported to the EPA include owls, hawks, vultures, coyotes, San Joaquin kit foxes, a mountain lion, raccoons, white-tailed deer, gray squirrels, and a kangaroo rat (Erickson and Urban 2004, USFWS 2007b, USEPA 2012a). It is noteworthy that the liver concentrations in these samples were variable, ranging from 0.18 to 4.89 µg/g, indicating the difficulty in relying solely upon this measurement as a diagnostic tool.

Ruder et al. (2011) reported three mortality events in Kansas that involved several species, including wild turkeys (*Meleagris gallopavo*), a raccoon (*Procyon lotor*), and an American badger (*Taxidea taxus*). In all three cases, chlorophacinone, alone or in combination with other anticoagulants, was detected in the liver of the non-target species. The first incident in 2002 included the death of 1 wild turkeys found 2.5 weeks after a Rozol® application; concentrations of chlorophacinone in their livers were 0.69 and 0.40 µg/g (Ruder et al., 2011). The second incident in 2009 included 45 dead turkeys from exposure to zinc phosphide as well as a raccoon with liver concentrations of chlorophacinone, brodifacoum, bromadiolone, and diphacinone of 1.4 µg/g, 0.5 µg/g, 0.37 µg/g, and trace, respectively. The authors suspected that the raccoon exposure to brodifacoum, bromadiolone, and diphacinone was from the use of over-the-counter rodenticides against commensal rodents (Ruder et al., 2011). The badger was found within an area in western Kansas where Rozol® had been used on BTPDs and had a high 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 4-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 anticoagulants such as chlorophacinone and diphacinone 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, size or coloration that renders the carcass inconspicuous, or field conditions such as remote, inaccessible areas, that 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 anticoagulants 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 from anticoagulant use on BTPDs indicate that raptors may be at high risk to secondary toxicity from diphacinone use Service Law Enforcement recovered two bald eagles in Nebraska and a great horned owl and ferruginous hawk in Kansas that died following chlorophacinone exposure (USFWS 2007b, 2009d, 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 (USFWS 2009d). 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. It is not firmly established whether the raptor mortalities are attributed to chlorophacinone or Rozol® as no definitive testing for chlorophacinone in body tissues was conducted on the raptors; however, the opportunistic finding of the raptors coincided with Rozol® applications nearby.

Migratory raptors are especially susceptible to secondary poisoning from anticoagulant use due to their propensity to feed in prairie dog colonies (Golden and Gober 2010). Raptors are believed to be especially susceptible to secondary poisoning given the likelihood that they can spot dead or dying BTPDs that are more difficult to see from a ground level perspective (Vyas 2010b) and raptors have been observed to be attracted to anticoagulant poisoned BTPD 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 (USFWS 2008a). Further, although bald eagles have been delisted under the ESA, both 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 (USFWS 2009e, 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 BTPDs (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 anticoagulant poisoning are not permitted or authorized under the MBTA.

The Service has been developing a better understanding of the Kaput®-D 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 and other predators and scavengers, and that some label requirements may be impractical or not reasonably implementable. Furthermore, Kaput®-D use on BTPDs is expected to result in take of migratory birds, including federally listed species such as the northern aplomado falcon.

As noted earlier, anticoagulant use on BTPDs was determined to have killed a bald eagle in 2006, when that species was protected under the ESA, which prohibits unauthorized taking of federally listed endangered or threatened species. In accordance with the bald eagle post-delisting monitoring plan (USFWS 2010b), the bald eagle monitoring team continues to track

new and potentially significant sources of bald eagle mortality. Since anticoagulants were authorized for BTPD control in 2006, there have been two bald eagle deaths attributed to poisoning in Nebraska. We consider anticoagulant use on BTPDs 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.

## F. SUMMARY OF KAPUT®-D EXPOSURE AND EFFECTS RELEVANT TO ALL LISTED SPECIES ADDRESSED IN THIS BIOLOGICAL OPINION

- Toxic effects from diphacinone exposure include fatigue and increased permeability of capillaries resulting in systemic internal hemorrhaging prior to death. There is no evidence of taste aversion to Kaput®-D; thus, non-target species may continue consumption until they receive a lethal dose (or greater, due to delayed mortality), 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.

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

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

- Excessive lethal doses per BTPD may be 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 Kaput®-D's prolonged toxic mode of action may result in a high risk of secondary exposure to non-target species, especially those species attracted to poisoned BTPD colonies. A 6-month application season for Kaput®-D 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 Kaput®-D 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 exposure to non-target species that are based on return site visits for weeks after the application to pick up dead and dying prairie dogs and bait may be impractical. Burying prairie dogs on the colony may not be effective at preventing exposure to non-target species that can dig up carcasses or feed on poisoned prey between carcass searches.

- RQs derived in the EPA's Kaput®-D Assessment underestimate non-target species risk to Kaput®-D because they are: a) based on study protocols that consider limited (1- to 5-day) exposures in the lab; b) do not comprehensively account for information indicating that raptors may be 20-30 times more sensitive than standard avian test species such as quail and ducks; c) do not attempt to quantify known sub-lethal effects; and d) do not consider higher concentrations of diphacinone in the liver, especially for species that may selectively consume internal organs instead of wholebody tissues.

- Although wildlife mortality incidents are underreported and surveillance efforts are lacking, opportunistic recoveries of non-target species exposed to diphacinone include: owls, hawks, vultures, coyotes, San Joaquin kit foxes, a mountain lion, raccoons, white-tailed deer, gray squirrels, and a kangaroo rat.

- Opportunistic recoveries have shown that anticoagulant use on BTPDs has killed non-target species protected under the ESA, MBTA, 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 be especially susceptible to anticoagulant toxicity and are expected to continue to die from Kaput®-D exposure given current label use restrictions.

# VI. 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. Based on the above discussion of Kaput®-D's mode of action, its environmental fate and effects and known exposure routes and risks to non-target animals we believe it is important to identify conservation recommendations that address those concerns. Accordingly, we provide the following conservation recommendations for EPA's consideration that are within your authorities and will further the purposes of the ESA and benefit the listed species in this consultation.

**A.** If the EPA chooses to continue registration of Kaput®-D 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 tests for diphacinone 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 tests that measure individual daily dosage and responses. This would complement 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).

**B.** If the EPA chooses to continue registration of Kaput®-D 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 results of such studies should be used to modify the label.

**C.** If the EPA chooses to continue registration of Kaput®-D 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, we recommend that the EPA exercise their authority under FIFRA to require an avian reproduction study and additional field assessments that include tracking predators and scavengers that are expected to be most susceptible (e.g., ferruginous hawks, eagles, corvids, canines) to Kaput®-D poisoning from applications at prairie dog towns. Such information would benefit our evaluation of the endangered northern aplomado falcon, gray wolves, and other predators and scavengers if those species were to become federally listed under the ESA.

**D.** If the EPA chooses to continue registration of Kaput®-D 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. Further, raptors are the likely avian species that will have the greatest exposure risk from Kaput®-D applications to BTPDs. 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 Kaput®-D risk assessment should reflect that.

**E.** If the EPA chooses to continue registration of Kaput®-D or other anticoagulants, the EPA should conduct tests to determine the minimum amount of product that should be applied to accomplish the intended task and revise the label accordingly.

**F.** Given our concerns with secondary toxicity, we encourage the EPA and Scimetrics to support Integrated Pest Management (IPM) education and outreach to applicators. An IPM approach could prevent unnecessary applications when good alternatives to pesticides exist. Guidance on how to perform IPM should be accessible on the EPA's *Bulletins Live!* online site.

# VII. SPECIES ANALYSES

## A. OVERVIEW

After carefully reviewing EPA's Transmittal Letter and Assessment, and informally consulting with the EPA prior to initiation of formal consultation, it was determined that the proposed action may affect the same listed species and critical habitats described in the Rozol® Biological Assessment (Rozol® Assessment) ('Nation-wide Effects Determination for Chlorophacinone Relative to the Use of Rozol® Prairie Dog Bait," USEPA 2010a), pending any new listings or status changes in existing listings. As discussed earlier, some changes from the Rozol assessment have been made to the list of species and critical habitat that may be potentially affected by the registration of Kaput®-D. See Table 2 below.

**Table 2. Summary of Species and Effects Determinations**

| | Species and critical habitat; (*) denotes species with designated critical habitat | No Adverse Effects Anticipated | Conservation Measures Preclude Adverse Effects | Conservation Measures Adopted, but Adverse Effects Still Anticipated |
|---|---|---|---|---|
| **1** | American Burying Beetle (*Nicrophorus americanus*) | ■ | | |
| **2** | Black-capped Vireo (*Vireo atricapilla*) | ■ | | |
| **3** | Black-footed Ferret (*Mustela nigripes*) | | | ■ |
| **4** | Canada Lynx* (*Lynx Canadensis*) | ■ | | |
| **5** | Chiricahua Leopard Frog* (*Lithobates* [*Rana*] *chiricahuensis*) | | ■ | |
| **6** | Eskimo Curlew (*Numenius borealis*) | ■ | | |
| **7** | Golden-checked Warbler (*Dendroica chrysoparia*) | ■ | | |
| **8** | Gray Wolf (*Canis lupus*) | | | ■ |
| **9** | Grizzly Bear (*Ursus arctos horribilis*) | | ■ | |
| **10** | Gulf Coast Jaguarundi (*Herpailurus* [=*Felis*] *yagouaroundi cacomitli*) | ■ | | |
| **11** | Jaguar (*Panthera onca*) | | ■ | |
| **12** | Mexican Spotted Owl* (*Strix occidentalis lucida*) | | ■ | |
| **13** | New Mexican Ridge-nosed Rattlesnake* (*Crotalus willardi obscurus*) | | ■ | |
| **14** | Northern Aplomado Falcon (*Falco femoralis septentrionalis*) | | | ■ |
| **15** | Ocelot (*Lepardus pardalis*) | ■ | | |
| **16** | Piping Plover* (*Charadrius melodus*) | | ■ | |
| **17** | Preble's Meadow Jumping Mouse* (*Zapus hudsonius preblei*) | ■ | | |
| **18** | Whooping Crane* (*Grus Americana*) | ■ | | |

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

## B. SPECIES FOR WHICH NO ADVERSE EFFECTS ARE ANTICIPATED

The Service does not anticipate adverse effects as a result of Kaput®-D use on BTPDs for the following nine species being analyzed in this BO. Those species include: 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 concluded in their recent Rozol® Assessment that the use of chlorophacinone to control BTPDs was 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.*

Comparable studies do not exist for terrestrial invertebrates exposed to diphacinone and therefore the EPA was unable to assess risk for this species. In their request for formal consultation for Kaput®-D, the EPA demonstrated that chlorophacinone and diphacinone have similar exposure and toxicity profiles and therefore suggested that affects to listed species would be similar.

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 Kaput®-D as BTPD 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, and Oklahoma) are outside of the BTPD 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 (Raithel 1991). 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 Kaput®-D label, diphacinone used on BTPD colonies is limited to October 1 through March 15. Therefore, it should not affect the American burying beetle as the species will be underground and inactive during the use window for Kaput®-D.

In summary, we do not anticipate adverse effects to the American burying beetle from the use of diphacinone to control BTPDs. 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 diphacinone. In addition, prairie dog carrion is not a preferred food source of American burying beetles, and individuals of this species are extremely unlikely to directly or inadvertently consume the bait. For these reasons, we assume that exposure of American burying beetles to diphacinone is extremely unlikely to occur and the effects are considered discountable. 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 black-capped vireo usually migrates southward from Oklahoma by late August-September and from Texas by mid-September (USFWS 1991) to winter in Mexico. The black-capped vireo occurs in mixed deciduous/evergreen shrubland. Black-capped vireos require broadleaf shrub vegetation in the form of low deciduous cover [e.g., juniper (*Juniperus* sp.) and oak sp. (Quercus sp.)] which is a key element in their habitat. Nests are preferentially located in dense deciduous vegetation. Nests are placed in the fork of a variety of deciduous species with blackjack oak (*Quercus marilandica*) being preferred in Oklahoma and shin oak (*Quercus havardii***),** Texas oak, and sumac (*Rhus* sp.) commonly used in Texas (USFWS 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 that Kaput®-D 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 BTPD colonies occur and the likelihood that black-capped vireos would come into direct or indirect exposure with Kaput®-D 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 in this analysis due to factors previously discussed.

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

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

The timing of the black-capped vireos' migration and arrival at the nesting grounds is also a factor. The Kaput®-D label restricts applications to the period between October 1 and March 15 which somewhat 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 to March 15 timeframe when Kaput®-D applications are allowed.

Although the range for the black-capped vireo historically was larger than today, current overlap of the range of the black-capped vireo with BTPDs is geographically limited. Likewise, BTPDs historically occurred over most of the western half of Texas but have been extirpated from portions of their former range (Davis and Schmidly 1994). The range for the black-capped vireo today only marginally overlaps with the range for BTPDs, and 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 extremely unlikely to occur due to: 1) limited geographic overlap between the current ranges of the black-capped vireo and BTPD; 2) black-capped vireos migrate to Mexico during the time frame in which Kaput®-D application would be permitted; and 3) in the highly unlikely event that black-capped vireos used habitat where Kaput®-D was applied, their dietary requirements would

minimize the probability of primary or secondary exposure. Thus the effects to black-capped vireos from the proposed action are considered discountable. No critical habitat for the black-capped vireo has been designated; therefore none will be affected.

### 3. Canada Lynx

The Kaput®-D Assessment describes that direct effects to mammals are expected to occur based on the potential for them to consume prey items that have consumed the diphacinone bait. Effects to growth and reproduction were not described and cannot be precluded.

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 BTPD habitat. No overlap of Canada lynx habitat with known BTPD colonies occurs in Montana, and no overlap of Canada lynx habitat with known BTPD colonies or potential range occurs in Wyoming. A very minimal amount of overlap of Canada lynx habitat with the BTPD's overall range in Colorado occurs; however, no overlap with mapped BTPD colonies occurs in Colorado.

Canada lynx are dependent on presence of snowshoe hares (*Lepus americanus*) 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 BTPD habitat. Canada 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. Canada Lynx prefer to move through continuous forest using the highest terrain available such as ridges and saddles (Koehler 1990, Staples 1995). While some Canada lynx may move through open habitats at times during transient or dispersal movements, the likelihood of a Canada lynx moving through a BTPD colony is small, and the likelihood that they would move through a black tailed prairie dog colony that is also being treated with Kaput®-D is so unlikely that it is discountable. Therefore, we do not anticipate adverse effects to Canada lynx from the use of Kaput®-D to treat BTPD colonies.

Critical habitat for Canada lynx is not designated in Colorado, and critical habitat in Wyoming and Montana does not overlap with BTPD known occurrences and potential range. Therefore, we conclude that the use of Kaput®-D in BTPD colonies would not adversely affect designated critical habitat for Canada lynx.

### 4. Eskimo Curlew

The Kaput®-D Assessment anticipates direct and indirect effects to birds that are exposed to diphacinone. While RQs were not exceeded for direct consumption of bait, we believe that TRV values used in these calculations to be underestimations of risk and that adverse effects from exposure to bait cannot be precluded, should such exposure occur. Direct effects to Eskimo curlew could also occur due to potential for this species to consume terrestrial invertebrate prey items that have consumed Kaput®-D. Additionally, impacts to terrestrial invertebrates from Kaput®-D exposure may indirectly affect Eskimo curlews by depleting their prey base. In its Rozol® Assessment, the EPA concluded that potential exposure of Eskimo curlews to bait

would be limited to the spring migration (USEPA 2010a). We anticipate that effects from Kaput®-D would be similar should exposure occur.

The Eskimo curlew was identified as being threatened by extinction under the Endangered Species Preservation Act of 1966 (USFWS 1967) and, after the ESA was enacted in 1970, was listed as endangered (USFWS 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, USFWS 2011d).

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, USFWS 2011d). These estimates are based on the last uncontroversial record of observance, a specimen that was shot in Barbados in 1963 (USFWS 2011d). 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 (USFWS 2011d). 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 (USFWS 2011d).

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 BTPD 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 wide-scale conversion of grassland to agriculture, fire suppression, and the extinction of the Rocky Mountain grasshopper (*Melanoplus spretus*) as an important food source (USFWS 2011d).

In conclusion, Eskimo curlews are likely already extinct or at best extremely rare; thus, direct and indirect effects from Kaput®-D exposure are so extremely unlikely to occur as to be considered discountable. Therefore, the Service does not anticipate adverse effects to Eskimo curlew from use of Kaput®-D on BTPDs. No critical habitat for the Eskimo curlew has been designated; therefore none will be affected.

### 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 (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 Kaput®-D Assessment anticipates direct and indirect effects to birds that are exposed to diphacinone. While RQs were not exceeded for direct consumption of bait, we believe that TRV values used in these calculations to be underestimations of risk and that adverse effects from exposure to bait cannot be precluded. For our assessment of the risk that Kaput®-D 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 BTPD colonies occur and the likelihood that golden-cheeked warblers would come into direct or indirect exposure with Kaput®-D 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.

Golden-cheeked warblers use juniper and oak dominated woodlands and prefer canyon or hill country. The BTPDs 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 that these habitats impose. Therefore, habitats used by golden-cheeked warblers do not overlap with the open prairie habitat used by BTPDs.

Golden-cheeked warblers are exclusively insectivorous. Thus, we do not anticipate that they will purposefully or inadvertently consume the bait intended for the BTPDs. Golden-cheeked warblers do not prey on rodents or small mammals such as BTPDs, so risk of secondary Kaput®-D poisoning from consumption of small mammals is not expected. The risk posed to golden-cheeked warblers from secondary poisoning through consumption of insects containing residues of Kaput®-D (i.e., consumption of insects that have come into contact with Kaput®-D grain bait or poisoned BTPDs) is possible but considered unlikely when life histories of the species and its prey species are considered.

The golden-cheeked warbler's migration timing is also a factor we have considered in this analysis. The Kaput®-D label restricts applications to the period between October 1 and March 15 which somewhat limits potential exposures to this species. Golden-cheeked warblers leave Texas in August, returning in late February the following year and, therefore, would be wintering in Mexico and Central America during the majority of the October 1 to March 15 timeframe when Kaput®-D applications are allowed.

Although the range for the golden-cheeked warbler was historically larger than today, its current overlap with BTPDs is limited geographically. Historically, BTPDs occurred over most of the western half of Texas, but they have been extirpated from portions of their former range (Natural Science Research Laboratory 2012). Although the range for the golden-cheeked warbler marginally overlaps with the range for BTPDs, different habitat requirements preclude the co-existence of this avian species with the BTPD.

We conclude that adverse effects to golden cheeked warblers from the proposed action are extremely unlikely to occur due to: 1) limited geographic overlap between the current ranges of the golden-cheeked warbler and BTPD; 2) in the highly unlikely event that golden-cheeked warblers would use habitat where Kaput®-D 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 Kaput®-D application would be permitted. Thus effects to golden-cheeked warblers from the proposed action area considered discountable. No critical habitat for the golden-cheeked warbler has been designated; therefore none will be affected.

### 6. Gulf Coast Jaguarundi

Based upon the exposure and effects sections of EPA's Rozol® Assessment and its Kaput®-D Assessment, diphacinone exposure to the Gulf Coast jaguarundi may occur from potential direct effects from prey that consume diphacinone bait, including BTPDs and non-target animals. However, the EPA's Rozol® Assessment indicated that there would be no indirect effects from prey-base loss expected because this species' habitat is distinct from BTPD habitat.

The Gulf Coast jaguarundi is reported from Mexico, southern Arizona, and southern Texas. It is not found within the BTPD range. As such, any effects from the action to the Gulf Coast jaguarundi are considered to be extremely unlikely to occur, and are considered discountable. Therefore, the Service does not anticipate adverse effects to the Gulf Coast jaguarundi from use of Kaput®-D on BTPDs. No critical habitat for the Gulf Coast jaguarondi has been designated; therefore none will be affected.

### 7. Ocelot

The ocelot may be adversely affected by Kaput®-D use based on potential direct effects from prey that may consume diphacinone bait, including BTPDs and non-target animals. However, the EPA's Rozol® Assessment indicated that there would be no indirect effects from prey-base loss expected because this species' habitat is distinct from the BTPD habitat.

The ocelot is found in Mexico, southern Arizona, and southern Texas. There is no overlap between the BTPD and the ocelot; any primary or secondary exposure effects to this species are extremely unlikely to occur and are considered discountable. Therefore, we conclude that the proposed action is not likely to adversely affect the ocelot. No critical habitat for the ocelot has been designated; therefore none will be affected.

## 8. Piping Plover

The action area encompasses the entire United States 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, direct overlap between prairie dog towns and piping plover critical habitat or known nesting areas. Additionally, piping 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 Kaput®-D or that dying prairie dogs may expire along the shoreline, exposing piping plovers to Kaput®-D through maggots. However, because piping plovers are not expected to forage in the prairie dog towns directly and the Kaput®-D use season ends before piping 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" (USFWS 2002b). 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 Kaput®-D application would occur only in prairie dog towns which do not have the primary constituent elements that define piping plover critical habitat and the effects of the proposed action would be extremely unlikely to extend to or measurably affect nearby critical habitat, we do not anticipate impacts to designated critical habitat for the piping plover.

The Kaput®-D 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 BTPD 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 Dakota 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 Kaput®-D. Secondary poisoning is a potential risk if piping 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 piping plovers (USFWS 2009f). In the two reported cases where piping 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, USFWS 2009f). We do not anticipate Kaput®-D 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 piping 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 directly, poisoning would have to occur via a secondary route, such as via insect prey. For terrestrial insects to be available for piping 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 piping plovers do most of their foraging, and be ingested by piping plovers. It is extremely unlikely that piping plovers would be exposed to sufficient Kaput®-D concentrations in this manner. Additionally, we do not anticipate that piping plovers will consume BTPD or other non-target mammal carcasses, so this secondary route of exposure is also extremely unlikely to occur.

In summary, impacts to piping plovers are extremely unlikely to occur and are considered discountable because:

- The Kaput®-D 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 Kaput®-D exposure routes are circuitous with both possible transmissions being via insects; neither of which is expected to occur.

    - *Route 1 – the invertebrates have eaten the bait directly and then move to piping plover foraging areas.* While this route is possible, the time lag between the last application of Kaput®-D 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 Kaput®-D 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 Kaput®-D to affect piping plovers and/or the piping 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.

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

Based on the above information, the Service concludes that adverse effects to piping plovers from the use of Kaput®-D to poison BTPDs are extremely unlikely to occur and are considered discountable. We also assume that, the proposed action is not likely to adversely affect designated critical habitat.

### 9. Whooping Crane

The Kaput®-D Assessment anticipates direct and indirect effects to birds that are exposed to diphacinone. While RQs were not exceeded for direct consumption of bait, we believe that TRV values used in these calculations to be underestimations of risk and adverse effects from exposure to bait cannot be precluded. Indirect effects could occur if there is loss of the prey base. Prey species are expected to be killed 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.

The map in the Rozol® Assessment, which was also used for reference in this consultation, indicates some overlap between the whooping crane and BTPD in Montana, North Dakota, South Dakota, Wyoming, Colorado, Nebraska, Kansas, and Oklahoma. The map does not depict any counties in Texas; the Service has sent a map of Texas counties to the EPA indicating potential whooping crane presence.

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 BTPDs. The Florida Population is non-migratory and is located on the Kissimmee Prairie, south of Orlando in Osceola and Polk counties and does not overlap with the range of BTPDs. 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 BTPDs. The Aransas Wood Buffalo Population is the only self-sustaining wild population. The Florida Population and Eastern Migratory Population are introduced and are designated nonessential experimental populations by the Service.

The whooping crane is a territorial nester and returns to the same area each year. Whooping 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 by the Service and The Crane Trust as they migrated from Wood Buffalo National Park to Aransas National Wildlife Refuge. In 2010, whooping cranes left Wood Buffalo National Park as early as August 20 and continued until October 31. 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 which is the first half of the Kaput®-D application season. During their spring migration from Aransas National Wildlife Refuge to Wood Buffalo National Park in late March, it is possible that Kaput®-D 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. Whooping cranes are not known to use BTPD colonies during their migration between wintering and breeding areas. Whooping cranes are known to eat agricultural grains, frogs, fish, insects, tubers, rodents, and crayfish, which may be exposed to diphacinone, but the whopping crane's risk of exposure to affected prey is uncertain.

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, and 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.

The BTPDs establish colonies near intermittent streams, water impoundments, homestead sites and windmills. However, BTPD 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 Kaput®-D -treated bait is placed. Where both whooping cranes and the BTPD occur, habitat isolation between the whooping cranes and BTPD reduces the chance that the whooping cranes would encounter treated grain.

However, the Service is currently monitoring whooping cranes within the migratory corridor with the use of telemetry data from the current whooping crane tracking study. A relatively small number of whooping cranes are marked with transmitters, but this study may inform whether whooping cranes occur in or near prairie dog colonies. We anticipate that a diagnostic necropsy of any dead whooping cranes will occur and should detect diphacinone if that is a factor in their death. If the tracking study or necropsies reveal significant new information or indicate adverse effects are occurring to whooping cranes, we will request that the EPA reinitiate consultation (as per the new information clause in the Reinitiation Notice at the end of the BO). In summary: a) whooping cranes have not been documented to forage or roost in BTPD colonies, b) the occurrence of the species in the proximity of BTPD colonies is not likely to be frequent, c) during migration, whooping cranes are not expected to venture into BTPD colonies, creating a degree of habitat isolation between the two species, and d) mechanisms are in place to further assess whether whooping cranes use BTPD colonies.

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 either Rozol® or Kaput®-D and whooping cranes, despite Rozol®'s ongoing use as a BTPD rodenticide in the migratory corridor since the early 1990s (Lee et al. 2005).

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

- Cheyenne Bottoms State Waterfowl Management Area and Quivira National Wildlife Refuge in Kansas;
- The Platte River between Lexington and Denman, Nebraska;
- Salt Plains National Wildlife Refuge in Oklahoma; and
- Aransas National Wildlife Refuge and vicinity in 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, habitats that are protected from disturbances or are representative of the geographical distribution of the listed species).

With exception of the Platte River in Nebraska, all designated critical habitats are Service National Wildlife Refuges or Waterfowl Management Areas that are unlikely to have Kaput®-D use on their properties; doing so would result in a future Section 7 consultation. The BTPD

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 in the Rozol® Assessment (and which is also used in this analysis) lists "altered plant community composition" as a second indirect effect on habitat resulting from BTPD control. Reduction or eradication of BTPD colonies could lead to increases in vegetation height and density at sites treated with Kaput®-D. However, some thicker vegetation is unlikely to cause adverse effects to the critical habitat for species because there are minimal BTPD colonies in whooping crane designated critical habitat. We conclude that adverse effects to the whooping crane from the proposed action are extremely unlikely to occur and are considered discountable. Additionally, we believe that adverse effects to whooping crane critical habitat are unlikely.

## C. 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 identifying areas where the product is prohibited and/or applying timing restrictions for the application of Kaput®-D. As a result of the conservation measures incorporated into the proposed action by the 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, gray wolf (Mexican subspecies) and northern aplomado falcon; see "Species for which conservation measures were adopted, but adverse effects are still 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 Kaput®-D as BTPD bait. In New Mexico, the species occurs in Catron, Hidalgo, Grant, Sierra, and Socorro Counties, which is about 16 to 19 percent of its historical localities (USFWS 2007c). Fourteen units of critical habitat have been designated in New Mexico for the Chiricahua leopard frog (USFWS 2012b). Chiricahua critical habitat and the BTPD range appear to overlap in New Mexico, at least at a landscape-scale level.

The EPA determined that the proposed action may directly affect the Chiricahua leopard frog because the range of the species overlaps with BTPD habitat. Although Catron, Hidalgo, Grant, Sierra, and Socorro Counties do not have large colonies of BTPDs (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 Kaput®-D could be used within or near Chiricahua leopard frog habitats (Johnson et al. 2003). The EPA determined that the Chiricahua leopard frog could be affected by Kaput®-D applications through consumption of poisoned invertebrates that have ingested Kaput®-D 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, Chiricahua leopard frogs only eat live prey and

would not consume a dead organism; they do not scavenge. A large portion of the Chiricahua leopard frog range in New Mexico is located on U.S. Forest Service lands, and agency approval would be required before Kaput®-D could be deployed.

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

Accordingly, implementation of the proposed action and its associated conservation measures is not expected to result in adverse effects to the Chiricahua leopard frog or adverse effects to its designated critical habitat.

### 2. Grizzly Bear

In the Kaput®-D assessment, the EPA describes that direct effects are expected to occur to mammals based on their potential to consume diphacinone bait (primary exposure) or other prey items that may have consumed diphacinone bait (secondary exposure). In the Rozol® Assessment, the EPA assumed exposure to grizzly bears would occur because the grizzly bear range overlaps BTPD habitat and the application season overlaps periods during which grizzly bears are active and not hibernating. The EPA defines the Kaput®-D application period on the label as occurring between October 1 and March 15. The EPA assumed acute exposure based on the assumption that a grizzly bear is most likely to encounter a rodenticide application area shortly before or after hibernation at which time the bear is engorging itself (USEPA 2010a). However, growth and reproductive effects cannot be precluded. The EPA calculated RQs that exceeded a 0.1 LOC for grizzly bears, especially for primary consumption (RQ = 24.04), values that we believe may be underestimated. The Kaput®-D Assessment also indicates potential indirect effects to mammals due to the loss of prey base.

As part of the proposed action, the EPA has agreed to impose a timing restriction so use of Kaput®-D 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 BTPDs (see Table 3). This measure would greatly reduce the potential for overlap of grizzly bears and Kaput®-D -treated BTPD colonies during the period where grizzly bears could be exposed to Kaput®-D through primary or secondary exposure (the non-denning period). Further, there are very few BTPD colonies that exist in the mountain/prairie transition zone where the occasional grizzly bear may encounter BTPD colonies. Based on a map produced by the Montana Natural Heritage Tracker website, less than 10 known or documented BTPD colonies occur where grizzly bears currently may occur (Montana Natural Heritage Program 2011).

**Table 3. Counties in Montana with Kaput®-D treatment timing restrictions.**

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

With the timing restriction, the likelihood of grizzly bear exposure to diphacinone from Kaput®-D use to control BTPDs is low enough to be considered discountable. With few BTPD colonies in areas where grizzly bears are likely to occur, the likelihood of grizzly bears using BTPD habitats as part of their home range is low. The restricted use season for Kaput®-D (December 1 to 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 BTPD 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 BTPD, until 2 to 4 weeks after emerging from their dens if they use those areas at all. Therefore, grizzly bears would not be expected to overlap with BTPD colonies for approximately 6 to 8 weeks after March 1 (around 50 days or more post any final application).

With the timing restriction conservation measure, we conclude that adverse effects to grizzly bears from primary exposure to Kaput®-D are extremely unlikely to occur and are considered discountable. In study of Rozol® application to BTPDs, prevalence of chlorophacinone bait visible in or around burrows declined by approximately 87 percent by day 7 (Lee and Hygnstrom 2007) and we assume similar values and/or trends for Kaput®-D prevalence. Thus, after approximately 50 days post-application when grizzly bears may first encounter a Kaput®-D -poisoned BTPD town, essentially all of the bait is likely to have been consumed by BTPDs or non-target species. Therefore, based on the timing restriction and the minimal overlap of grizzly bear habitat and BTPD colonies, we conclude that the likelihood of a grizzly bear encountering and consuming a sufficient quantity of Kaput®-D 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 Kaput®-D is also so low that it is discountable. The die-off of BTPDs and non-target animals following a Kaput®-D application would likely reach its conclusion before a grizzly bear would encounter a poisoned colony. Fifty or more days following application, few, if any, Kaput®-D-poisoned carcasses or prey debilitated by exposure to Kaput®-D would be available for consumption by grizzly bears. While moribund BTPDs were detected 29 days after Rozol® application (Vyas 2010a), the prairie dog availability is not expected to be high 50 days following application. 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 Kaput®-D-poisoned colonies.

Therefore, by the time grizzly bears may use habitat within these areas, the Services concludes there will be insufficient quantities of available prey items or bait to cause adverse effects.

It is also the Service's conclusion that indirect effects to grizzly bears due to the loss of prey base from use of Kaput®-D are insignificant. Few BTPD colonies occur in areas where grizzly bears also occur, and prairie dogs are not a significant dietary item for grizzly bears.

In summary, few BTPD colonies occur in areas accessed by grizzly bears and, with the restricted timing of Kaput®-D 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 Kaput®-D use on BTPDs in those areas. No critical habitat for the grizzly bear has been designated; therefore none will be affected.

### 3. Jaguar

In the Kaput®-D assessment, the EPA describes that direct effects are expected to occur to mammals based on their potential to consume diphacinone bait (primary exposure) or other prey items that may have consumed diphacinone bait (secondary exposure). In the Rozol® Assessment, the EPA assumed exposure to jaguars would occur because the jaguar range overlaps BTPD habitat. In addition, the EPA's Kaput®-D Assessment indicates that there could be indirect effects from prey-base loss.

The jaguar is reported from Mexico, Arizona, and New Mexico. It is rarely found (one report in the last 20 years) 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 BTPDs in Hidalgo County (Johnson et al. 2003). The proposed conservation measure of prohibiting Kaput®-D application in Hidalgo County substantially reduces the risk of diphacinone exposure to the jaguar. Based on the low BTPD abundance, unlikely interaction of the jaguar and BTPD, and prohibition of Kaput®-D application in the area occupied by the jaguar, effects to the jaguar are extremely unlikely to occur and are considered discountable. Thus, the Service does not anticipate adverse effects to the jaguar. No critical habitat for the jaguar has been designated; therefore none will be affected.

### 4. Mexican Spotted Owl

The proposed action may directly affect the Mexican spotted owl because the range of the species overlaps with BTPD habitat at a large landscape scale. The Mexican spotted owl could be affected by application of Kaput®-D 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 (USFWS 1995). The action area was analyzed for possible effects to the Mexican spotted owl that include the BTPD range within the three States listed. Effects may extend beyond the use area due to exposure to individuals or via prey items with diphacinone residues if found outside of their described range. The final Mexican spotted owl

critical habitat rule (USFWS 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 (USFWS 2004). Within this larger area, critical habitat is limited to areas that contain the primary constituent elements (USFWS 2004). The primary constituent elements include forest structure for nesting and prey maintenance but not the prey base itself (USFWS 2004). In summary:

- Known habitat use by the Mexican spotted owl does not correspond with BTPD habitat; thus, the Mexican spotted owl is considered extremely unlikely to occur within BTPD habitats where Kaput®-D will be applied. The potential for Mexican spotted owls to experience secondary exposure to diphacinone is considered so unlikely as to be discountable.

- The proposed action will not result in any effects to the PCEs of designated critical habitat for the Mexican spotted owl. PCEs for the Mexican spotted owl include mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing. These PCEs do not correspond with BTPD habitat and are unlikely to occur within the areas Kaput®-D is applied. Therefore, the potential for Mexican spotted owl PCEs to be adversely affected by diphacinone is considered so unlikely as to be discountable.

- The prohibition of Kaput®-D application 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 extremely unlikely to occur and are considered discountable.

### 5. New Mexico Ridge-Nosed Rattlesnake

The Kaput®-D Assessment indicates that reptiles exposed to diphacinone are likely to experience direct effects, including but not limited to mortality. Diphacinone appears to have a different mode of action in reptiles, which is currently unknown. Mortality does not result from anticoagulation, its mode of action in target species. Effects to reproduction have not been evaluated but 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 BTPD burrows. In addition, adverse effects to designated critical habitat may occur because of overlap with BTPD 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. The BTPD habitat does not overlap with the New Mexico ridge-nosed rattlesnake, although 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

Kaput®-D may be applied, substantially reducing the potential impacts of the action to the New Mexico ridge-nosed rattlesnake. Because of the low BTPD abundance in Hidalgo County (Johnson et al. 2003), the low probability of interaction between the New Mexico ridge-nosed rattlesnake and BTPD, based on differing habitat use of each species, and Kaput®-D use prohibition in the area occupied by the Mexico ridge-nosed rattlesnake, effects from the action are extremely unlikely to occur and are considered discountable. 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 BTPDs in designated critical habitat. The conservation measure of excluding Kaput®-D 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.

### 6. Preble's Meadow Jumping Mouse

In the Rozol® Assessment, the EPA concluded that the use of Rozol® to control the BTPD was likely to adversely affect the Preble's meadow jumping mouse for the reasons described below. The rationale extends to Kaput®-D:

> *The range of this species overlaps with Black-tailed prairie dog habitat. Rozol® Prairie Dog bait application season for the control for Black-tailed prairie dogs 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.

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 BTPD 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, 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 BTPD 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).

Less than 30 percent of the Preble's meadow jumping mouse distribution is estimated to fall within the range of the BTPD. Within the BTPD 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 Preble's meadow jumping mouse in close proximity to BTPD colonies is infrequent throughout occupied Preble's meadow jumping mouse range.

Preble's 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 to 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 BTPD occur, habitat isolation between the Preble's meadow jumping mouse and BTPD 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, BTPD 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 7 or 8 months. The only direct overlap between the Preble's meadow jumping mouse active season and the Kaput®-D treatment period, as reflected in label instructions (October 1 to March 15) is October, when some Preble's meadow jumping mice remain actively foraging above ground. As part of the proposed action, Scimetrics and the EPA agreed to timing restrictions on Kaput®-D applications, limiting its use within the known range of Preble's meadow jumping mouse occurrence in Wyoming and Colorado to the period November 1 to March 15. Timing restrictions will be included in County Bulletins via the EPA's *Bulletins Live!* 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 diphacinone-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 Kaput®-D 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 Kaput®-D 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, Kaput®-D is placed at least 6 inches down BTPD burrows. Our knowledge of the Preble's meadow jumping mouse does not suggest that, while foraging, they would venture into prairie dog burrows where Kaput®-D is placed. Spillage, improper baiting, or BTPD 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 BTPD colonies, foraging in those colonies, and encountering and consuming Kaput®-D or exposed insects is considered highly unlikely to occur and therefore discountable.

Potential indirect effects from reduction of prey (invertebrates) were indicated for mammals in the Kaput®-D Assessment. As stated above, the species feeds on a variety of items, including insects. However, it is unlikely to regularly forage in BTPD 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 Preble's meadow jumping mouse to be adversely impacted by reduction of the invertebrate populations within BTPD colonies appears insignificant.

In summary, occurrence of the Preble's meadow jumping mouse in the proximity of BTPD colonies is likely infrequent within mouse's range. Where it occurs, the Preble's meadow jumping mouse would rarely venture into BTPD colonies, creating a degree of habitat isolation between the two species. The Preble's meadow jumping mouse hibernates November-April, throughout the period of Kaput®-D application as modified by the agreed upon conservation

measures (November-March 15), creating a temporal isolation between availability of Kaput®-D-treated bait or affected insects and the mouse's active season. Therefore, the Service does not anticipate adverse effects as a result of the proposed action.

An estimated 10,200 acres of Preble's meadow jumping mouse critical habitat in Colorado overlaps with the BTPD 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 mouse's 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 Kaput®-D to control the BTPD 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 critical habitat due to the loss of BTPD burrows and cessation of BTPD activities that would otherwise modify vegetation. The Service believes that the loss of burrows is not expected to have an adverse impact to the Preble's meadow jumping mouse.

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 Kaput®-D application. In the BA (page 60), the EPA's conceptual impact model lists "altered plant community composition" as a second indirect effect on habitat resulting from BTPD control. Reduction or eradication of BTPDs would likely lead to vegetation of greater height and density at sites of their former BTPD colonies. Where BTPD 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 mouse than low, sparse vegetation typically found within an active BTPD colony.

With the inclusion of the conservation measures agreed to by the EPA and Scimetrics, adverse effects to the Preble's meadow jumping mouse are considered to be so unlikely as to be discountable. Thus, the Service concludes Kaput®-D is not likely to adversely affect the PMJM or its critical habitat.

# D. SPECIES FOR WHICH CONSERVATION MEASURES WERE ADOPTED, BUT ADVERSE EFFECTS ARE STILL ANTICIPATED

For those species for which conservation measures did not preclude adverse effects, the full analysis of a biological opinion is necessary. Three species are anticipated to experience adverse effects, even with the conservation measures adopted by the EPA: 1) black-footed ferret, 2) gray wolf and 3) northern aplomado falcon.

## 1. Black-Footed Ferret

### a. Status of the Species/Critical Habitat

The black-footed ferret was listed as endangered in 1967 and again in 1970 under early endangered species legislation and was "grandfathered" into the current ESA in 1973 (USFWS 2008b). Critical habitat has not been designated for this species. The species' 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 black-footed 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 black-footed ferret observed at the Mellette County site was in 1974 (Clark 1989). Attempts at captive breeding of 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 black-footed ferret was again presumed extinct (USFWS 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 black-footed ferrets (totaling 18 individuals) were removed from the wild between 1985 and 1987 to initiate a captive breeding program (USFWS 1988). Seven of the black-footed ferrets captured at Meeteetse successfully reared young, leading to a lineage of continuing captive reproduction that provides black-footed ferrets to reintroduction sites today (Hutchins et al. 1996, Garelle et al. 2006).

Reintroductions began in 1991 (Table 4) and all extant populations, both captive and reintroduced, descend from these seven "founder" animals (Garelle et al. 2006). No wild populations of black-footed ferrets have been found since the capture of the last Meeteetse black-footed 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 black-footed ferrets exist, except those at reintroduction sites.

### (1) Ferret Reintroductions

Section 10(j) of the ESA allows reintroduced populations to be designated Nonessential Experimental Populations (NEPs) to ease concerns about listed species reintroductions and facilitate species recovery efforts. To date, 11 black-footed ferret reintroductions have occurred through use of Section 10(j) designated NEP areas in the United States (USFWS 2008b). There have also been six black-footed ferret reintroductions in the United States that used Section 10(a)(1)(A) recovery permits. Additionally, there have been black-footed ferret reintroductions in Chihuahua, Mexico, and in Saskatchewan, Canada, in compliance with those countries' statutes, for a total of 19 reintroduction attempts (USFWS 2008b, Fargey 2010). See Table 4 for the location and date of initiation of each of the black-footed ferret reintroduction sites.

**Table 4. Black-footed ferret reintroductions in North American locations, year initiated, and associated prairie dog species.**

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

### (2) Life History

The black-footed 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).

Black-footed 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 black-footed ferrets depend almost exclusively on prairie dogs for food and shelter, and the species' range overlaps that of certain prairie dog species (Anderson et al. 1986) with no documentation of black-footed ferrets breeding outside of prairie dog colonies, the Service believes that black-footed ferrets were historically endemic to the range of three prairie dog species. There are records of black-footed ferrets from the ranges of the BTPD, white-tailed prairie dog (*Cynomys leucurus*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Anderson et al. 1986) which collectively occupied approximately 100 million ac (40 million ha) of intermontane and prairie grasslands (Biggins et al. 1997, Clark et al. 1986, Ernst et al. 2006). Ernst (2008, pers. comm.) estimates that in the United States, this occupied habitat existed within an estimated 562 million ac (228 million ha) of potential habitat.

Ernst (2008, pers. comm.) used a geographic information system database to predict the distribution of prairie dog habitat across the United States and concluded that, historically, 85 percent of all black-footed ferrets probably occurred in BTPD habitat, 8 percent in Gunnison's prairie dog habitat and 7 percent in white-tailed prairie dog habitat. We conclude that most black-footed ferrets likely occurred in BTPD habitat.

The black-footed ferret breeds at 1 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 black-footed ferret leads a solitary existence except for the period when mother and young are together (Forrest et al. 1985). It is a "searcher" predator that is generally nocturnal, appearing above ground at irregular intervals and for irregular durations (Clark et al. 1986).

The black-footed 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 (USFWS 2008b). The North American black-footed ferret population declined precipitously as a result (Biggins 2006), and the species was one of the original species listed under early versions of the ESA and was grandfathered in as an endangered species with passages of the ESA in 1973 (USFWS 2008b). Black-footed ferret populations in the BTPD range and other prairie dog species are known to exist today only in areas where black-footed ferret reintroductions have occurred (USFWS 2008b).

**b. Environmental Baseline**

Since the 1960s, occupied BTPD acreage has increased from approximately 365,000 acres to approximately 2.4 million acres within the 10 states where Kaput®-D is currently registered to be used as a rodenticide (USFWS 2009c). Current BTPD populations do not indicate a downward trend even though both Kaput®-D and Rozol® have been used under SLN labels for BTPD control since 2006/2007 and 2004, respectively, and chlorophacinone being used as early as 1991 for BTPD control under a pocket gopher formulation (Lee et al. 2005, USFWS 2009c).

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

Nineteen black-footed ferret reintroductions (Table 4) have been undertaken in North America beginning in 1991, and most of these sites continue to have some black-footed ferrets remaining (USFWS 2008b, Fargey 2010). Thirteen reintroductions are within the range of BTPDs, and 11 of those sites are within the 10 states where Kaput®-D is labeled for use to be used as a prairie dog rodenticide (USEPA 2012a). Despite these 19 black-footed 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 Black-footed Ferret Recovery Plan objectives (USFWS 2008b).

A recent estimate of black-footed ferret populations at reintroduction sites indicates approximately 840 black-footed ferrets alive in the wild with approximately half of those located in the BTPD range (USFWS 2008b). Since that time, plague has reduced black-footed ferret numbers at the Conata Basin in South Dakota (Griebel 2010) while existing black-footed ferret populations are believed to have expanded in Arizona and Wyoming (Corcoran 2012, Grenier 2008). The Service believes that approximately 800 black-footed ferrets alive in the fall of 2011 is a reasonable estimate of the species' current population numbers in the wild.

To date, there have been a few instances where black-footed ferrets are known to have left a reintroduction site and been located on adjacent property. If a black-footed ferret does disperse from a reintroduction site, there are provisions in the reintroduction site permit or the reintroduction plans to relocate that individual at the request of the adjacent property owner if the owner grants 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 Kaput®-D use as a BTPD rodenticide.

Landowners adjacent to current black-footed ferret reintroduction sites are not required to conduct surveys for the species prior to undertaking normal ranching operations, such as the use of rodenticides to control prairie dogs. The Service anticipates that future black-footed ferret reintroduction sites will similarly not require black-footed ferret surveys on adjacent properties.

Black-footed 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 species from endangered to threatened status. The objectives include increasing the captive population of black-footed ferrets to 200 breeding adults and establishing at least 1,500 free ranging breeding adult black-footed 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 (USFWS 1988). The first objective of increasing the captive black-footed ferret population has been surpassed. The second objective is approximately 25 percent met when fall black-footed 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 (USFWS 2008b). This indicates that additional successful black-footed ferret reintroduction sites are needed to meet the downlisting objective. Recovery objectives for complete delisting of the black-footed ferret have not been finalized but are anticipated to include at least 3,000 free ranging breeding adult black-footed ferrets distributed between at least 30 populations. The downlisting objectives indicate that there will need to be significant continued efforts to establish free ranging black-footed ferret populations through the use of reintroductions, and complete delisting of the species will require considerably more reintroductions.

### c. Effects of the Action

Rodenticides used to poison prairie dogs can have multiple effects to black-footed ferrets via secondary exposure or by destroying the habitat where the species lives or could live. A study in the 1980s evaluated the potential secondary poisoning of domestic ferrets by bchlorophacinone, the active ingredient in Rozol®, and found that 5 of 6 ferrets were killed when each ferret was fed 4 poisoned BTPDs 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). While no similar data exist for ferrets fed diphacinone-poisoned BTPDs, a preliminary study showed similar results for domestic ferrets fed diphacinone-poisoned rats (USEPA 2006). The Service believes that black-footed ferrets would be similarly killed as the domestic ferrets were, if they consumed prairie dogs poisoned by Kaput®-D. Accordingly, the EPA, Scimetrics, and the Service agreed upon conservation measures that would prevent Kaput®-D use at current and future black-footed ferret reintroduction sites (USEPA 2012a, Scimetrics 2012). These measures were intended to address the secondary poisoning of black-footed ferrets and the loss of prey base for black-footed ferrets at reintroduction sites. The issue of black-footed ferret dispersal away from a reintroduction site that might encounter a Kaput®-D poisoned BTPD colony was more difficult to address.

The key challenge with development of the black-footed ferret conservation measures was to ensure that Kaput®-D use would not occur at locations where the species is being reestablished while at the same time ensure that adjacent landowners' ability to manage prairie dogs on their properties would not be impacted. It was concluded that banning rodenticide use in areas

surrounding black-footed ferret reintroduction sites (up to a county in size) would increase animosity toward black-footed ferret reintroduction efforts and undermine or prevent reintroductions altogether. Accordingly, to avoid creating that backlash, conservation measures were developed that would restrict Kaput®-D use at reintroduction sites, but not impose restrictions on adjacent landowners' use of legal rodenticides. As indicated above, the Service does not believe that black-footed ferret surveys on properties adjacent to or in the vicinity of a reintroduction site are needed prior to undertaking otherwise legal activities such as rodenticide use on prairie dogs, and the cost and inconvenience of black-footed ferret surveys on adjacent lands would generate opposition to, and possibly compromise, the black-footed ferret reintroduction effort. If a black-footed ferret disperses from a reintroduction site, and if the landowner wants the ferret relocated and grants permission to access the property, then the relocation can be done under existing mechanisms.

The black-footed ferret conservation measures rely upon identification of existing and future black-footed ferret reintroduction sites on the *Bulletins Live!* database maintained by the EPA and referenced on the Kaput®-D label which becomes part of the legal requirement for label compliance. Prior to Kaput®-D use, applicators are required to consult this database to ensure that they are not applying Kaput®-D at an existing black-footed ferret reintroduction site. If additional reintroductions are implemented in the future, we will provide the information for those sites to the EPA for inclusion in the EPA's *Bulletins Live!* database to reflect the new black-footed ferret reintroduction sites. The process to add areas to the *Bulletins Live!* database takes approximately 8 months to complete and that timeframe will be factored into the timing of adding new reintroduction sites or modifications to that database.

The Service recognizes that if a black-footed ferret leaves a reintroduction site it could encounter prairie dog colonies where Kaput®-D is being used and could consume poisoned prairie dogs and perish. That mortality must be balanced with the intent of the reintroduction, which is to establish a breeding black-footed ferret population at the reintroduction site. The deaths of black-footed ferrets that leave the reintroduction site are not anticipated to materially affect the reintroduction site's ability to meet recovery objectives for the species because the sites are reliant upon the amount of black-footed ferret habitat within their boundaries to meet those objectives. The Service selects reintroduction sites that have the attributes (i.e., prairie dog acreage, densities, locations, partnerships, etc.) to help meet the black-footed ferret recovery objectives of establishing widely distributed breeding populations. The Service and our reintroduction partners have long understood that dispersing black-footed 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 (USFWS 1988, 1994a). Accordingly, we believe that the conservation measure to restrict Kaput®-D use at the reintroduction site, but not on adjacent properties is appropriate.

Another possible effect of Kaput®-D use for BTPD control involves the elimination of possible black-footed ferret reintroduction habitat because of Kaput®-D use. This same concern was discussed in the Rozol® BO. In 2009, the Service estimated that there were approximately 2.4 million acres of BTPDs in the 10 States where Rozol® was being used or was proposed for use as a BTPD rodenticide (USFWS 2009c). Luce (2006) examined opportunities for immediate

and near term potential reintroduction sites and concluded that there are over 70 potential sites within the black-footed ferret range, most of which are in BTPD colonies. The Service believes that rodenticide use (including the use of Kaput®-D), while widespread in the BTPD range, in and of itself is not the determinate factor whether a black-footed ferret reintroduction can occur. Instead, it is the willingness of partners (private, State, Tribal and Federal) to consider a reintroduction and then commit to manage a block of prairie dog habitat for black-footed ferret conservation. Most recent BTPD surveys indicate that there are many biologically suitable and potential reintroduction sites available, but the key to achieving black-footed ferret reintroductions and thus recovery is finding interested landowners and partners (USFWS 2009c, 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 black-footed ferret reintroductions and, if Kaput®-D was not available, they would likely use a different rodenticide. Therefore, the Service believes that Kaput®-D use on BTPDs, with the agreed upon conservation measure to restrict Kaput®-D use on future black-footed ferret reintroduction sites, will not eliminate future opportunities for reintroductions. Use of Kaput®-D will not preclude black-footed ferret recovery.

### d. 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 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.

Future rodenticide use, along with some land conversion from grasslands or rangeland into croplands or other development, is likely to continue in the range of the BTPD. With the black-footed ferret conservation measures in place, we do not believe that these actions will preclude conservation and recovery of the black-footed ferret because recent trends in BTPD occupied habitat are stable to increasing over large areas of the species' range (USFWS 2009c). While Kaput®-D and Rozol® use will likely increase in the future, their use may be supplanting some of the previously used prairie dog rodenticides, such as zinc phosphide. Thus, even though the Kaput®-D SLN labeled product has been used for BTPD control in five states for approximately 5 years, and Rozol® has been used for nearly two decades in one state and for 5 to 10 years in others (Lee et al. 2005, USEPA 2010a, 1993), it does not appear to be altering the stable to increasing prairie dog trends found by the Service at this time (USFWS 2009c). Because the use of Kaput®-D in black-footed ferret reintroduction sites will not be allowed, the impacts to current and future black-footed ferret reintroduction sites are not expected to be seriously impacted.

Within the black-footed ferret's range, which includes three species of prairie dogs, the Service believes that the availability of rodenticides will not prevent recovery of the black-footed ferret because recent analysis of the three prairie dog species indicates that those prairie dog species continue to inhabit millions of acres of habitat (USFWS 2010c, 2009c, 2008c). As noted earlier, without adequate regulatory mechanisms, poisoning can affect current and future black-footed ferret reintroduction sites (USFWS 2008b). While the total prairie dog acreage among the three species is much greater than is believed necessary to recover the black-footed ferret,

much of the existing prairie dog acreage is not of a size or in a location to contribute to the black-footed ferret's recovery. The Black-footed Ferret Recovery Plan estimated that an average of 124 acres of prairie dog colonies is needed per black-footed ferret or approximately 185,000 acres of black-footed ferret occupied prairie dog habitat is needed to meet downlisting objectives for the species (USFWS 1988). This acreage amount can be distributed between the three species of prairie dogs that encompass the black-footed ferrets' range (USFWS 1988). While complete delisting objectives for the black-footed 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 black-footed ferret (USFWS 1988).

Another important factor affecting prairie dog populations and therefore black-footed ferret recovery is sylvatic plaque and the ongoing outbreaks which can result in widespread prairie dog die offs or, in some cases, more subtle deaths (Cully et al. 2010, Matchett et al. 2010). This exotic disease can directly kill black-footed ferrets that consume infected prairie dogs or eliminate black-footed 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 Kaput®-D use on BTPDs, in combination with other rodenticides and sylvatic plague, will prevent black-footed ferret recovery, but, in order to make informed decisions in the future, it will be important to have an understanding of the extent of Kaput®-D use in each state.

### e. 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 Kaput®-D as a BTPD rodenticide, which includes the black-footed ferret conservation measures, is not likely to jeopardize the continued existence of the black-footed ferret. No critical habitat for the black-footed ferret has been designated; therefore none will be affected. At this time, the Service believes that Kaput®-D use on BTPDs, as modified through the agreed upon conservation measures will not preclude the conservation and recovery of the black-footed ferret even when combined with the use of other currently available legal rodenticides and our understanding of sylvatic plague.

In summary, this conclusion is based on the following:

- The conservation measures adopted for the black-footed ferret into the EPA's proposed action will ensure that:
    - Kaput®-D use is prohibited in current and future black-footed ferret reintroduction sites; thus, we anticipate that survival of the species in the wild will not be compromised by this product.
    - Kaput®-D use is prohibited in an area if an unknown wild black-footed ferret population is discovered.
    - Kaput®-D restrictions on properties adjacent to reintroductions are minimized which lessens opposition to black-footed ferret reintroduction.

- Kaput®-D production quantities and distribution to locations within states will be provided to the Service which will allow an assessment whether the level of use could preclude recovery of the black-footed ferret.

- Sufficient prairie dog acreage exists among the three species of prairie dogs to support current Black-footed Ferret Recovery Plan downlisting objectives and likely future delisting objectives when those become finalized in the revised Recovery Plan.

## 2. Gray Wolf

### a. Status of the Species/Critical Habitat

Gray wolves were originally listed as subspecies or as regional populations of subspecies in the conterminous United States and Mexico. In 1967, we listed the eastern timber wolf *(Canus lupus lycaon)* in the Great Lakes region (32 FR 4001, March 11, 1967), and in 1973 we listed *C. l. irremotus* in the northern Rocky Mountains (38 FR 14678, June 4, 1973). Both listings were promulgated under the Endangered Species Conservation Act of 1969; subsequently, on January 4, 1974, these subspecies were listed under the Endangered Species Act of 1973 (ESA) (39 FR 1171). We listed a third gray wolf subspecies, the Mexican wolf *(C. l. baileyi)* as endangered on April 28, 1976 (41 FR 17740), in the southwestern United States and Mexico. On June 14, 1976 (41 FR 24064), we listed the Texas gray wolf subspecies *(C. l. monstrabilis)* as endangered in Texas and Mexico.

In 1978, we published a rule (43 FR 9607, March 9, 1978) reclassifying the gray wolf as an endangered population at the species level *(C. lupus)* throughout the conterminous 48 States and Mexico, except for the Minnesota gray wolf population, which was classified as threatened.

At that time, we considered the gray wolf group in Minnesota to be a listable entity under the ESA, and we considered the gray wolf group in Mexico and the 48 conterminous States other than Minnesota to be another listable entity (43 FR 9607 and 9610, respectively, March 9, 1978). The separate subspecies listings thus were subsumed into the listings for the gray wolf in Minnesota and the gray wolf in the rest of the conterminous United States and Mexico. In that 1978 rule, we also identified critical habitat in Michigan and Minnesota and promulgated special regulations under section 4(d) of the ESA for operating a wolf management program in Minnesota. The special regulation was later modified (50 FR 50793, December 12, 1985).

The 1978 reclassification was undertaken to "most conveniently" handle a listing that needed to be revised because of changes in our understanding of wolf taxonomy, and in recognition of the fact that individual wolves sometimes cross subspecific boundaries. In addition, we sought to clarify that the gray wolf was only listed south of the Canadian border. However, the 1978 rule also stipulated that "biological subspecies would continue to be maintained and dealt with as separate entities" (43 FR 9609), and offered "the firmest assurance that [the Service] will continue to recognize valid biological subspecies for purposes of its research and conservation programs" (43 FR 9610, March 9, 1978). Accordingly, recovery plans were developed for the wolf populations in the following regions of the United States: the northern Rocky Mountains in 1980, revised in 1987; the Great Lakes in 1978, revised in 1992; and the Southwest in 1982, the revision of which is now underway.

Between 2003 and 2009 we published several rules revising the 1978 conterminous listing for *C. lupus* (68 FR 15804, April 1, 2003; 72 FR 6052, February 8, 2007; 73 FR 10514, February 27, 2008; 74 FR 15070 and 74 FR 15123, April 2, 2009). However, each of these revisions was challenged in court. As a result of court orders (*Defenders of Wildlife, et al. v. Norton, et al.*, 354 F.Supp.2d 1156 (D. Or. 2005); *National Wildlife Federation, et al. v. Norton, et al.*, 386 F.Supp.2d 553 (D. Vt. 2005); *Defenders of Wildlife, et al. v. Hall, et al.*, 565 F.Supp.2d 1160 (D. Mont. 2008); *Defenders of Wildlife, et al. v. Salazar, et al.*, 729 F.Supp.2d 1207 (D. Mont. 2010); *Humane Society of the United States v. Kempthorne*, 579 F. Supp. 2d 7 (D.D.C. 2008)) and, in one case, a settlement agreement (*Humane Society of the United States v. Salazar*, 1:09-CV- 1092-PLF (D.D.C.)), by the spring of 2010 the listing for *C. lupus* in 50 CFR 17.11 remained unchanged from the reclassification that occurred in 1978 (except for the addition of the three experimental populations (Yellowstone Experimental Population Area (59 FR 60252, November 22, 1994), Central Idaho Experimental Population Area (59 FR 60266, November 22, 1994), and the Mexican Wolf Experimental Population (63 FR 1752, January 12, 1998)). For additional information on these Federal Actions and their associated litigation history refer to the relevant associated rules (68 FR 15804, April 1, 2003; 72 FR 6052, February 8, 2007; 73 FR 10514, February 27, 2008; 74 FR 15070 and 74 FR 15123, April 2, 2009) or Previous Federal Actions sections of our most recent wolf actions (76 FR 61782, October 5, 2011; 76 FR 81666, December 28, 2011).

On May 5, 2011, we published a final rule that implemented Section 1713 of Public Law 112–10, reinstating our April 2, 2009, delisting rule which identified the Northern Rocky Mountain (NRM) population of gray wolf as a distinct population segment (DPS) and, with the exception of Wyoming, removed gray wolves in the DPS from the List of Endangered and Threatened Wildlife (76 FR 25590). On September 10, 2012, gray wolves in Wyoming were removed from the List of Endangered and Threatened Wildlife in addition to having their status as an Experimental Population removed (77 FR 55530).

On December 28, 2011, we revised the 1978 listing of the Minnesota population of gray wolves to conform to current statutory and policy requirements. We revised what was previously listed as the Minnesota population of the gray wolf and identified it as the Western Great Lakes (WGL) Distinct Population Segment (DPS) (the DPS includes all of Minnesota, Wisconsin, and Michigan and portions of the adjacent states) and removed that WGL DPS from the List of Endangered and Threatened Wildlife (76 FR 81666). This action became effective on January 27, 2012.

As a result of the recent actions described above, the 1978 reclassification for *C. lupus* now encompasses all or portions of 42 States (AL, AR, CA, CO, CT, DE, FL, GA, KS, KY, LA, MA, MD, ME, MO, MS, NC, NE, NH, NJ, NV, NY, OK, PA, RI, SC, TN, VA, VT and WV, AZ, NM, TX, and portions of IA, IN, IL, ND, OH, OR, SD, UT, and WA) and Mexico.

Gray wolves that are currently listed under the ESA and relevant to this consultation include those wolves listed as endangered in CO, KS, NE, NM, western ND, OK, western SD, and TX and the nonessential experimental population of Mexican gray wolves (listed under section 10j

of the ESA) which is considered a subspecies and reintroduced portions of central Arizona, central and southern New Mexico, and a minute portion of western Texas, south of New Mexico. The nonessential experimental population of Mexican gray wolves is protected by the ESA within the parameters established for that reintroduction effort (USFWS 1998).

While the open rangeland habitat of the BTPD 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 nonessential experimental population area or areas where they are have been delisted, their status under the ESA changes; they take on the listing status of the gray wolf in that area. For example, a wolf that moves from Wyoming (currently delisted) to Colorado would be considered endangered. Those wolves within Nonessential Experimental area boundaries (Arizona/New Mexico/Texas) retain ESA protections but with the management parameters established with the Section 10(j) rulemaking.

Currently, there is no designated critical habitat for the gray wolf; therefore, none will be affected.

### (1) Species description

Gray wolves 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 (the Mexican wolf is the smallest extant wolf in North America) and larger sizes in the northern portion. Females weigh slightly less than males. Wolves reach adult size by 1 year of age. Wolves' fur color is frequently a grizzled gray, but it can vary from pure white to coal black. Mexican wolves are typically a patchy black, brown to cinnamon, and cream color, with primarily light underparts (Brown 1988). Solid black or white Mexican wolves do not exist as seen in other North American gray wolves.

### (2) 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 (USFWS 2003).

### (a) Range and habitat

Within North America, gray wolves formerly ranged from coast to coast with the exception of the mid-Atlantic states, 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 1900s. 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 wolf reintroduction area in New

Mexico, Arizona and a small part of western Texas. The Mexican wolf is endemic to the southwestern United States and Mexico. 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). The BTPD habitat is generally not considered preferred habitat by the gray wolf today; it offers little protective cover, and though individuals may traverse it quickly, they often do not survive human encounters in such areas. 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 if excessive numbers are not taken by humans.

**(b) 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).

**(c) 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 30s 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.

**(d) 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 (mph), wolves can attain speeds as high as 40 mph. By 3 years of age, many wolves disperse from the pack that they were born into to find mates and to 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 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. 2007). 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 6 months, but daily GPS locations showed she actually walked over 3,000 miles (USFWS et al. 2011).

Considerable information on wolf dispersal was obtained during 1993-2008, when 1,681 radio-collared wolves (858 males and 823 females) in the Northern Rocky Mountain DPS 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 that Kaput®-D may be applied) (Jimenez et al. 2011, unpublished data). Licht and Fritts (1994) studied 10 wolf mortality records in North Dakota 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 more than 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 1992-2010 have been over 190 miles with 4 wolves travelling beyond the Northern Rocky Mountain DPS border (USFWS et al. 2011). The eastern edge of the Northern Rocky Mountain DPS is about 400 miles from the western edge (eastern Minnesota) of the Western Great Lakes DPS core area and is separated from it by hundreds of miles of unsuitable habitat in those Great Plains States (USFWS 2009g). This propensity to disperse and the distances that have been recorded are the factors that lead the Service to believe that gray wolves could encounter and be exposed to Kaput®-D-poisoned prairie dogs.

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 to 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 to breed in the United States (USFWS 2009h).

Human causes of mortality among dispersing wolves include illegal shootings, trapping, poisonings (e.g., M-44s intended for coyotes), and vehicle collisions. Dispersing wolves have been noted by the Service in Colorado in recent years with a likely vehicle collision mortality of an individual in 2004 and an illegal poisoning of another wolf in 2009 (via banned substance: Compound 1080). Of the 10 wolf mortalities documented in North Dakota and South Dakota from 1981-1992, 8 were mistakenly shot as coyotes, 1 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 (Licht and Fritts 1994). A wolf killed by a car near Sturgis, South Dakota, in 2006 was determined to have been from the Northern Rocky Mountain DPS. A wolf from the

Western Great Lakes DPS was shot in Nebraska in 2003. A wolf (Minnesota origin) killed via a 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 in the Eastern United States, Initiation of Status Reviews for the Gray Wolf and for the Eastern Wolf (*Canis lycaon*) (USFWS 2011e):

- *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.*

Despite human-caused mortalities, populations have continued to increase in both numbers and range in both the Northern Rocky Mountain and Western Great Lakes DPSs. However, 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 (USFWS 2011f).

**(3) 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 1-11 pups but generally include 4-6 pups (USFWS 2003). Normally a pack has a single litter annually, but producing 2 or 3 litters in 1 year has been documented in Yellowstone National Park (USFWS et al. 2002). The breeding season for wolves is from late January through March.

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 2 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, 2009h). 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 (USFWS et al. 2011).

The Western Great Lakes DPS 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 (USFWS 2011e). Wolves were considered extirpated from Wisconsin in 1960 but began to recolonize in the 1970s, and an increase in the late 1980s has continued into 2011; the current population estimate there is 782 wolves (USFWS 2011b, 2011g). With the exception of Isle Royale, wolves were extirpated from Michigan prior to the gray wolf listing, but wolves began to return in the late 1980s (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), and 87 individuals were estimated to occur in Michigan in 2010-2011 (USFWS 2011b).

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 2010, the wild population totaled a minimum of 50 individuals (USFWS 2012d).

With a minimum of 1,651 wolves in the Northern Rocky Mountain DPS in 2010 (USFWS et al. 2011), an estimated 4,390 in the Western Great Lakes DPS (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) (USFWS 2011b) and a 2010 estimate of the Mexican wolf population at 50 (USFWS 2012d), the total minimum estimate of wolves in these areas combined is approximately 6,091. Wolf population levels in the range of the BTPD are limited to dispersing wolves.

### (4) Status, trends, and distribution

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 (Young and Goldman 1944, Mech 1970). 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 (USFWS 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 (USFWS 2009h).

In both the Northern Rocky Mountain and Western Great Lakes DPSs today, wolf numbers are trending upward but at slower rates than has been documented in the recent past. Available

habitat appears to be reaching carrying capacity. The total population in the Northern Rocky Mountain DPS today is about five times higher than the minimum population recovery goal and three times higher than the minimum breeding pair recovery goal (USFWS 2009h); 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 (USFWS 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 (USFWS 1994b). As mentioned above, wolves in the Northern Rocky Mountain DPS have been delisted.

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 DPS. Wolves in the Western Great Lakes DPS greatly exceed the recovery criteria (USFWS 1992) for 1) a secure wolf population in Minnesota, and 2) a second population outside Minnesota and Isle Royale consisting of 100 wolves for 5 successive years. Based on the criteria set by the Eastern Wolf Recovery Team in 1992 and reaffirmed in 1997 and 1998 (USFWS 2011e), the proposed DPS contains sufficient wolf numbers and distribution to ensure their long-term survival within the DPS, and this population has been delisted (USFWS 2011b).

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. A captive breeding program has been the source of Mexican wolves for reintroduction efforts to date. Currently, dispersing Mexican wolves are stringently managed. Individuals known to be from the reintroduced population are not allowed to establish territories outside the recovery area boundaries; they are captured and may be returned to the recovery area, put into the captive population, or otherwise managed according to existing provisions (USFWS1998). Mexico has recently initiated reintroductions of the Mexican wolf; in 2011, officials released five captive-bred Mexican wolves into the San Luis Mountains in Sonora just south of the United States-Mexico border (Bryan 2011). As of February 2012, four of the five released animals were confirmed dead due to poison (Albuquerque Journal 2012). Despite the initial setback, Mexico continues to plan additional releases. If wolves from Mexico disperse into the United States, they will be considered endangered under the ESA, unless they establish themselves within the boundaries of the United States Mexican wolf experimental area, where they would be subject to the existing management provisions (USFWS 1998).

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 wolves may decrease under state management plans. However, the Service believes there will still be some dispersing wolves from existing populations into areas where Kaput®-D may be applied for prairie dog control. Areas within the BTPD range where the wolf remains protected are the locations where exposure to Kaput®-D may occur that results in take of gray wolves.

### (5) 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 BTPD exists (within the 10 States where Kaput®-D may be applied) are the individuals of concern with the potential to be adversely affected by the proposed action. This may include reintroduced Mexican gray wolves that enter the United States from Mexico. Wolves in nonessential experimental populations receive protections of the ESA per their specific rulemaking parameters. Wolves that occur in areas that have been delisted that enter into the action area (specifically CO, KS, NE, NM, western ND, OK, western SD and TX) excluding the Mexican wolf nonessential experimental population area would be considered as an endangered species.

As mentioned previously under the "Conservation Measures" section, in order to provide some protections for the Mexican gray wolf, the EPA and Scimetrics agreed to preclude Kaput®-D 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; the BTPD is not common in these areas (Johnson et al. 2003), and prohibiting Kaput®-D use on BTPDs 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 Kaput®-D use may still occur within the greater nonessential experimental population area boundary, key areas of the reintroduction area will not have Kaput®-D use. This conservation measure is anticipated to reduce the risk of adverse effects from Kaput®-D use to the Mexican gray wolf.

Some level of wolf dispersal is expected from other recovered wolf populations, and the potential for endangered wolves to encounter Kaput®-D 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 Dakota and South Dakota (17), Colorado (2) and Nebraska (1)) have averaged approximately 0.65 wolves per year. These are documented wolf mortalities, but it is unknown how many gray wolves may disperse into the action area and not be reported.

## b. Environmental Baseline

### (1) Status of the species within the action area

Gray wolves are not uniformly protected under the ESA throughout the range of the BTPD. Some wolf populations have been delisted. The exact number of dispersing wolves that may occur in the range of the BTPD where Kaput®-D is authorized for use cannot be determined with certainty. The Service does not know of wolf populations in the range of the BTPD except for the reintroduction efforts in southwestern New Mexico. The Service recognizes that dispersing wolves can occur throughout the BTPD range and could be exposed to Kaput®-D use.

### (2) 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 BTPD 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. Dispersing wolves are likely to encounter many forms of threats when they leave their core areas, and high wolf mortality rates in the BTPD range are likely irrespective if Kaput®-D is being used. We currently have no documented Kaput®-D-related mortalities of gray wolves.

### c. Effects of the Action

#### (1) Factors to be considered

Based upon the exposure and effects sections of EPA's Rozol® Assessment and its Kaput®-D Assessment, diphacinone exposure to the gray wolf is expected as the wolf range overlaps BTPD and gray wolf prey items may include animals poisoned by Kaput®-D, including small mammals, birds and large invertebrates. The EPA determined that mortality to the gray wolf is likely as a result of mammals consuming contaminated carcasses. Though growth and reproductive effects were not assessed for diphacinone-exposed mammals, these effects cannot be cannot be precluded. The EPA's Rozol® Assessment also describes potential indirect effects due to the loss of prey base from the use of anticoagulant rodenticides. The Service agrees that Kaput®-D use on BTPDs could adversely affect dispersing wolves.

#### (2) Analyses for the effects of the action

The effects to dispersing gray wolves in the action area are most likely to occur as a result of secondary poisoning via consumption of Kaput®-D-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 Kaput®-D-poisoned area is unknown and would depend on a variety of factors such as the prevalence of Kaput®-D 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 diphacinone rodenticides, other canines (including kit foxes and coyotes) have been diagnosed with diphacinone poisoning. In addition, an American badger, was found dead in association with Rozol® applications in BTPD colonies (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 diphacinone exposure to the gray wolf when individuals do encounter a Kaput®-D-poisoned prairie dog colony would likely be similar to those seen in domestic 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 1999, Murray and Tseng 2008).

A wolf that encounters a Kaput®-D-poisoned BTPD 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 Kaput®-D-poisoned animals would depend in part on the amount of Kaput®-D ingested over time because most animals experience greater adverse effects from multiple doses of diphacinone. Repeat exposure could occur if a dispersing wolf remains near a Kaput®-D-poisoned prairie dog colony and obtains multiple meals from it. Receiving a lethal dose may take more than one poisoned prairie dog. Sub-lethal 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 Kaput®-D-poisoned animals to consume. However, little information is available regarding sub-lethal effects, and Kaput®-D is known to be an effective anticoagulant. It seems likely that death would be the likely result for a gray wolf that ingests Kaput®-D, either directly through hemorrhaging or sub-lethal impairment of behavior (e.g., breeding, feeding and 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 Kaput®-D are not cause for concern regarding effects to wolves because prairie dogs are not known to be a significant dietary item for the gray wolf which normally does not inhabit BTPD areas. Dispersing individuals are anticipated to come upon BTPD colonies only opportunistically as they travel.

**(3) 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. Most of the habitat within the action area is not important for wolf recovery, and we do not expect populations to become established in these areas. Lethal control of wolves in North Dakota 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 DPS 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 DPS (USFWS 2011e). The same may be said for wolves dispersing from the Northern Rocky Mountain DPS. The potential impact to the Mexican gray wolf population within the area occupied by wolves is not expected to be great, given the EPA's adopted conservation measure to prohibit Kaput®-D use in counties within the core reintroduction area, the ongoing intensive management (capture and return of dispersing wolves to reintroduction area) that inhibits dispersal of Mexican gray wolves, relative lack of preference by wolves for the open country typical of BTPD colonies,

and risk posed to wolves that occur in such habitats where they are highly visible and vulnerable to more direct forms of human mortality (i.e., shooting). However, within the 15-year timeframe for which this BO is applicable, it is possible for reintroduced Mexican gray wolves to enter the United States via Mexico's reintroduction efforts, and Mexican gray wolves in New Mexico may expand their populations beyond the current 10(j) boundaries. If Kaput®-D use is determined to result in wolf mortality beyond the low levels anticipated herein, such mortality could impede recovery of the Mexican gray wolf (USFWS 1982). With the exception of the Mexican gray wolf population, individual gray wolves lost to Kaput®-D 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. However, due to the diminished status of the Mexican gray wolf population, take of any wolves in New Mexico due to Kaput®-D is of increased concern and could affect the ability of wolves to expand their populations.

### d. 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 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.

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 BTPD and will continue into the foreseeable future. The Service anticipates high mortality rates for gray wolves that disperse in the BTPD range. Such wolves occurring outside of their current core 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 BTPD range. Cumulatively, wolf populations have continued to rise in the face of these factors, except for the Mexican gray wolf population. For Mexican gray wolves, any additional mortality, when combined with the effects of the proposed action, is a cause for concern. However, we do not believe that it is to the level that would preclude recovery of the Mexican gray wolf, due to the low value of the open habitats preferred by BTPDs for the wolf.

### e. Conclusion Regarding Jeopardy

After reviewing the current status of the gray wolf, the environmental baseline for the action area, the effects of the proposed use of Kaput®-D to control BTPDs 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. Currently, there is no designated critical habitat for the gray wolf; 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, and such individuals are typically precluded from establishing packs and territories due partly to high mortality rates.

- Dispersing wolves in the BTPD range are not considered critical to the recovery of wolf populations in the United States and, cumulatively, gray wolf populations have continued to increase despite losses of dispersing individuals.
- The BTPD colonies are not typical habitat for the gray wolf, dispersing individuals are not anticipated to remain in such areas for long, and lack of cover for gray wolves within BTPD habitat often results in increased vulnerability to other mortality factors such as shooting.
- Gray wolf populations in the Northern Rocky Mountain and Western Great Lakes DPSs are considered recovered by the Service and have been delisted.
- The conservation measure by the EPA to preclude Catron, Grant, Hidalgo, and Sierra Counties in New Mexico from Kaput®-D use is protective of the Mexican gray wolf. Impediments to recovery may be possible in the future if Mexican wolf populations expand into new areas and Kaput®-D-related mortalities are determined to exceed currently anticipated levels for the Mexican gray wolf, but a low number of Mexican gray wolves are expected to be affected by the action at this time.

### 3. Northern Aplomado Falcon

#### a. Status of the Species/Critical Habitat

The northern aplomado falcon 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 (USFWS 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 (USFWS 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 (USFWS 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 (USFWS 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 (USFWS 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 (USFWS 1990).

Little is known about the migratory behavior or seasonal movements of northern aplomado falcons (USFWS 1990). 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 such as Chihuahuan ravens (*Corvus cryptoleucus*) or by 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 (USFWS 2002a). 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 (USFWS 2002a). Documented invertebrate prey includes grasshoppers, beetles, dragonflies, cicadas, crickets, butterflies, moths, wasps, and bees (USFWS 1990). Differences in prey abundance and nest site availability can cause differences in home range size. Based on several studies, the Service estimates the northern aplomado falcon home range size to be approximately 34 square km2 (8,401 acres) (USFWS 1990, 2002a). 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 (USFWS 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 (USFWS 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 (USFWS 2006a). 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 the 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, which preys upon the northern aplomado falcon, may be limiting recovery of this subspecies (Macías-Duarte et al. 2004, USFWS 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 (USFWS 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 Aplomado Falcon 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 Aplomado Falcon 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 2008, The Peregrine Fund found that 31 out of 38 territories surveyed in southern Texas were occupied (The Peregrine Fund 2009). 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 on private, State, and federally-managed areas. Northern aplomado falcons in New Mexico and Arizona are included in a nonessential experimental population designation under Section 10(j) of the ESA (USFWS 2006a). When nonessential experimental populations are located outside a National Wildlife Refuge or unit of National Parks, they are treated as proposed for listing and only two provisions of Section 7 apply: Section 7(a)(1) and Section 7(a)(4). Section 7(a)(4) requires Federal agencies to confer, rather than consult, with the Service on actions that are likely to jeopardize the continued existence of a proposed species. The results of a conference are advisory in nature and do not restrict agencies from carrying out, funding, or authorizing activities. Northern aplomado falcons have been reintroduced in Texas on private lands using Safe Harbor Agreements, and their regulatory status under the ESA is endangered. Therefore, Section 7(a)(2) consultation by Federal agencies applies to aplomado falcons in Texas.

Currently, there are approximately 36 aplomado falcon pairs in the United States, which constitute less than two-thirds of the minimum number of 60 self-sustaining breeding pairs in suitable parts of the southwestern United States recommended by the 1990 Recovery Plan for reclassification of the subspecies to threatened status. The great majority of these breeding pairs currently occur outside the action area of this project in south Texas due to higher prey availability in the coastal region. Over the course of this 15-year project, the Service expects more breeding pairs to establish in New Mexico and west Texas.

### b. Environmental Baseline

Formal surveys and reliable sightings submitted to the Service show that a small number of northern aplomado falcons have been sighted in the United States during every decade since the 1960s (USFWS 2006a). 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 northern aplomado falcons produced in either New Mexico or Arizona since the subspecies' extirpation as a breeding species in the 1950s. Another pair was reported near this site in 2002, but no nest was located and only one of the pair was present 2 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 northern aplomado 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).

### (1) Status of the species within the action area

The action area for this consultation includes the historic range of the BTPD 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 Kaput®-D to control BTPDs 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 northern aplomado falcons in the state. Several landowners have supported reintroduction and manage the introduction areas to promote northern aplomado falcons. Under the 10(j) rule, northern aplomado 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 (USFWS 1996 and 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 northern aplomado falcons incidental to future lawful land-use actions (such as prairie dog control), provided that the landowner maintains any established baseline responsibilities (USFWS 2000b). All northern aplomado falcon release sites and all recorded nests and northern aplomado falcon pairs within the action area in Texas occur on lands covered by the Safe Harbor Agreement (Montoya 2011, personal communication).

### (2) 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 northern 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.

#### (a) 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.

### (b) 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 the 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.

### (c) 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.

### (d) 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, especially if the power lines 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).

### (e) 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 that this may be a lingering threat (Mora et al. 1997, Keddy-Hector 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.

## c. Effects of the Action

In its Kaput®-D Assessment, the EPA concluded that secondary exposure of birds to diphacinone can be sufficient to result in severe effects, including mortality. Though avian reproduction studies are lacking, risks cannot be precluded.

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 "Indandione Mode of Action and Toxicity" above). Additionally, diphacinone is a first generation rodenticide, and consecutive intake over multiple days tends to reduce the amount that results in lethal dose. Thus, BTPDs 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. However, due to its relatively small size, the northern aplomado falcon is not likely to take prey as large as a BTPD, and the northern aplomado 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 diphacinone. Toxicity tests with diphacinone indicate that some raptors are 20-30 times more sensitive than the two test species, northern bobwhite quail and mallard duck, required by the EPA for pesticide registration (Rattner et al. 2010a, 2011, 2012). Therefore, acute and sub-acute risks to the northern aplomado falcon are likely higher than assessed than indicated by the EPA's quantitative risk assessment.

If individual northern aplomado falcons were to enter a BTPD colony, exposure to diphacinone via consumption of primary consumers of Kaput®-D bait may occur. The falcons are not known to consume carrion, but diphacinone poisoning of this species is possible via consumption of live mammals and birds that have fed on Kaput®-D bait. As mentioned previously, the evidence of Rozol® exposure to horned larks and a meadowlark from a field application of Rozol® (Vyas et al. *in press*) indicate that predation of songbirds that have consumed 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, although birds over 500 g have been recorded (USFWS 2002a).

Following treatment with Kaput®-D, northern aplomado falcons may experience repeated doses of diphacinone-exposed prey. For example, in BTPD colonies treated with Rozol®, dead and dying primary consumers (i.e., BTPDs, other small mammals, and birds) were visible in colonies 9 days after treatment and were still present when the study ended at day 29 post-treatment (Vyas 2010a). Additionally, Vyas (2010a) suggested that raptors may preferentially feed at prairie dog colonies treated with Rozol® compared to untreated colonies (Vyas 2010a). This suggestion would likely hold true for prairie dog colonies treated with Kaput®-D. This effect has been observed in predators previously. Kestrels preferentially catch prey displaying aberrant behavior following pesticide exposure compared to healthy prey (Hunt *et al.* 1992).

The northern aplomado falcon may also be attracted to Kaput®-D-treated prairie dog colonies if they provide a source of easy meals of either rodents or birds species.

Northern aplomado falcons experiencing secondary exposure to diphacinone are likely to experience mortality or sub-lethal 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 Kaput®-D, 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 diphacinone-contaminated bait. When these predators are killed by exposure to diphacinone, the number of stick nests available to northern 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, or they may find no suitable nests and forego breeding altogether.

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

However, we also anticipate that detection of diphacinone-poisoned northern aplomado falcons will be rare. The birds are highly mobile; debilitated, dying, or dead falcons, particularly when they move away from Kaput®-D-poisoned prairie dog colonies, are likely to go unreported. For comparison, Rozol®, a similar grain bait rodenticide, has been used for BTPD control in Texas since 2006 under a SLN label. During that time, there have been no reports of incidents involving Rozol® and the northern aplomado falcon; however, we recognize the vastness of the area involved and the difficulty in locating rodenticide-affected raptors such as northern aplomado falcon.

### d. 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 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.

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 and gas), and development (e.g., roads and power lines). These activities can potentially reduce the quality of northern aplomado falcon nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season.

### e. Conclusion Regarding Jeopardy

After reviewing the current status of the northern aplomado falcon, the environmental baseline for the action area, the effects from the use of Kaput®-D, and the cumulative effects, it is the Service's biological opinion that the use of Kaput®-D, 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 northern aplomado falcon may prey on non-target organisms that feed on Kaput®-D grain bait, but it is unlikely that this would occur regularly or predictably. Because the aplomado falcon does not feed upon dead animals, exposure to individuals would only occur from moribund animals on the surface. Moribund animals are expected to be a small proportion of diphacinone-poisoned animals available on the surface.

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

- As BTPD colonies are not known to be highly important habitat for northern aplomado falcon foraging, it is not anticipated that Kaput®-D use as proposed in this action will preclude recovery of this species even when combined with other potential anthropogenic threats. In addition, cooperative agreements with landowners in reintroduction areas allows for the monitoring and potential avoidance of take within reintroduction areas.

- Most breeding aplomado falcons are outside the action area of this project in south Texas. This greater proportion is expected to persist for the duration of this project due to higher prey availability in the coastal region. Therefore, the survival of the northern aplomado falcon is not anticipated to be jeopardized by Kaput®-D use in New Mexico and west Texas.

- Reintroduction of captive bred northern aplomado falcons is expected to continue within the range of the species during some years of this project.

## INCIDENTAL TAKE STATEMENT

### I. INTRODUCTION

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 ITS.

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 Scimetrics, 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 ITS. If the EPA 1) fails to assume and implement the terms and conditions, or 2) fails to require Scimetrics to adhere to the terms and conditions of the ITS 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 ITS (50 CFR § 402.14(i)(3)). For the northern aplomado falcon, this applies to Texas populations.

For northern aplomado falcons in New Mexico, the prohibitions against taking this species found in Section 9 of the ESA have been modified by the nonessential experimental designation. The results of this conference are advisory in nature and do not restrict agencies from carrying out, funding, or authorizing activities. However, the Service advises EPA to consider implementing the conservation measures for northern aplomado falcons in New Mexico.

Under the Safe Harbor Agreement program, for northern aplomado falcons 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).

This ITS exempts take of black-footed ferrets, gray wolves, and northern aplomado falcons protected by the ESA that may be incurred by the proposed action, provided the October 25, 2012, Kaput®-D label, with modifications specified herein, is followed.

Noncompliance with the Kaput®-D label that results in take of gray wolves is not covered by this ITS; 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.

## II. AMOUNT OR EXTENT OF TAKE ANTICIPATED

We anticipate that incidental take may result from the use of Kaput®-D in the 10 states identified on the product label (Appendix A) within and/or adjacent to the range of the BTPD in those states. It should be noted that the amount or extent of incidental take anticipated from the use of Kaput®-D is not additive to the amount or extent of incidental take anticipated in the ITS for Rozol®. Both product labels specifically state that only one anticoagulant rodenticide (diphacinone or chlorophacinone) can be used in a given treatment year (i.e., from October 1 to March 15). Therefore, the incidental take from Kaput®-D, when added to that quantified for Rozol®, should not exceed the amount or extent of incidental take anticipated in this ITS.

### A. Black-footed ferret

The Service has developed this ITS based on the premise that the EPA and Scimetrics will implement the label measures that include black-footed ferret conservation measures as previously described. The conservation measures prohibit application of Kaput®-D within current black-footed ferret reintroduction sites (12 sites in the 10 states) and future reintroduction areas to reduce the level of impact to the black-footed ferret. This information is to be located in the EPA's *Bulletin Live!* database. Changes to this database take approximately 8 months to enact; therefore, the Service will provide information to the EPA accordingly.

Incidental take of black-footed ferrets is anticipated in the form of mortality when individuals disperse from a reintroduction area and encounter a BTPD colony that has been poisoned with Kaput®-D within the previous 2 months, or if the black-footed ferret is residing on a colony when Kaput®-D is applied. While black-footed ferrets can leave reintroduction sites, those departures are unlikely to be documented, and the Service is unable to accurately predict the number of black-footed ferrets that may encounter Kaput®-D-poisoned BTPD colonies. Most black-footed ferrets that leave a reintroduction area are likely to die because of natural causes (predation/starvation) or other activities (vehicle collisions) unrelated to Kaput®-D. Further, due to black-footed ferrets' nocturnal behavior and tendency to spend much of their time underground in prairie dog burrows, it is unlikely that many, if any, black-footed ferret mortalities due to Kaput®-D will be reported to further inform this issue. Therefore, while dispersing black-footed ferrets may die from consuming Kaput®-D-poisoned prairie dogs, this number is not anticipated to be large and will rarely be detected.

At previous black-footed 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). Black-footed ferret reintroduction site managers are authorized to retrieve dispersing black-footed ferrets if that information is available and if the landowner wants the black-footed ferrets removed from their property. Requests to relocate black-footed ferrets that have left a reintroduction area are very rare.

The Service anticipates that incidental take of dispersing black-footed ferrets that leave a reintroduction area and encounter a Rozol® or a Kaput®-D-poisoned BTPD colony will result in two or fewer black-footed ferret mortalities per year because the number of dispersing individuals is not believed to be high and most dispersing black-footed ferrets are expected to die of natural causes or other forms of incidental take. Black-footed ferrets that are captured alive from an area proposed for Kaput®-D use and relocated to suitable habitat where Kaput®-D will not be applied will not be counted against the lethal take of two black-footed ferrets per calendar year. The relocation of live black-footed ferrets from proposed Kaput®-D use areas, while considered incidental take, is exempted under each reintroduction sites' existing management plan and through a Service issued permit to the recovery partners at that site. That permit authorizes activities including black-footed ferret relocation, if needed, at each of the reintroduction sites through coordination with the Black-footed Ferret Recovery Coordinator. Therefore, this Kaput®-D ITS is not intended to cover relocation activities because such actions have been already been exempted under the ESA, or will be exempted by another means in the future. Black-footed ferret mortalities from those relocation efforts are not anticipated.

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

### B. Gray wolf

The Service anticipates that dispersing wolves from source populations may occur in the BTPD range at an average rate of 0.65 wolves per year (essentially 1 or 2 every other year), based on documented mortalities outside of existing DPSs and the 10(j) area for the Mexican gray wolf. This is considered a conservative number as additional dispersers have likely occurred and have gone undetected. Other forms of mortality can affect these wolves before any exposure to Kaput®-D occurs. However, if wolves ingest poisoned prey, evidence suggests that the wolves are likely to die. The exact number of wolves that may encounter a Kaput®-D-poisoned prairie dog town with dead and dying prey is not determinable; however, we conclude that the number would be low. The Service anticipates that one ESA-protected gray wolf every 3 years could be incidentally taken as a result of the registration of Rozol® and this proposed action. Due to the long-distance dispersal capabilities of gray wolves, this incidental take could conceivably occur in Kaput®-D -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 DPSs (e.g., eastern North Dakota, eastern South Dakota, Nebraska, and Colorado). Due to the low number of gray wolves in the Mexican gray wolf population, we anticipate incidental take of gray wolves from the Mexican gray wolf to be lower. We anticipate that only one gray wolf from the Mexican gray wolf population will be incidentally taken over the course of the 15-year term of this biological opinion.

### C. Northern aplomado falcon

Incidental ake of the northern aplomado falcon is expected in the form of mortality or sub-lethal effects such as changes in behavior when they consume prey from a BTPD colony that has been poisoned with Kaput®-D. The Service is unlikely to know when that might occur nor be able to

accurately predict the number of northern aplomado falcons that may encounter BTPD colonies or non-target prey that have been exposed to Kaput®-D. It is unlikely that northern aplomado falcons will be found; therefore, it is unlikely that many, if any, northern aplomado falcon mortalities due to Kaput®-D will be reported to further inform the EPA and the Service on this issue.

We anticipate that northern aplomado falcons in Texas that encounter Rozol® or Kaput®-D-exposed BTPD colonies or non-target prey will result in one or fewer mortalities over 5 years. We further anticipate that one or fewer northern aplomado falcons in Texas over 5 years will be harassed to a level that results in incidental take through a reduction in available nest sites caused by Rozol® or Kaput®-D mortality to large raptors and ravens. However, since this incidental take is unlikely to be easily detected, 2 falcon mortalities or injuries attributable to Rozol® or Kaput®-D use will be considered to be representative of the total amount of take exempted for each 5 years of this 15-year project.

## III. EFFECT OF TAKE

### A. Black-footed ferret

The Service has determined that two mortalities per year of dispersing black-footed ferrets due to Kaput®-D use is not likely to jeopardize the continued existence of the species or materially affect black-footed ferret recovery because individuals dispersing from reintroduction sites are not known to regularly return and contribute further to ferret recovery. It is acknowledged that if a Kaput®-D-caused black-footed ferret mortality that is reported, there could be multiple black-footed ferret mortalities not found or reported. Because the anticipated mortalities are likely to be dispersing black-footed ferrets that are unlikely to contribute to the success of the reintroduction site, such losses are not anticipated to compromise the survival and recovery of the black-footed ferret.

### B. Gray wolf

The Service determines that the level of anticipated incidental take is not likely to result in jeopardy to the species. Few gray wolves are anticipated to disperse into the action area from established populations. The BTPD habitat is generally not preferred habitat for this species. Incidental take is anticipated to be relatively low and not anticipated to have any population-level effects to recovered source populations of gray wolves that disperse into the action area. The low number of Mexican wolves (one over 15-year timeframe) that may be incidentally taken is not currently a threat to its recovery. Kaput®-D use on BTPD towns and any resulting incidental 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. Kaput®-D poisoning is likely a compensatory form of mortality (whereby any individuals lost to Kaput®-D poisoning would have been likely to succumb to another form of mortality in the absence of Kaput®-D) not resulting in an overall increase in total mortality of gray wolves.

### C. Northern aplomado falcon

The Service has determined that two northern aplomado falcons, in the form of one mortality and one harassment per 5 years in the 15-year timeframe, due to Kaput®-D use are not likely to jeopardize the continued existence of the northern aplomado falcon. This amount of incidental take is not likely to neither result in population level effects to the species nor reduce its chances for recovery. This is due to the fact that the core of the northern aplomado falcon population is expected to persist at current or greater levels in southern Texas, outside the action area of this project. In addition, reintroduction of captive bred northern aplomado falcons is expected to continue within the range of the species during some years of this project.

## IV. REASONABLE AND PRUDENT MEASURES

Pursuant to 50 CFR 402.14 (I) (ii), reasonable and prudent measures (RPMs) are those the Service considers necessary to minimize the impact of the incidental taking. Impacts of the proposed action largely will be minimized by compliance with the conservation measures incorporated into the proposed action, as described in Section IV A. Consequently, no reasonable and prudent measures are necessary.

## V. TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of ESA, the EPA must comply with the following terms and conditions which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary. As mentioned above, the Service considers the conservation measures incorporated into the proposed action as described to be sufficient to minimize incidental take of black-footed ferrets, gray wolves, and northern aplomado falcons. Therefore, no terms and conditions are necessary other than those discussed under Monitoring and Reporting Requirements below.

### Monitoring and Reporting Requirements

When incidental take is anticipated, provisions for monitoring activities of the action are required to determine actual effects on federally listed species. Monitoring and reporting is essential for the Service to assess the action effects, track incidental take levels, and refine the BO, RPMs, and terms and conditions. Thus, the EPA shall provide a written annual report to the Service each year this biological opinion is in effect. The report shall be submitted to the Service by May 15 of each year. The report shall include:

- The number of, and species of, any non-target species reported to the National Pesticide Information Center, with associated relevant incident information;

- The number and locations of applicator training sessions, including the number of attendees at each training.

- The number and circumstances surrounding any federally listed species killed or injured as a result of Kaput®-D poisoning;

- A discussion of progress in implementing the conservation measures contained in this BO, including:
    - Any problems encountered in implementing them;
    - Recommendations for modifying the stipulations to enhance the conservation of the covered species;
    - Any new information, study results, or other relevant information that EPA receives regarding the proposed action and it's likely effects to listed species;
    - A description of activities planned for the coming reporting year; and
    - Any other pertinent information.

This document will assist the Service, the EPA, and the Scimetrics evaluating future measures for the conservation of the black-footed ferret, gray wolf, and aplomado falcon.

**Disposition of dead or injured federally listed species**

Upon locating dead, injured, or sick federally listed species, the animals shall be left in place, photographed if possible, and immediately reported to one of the Service Law Enforcement numbers provided on the label, or a local Service Law Enforcement Agent, along with any information related to Kaput®-D use in the area where the animals were found. The date, time, location, and any other relevant details shall be conveyed. Specimens (collected by authorized individuals) shall be kept cool or frozen to facilitate later examination for Kaput®-D poisoning. Sick or injured animals shall be picked up and transported by authorized individuals to a permitted local wildlife rehabilitation or veterinary facility for treatment. Care must be taken in handling sick or injured animals to ensure effective treatment.

For federally listed species located in the states of Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado and Kansas, the local Service Ecological Services Office within the state the animal is detected shall be notified as soon as possible and informed of the incident and local Kaput®-D use, if known. Office contact information may be found on the internet at www.fws.gov.

The National Black-Footed Ferret Coordinator must also be notified 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.

For gray wolves located in Oklahoma, New Mexico, or Texas (potentially Mexican gray wolves from a reintroduced population) the Mexican Wolf Recovery Coordinator must be notified as soon as possible and informed of any Kaput®-D use, if known. Contact: U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, NM 87113, Office Phone: (505) 761-4748, Office Fax: (505) 346-2542.

The Service's Northern Aplomado Falcon Coordinator must also be notified of sick, injured, or dead northern aplomado falcons within 24 hours by calling (505) 346-2525 at the New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, NM 87113; Fax: (505) 346-2542.

The Service believes that no more than two black-footed ferrets per year; one wolf every 3 years with only one being from the Mexican wolf population; and two northern aplomado falcons for each 5-year period within this 15-year project will be incidentally taken as a result of the proposed action. The Service expects that the conservation measures that have been incorporated into the proposed action will minimize the impact of incidental take that might otherwise result in the absence of those measures. 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 conservation measures incorporated into the action. 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 conservation measures or the addition of RPMs.

## VI. 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. We believe implementation of these will assist EPA in demonstrating that it is meeting the requirements of 7(a)(1) of the ESA.

- A voluntary reporting form shall be developed and made available at training or education sessions and on the internet in association with Kaput®-D information that identifies 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 Kaput®-D was found on the surface and other information that can be used to assess the routes of exposure to nontarget wildlife). Completed forms shall be sent directly to the Service.

- The EPA should work in coordination with the Service to evaluate methods to prevent secondary poisoning of federally listed species by performing a field study that allows for an evaluation of efficacy of the newly implemented line-transect animal search and removal protocol as well as other feasible methods to prevent secondary poisoning. Although other research entities may be acceptable, the Service recommends the EPA contact a university to develop a graduate-level research study with the objective of determining appropriate search methodology/protocols to reduce the above-ground availability of Kaput®-D -poisoned BTPDs and non-target animals.

- The EPA should become a member of the Black-footed Ferret Recovery Implementation Team due to its 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 black-footed ferrets and other listed species. The EPA participation on the Black-footed Ferret Recovery Implementation Team would provide an avenue for the agency to understand the ramifications of rodenticide use on black-footed ferret habitat along with an opportunity to work with recovery partners to ensure EPA actions avoid working at cross purposes with black-footed ferret recovery.

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

- The EPA should initiate or require studies to evaluate secondary toxicity of the EPA registered prairie dog rodenticides to black-footed ferrets.

- The EPA should implement the incorporated conservation measures throughout the nonessential experimental range of the northern aplomado falcon in New Mexico where Kaput®-D may be used.

- The EPA should 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.

- 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.

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.

## VII. REINITIATION NOTICE

This concludes formal consultation on the action outlined in the EPA's October 25, 2012, request for formal consultation regarding federally listed species and critical habitat impacts relative to the registration and application of Kaput®-D to control BTPDs in 10 western States. 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 incidental 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 (for example, this BO does not cover Kaput®-D use on any other prairie dog species; thus, expansion of Kaput®-D use to prairie dog species other than the BTPD would necessitate reinitiation of

formal consultation; changes to the October 25, 2012, Kaput®-D label altering the application of the product may also represent new information not considered herein); 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 Kaput®-D use by itself or in combination with other factors is precluding black-footed ferret recovery, then the EPA and the Service shall reinitiate consultation to determine appropriate measures to allow black-footed 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.

## VIII. REFERENCES CITED


Albuquerque Journal (ABQonline). 2012. Four of five released Mexican wolves found dead. <http://www.abqjournal.com/main/2012/02/21/abqnewsseeker/four-of-five releasedmexican-wolves-found-dead.html> February 21, 2012. Accessed online April 5, 2012.

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, Memorandum from Ed Bangs, Wolf Recovery Coordinator for the 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 4-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.

Bryan, S.M. 2011. Mexican wolves released south of border. <http://www.deseretnews.com/article/700189558/Mexican-wolves-released-south-ofborder. html> Associated Press, October 19, 2011. Accessed online April 5, 2012.

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

Brown, D.E. 1988. The wolf in the southwest, the making of an endangered species. The University of Arizona Press, Tucson, Arizona Bryson, P.D. 1996. Comprehensive review in toxicology for emergency clinicians, third edition. Taylor & Francis; Washington, D.C. 848 pp.

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.

Chesser, R.K. 1979. Opportunistic feeding on man-killed prey by ferruginous hawks. The Wilson Bulletin 91:330-331.

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. 2012. 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, Texas. 338pp. <http://www.nsrl.ttu.edu/tmot1/cynoludo.htm>

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

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

Fisher, P.; E. B. Spurr, S.C. Ogilvie and C.T. Eason. 2007. Bait consumption and residual concentrations of diphacinone in the Wellington tree weta (Hemideina crassidens) New Zealand Journal of Ecology. 31(1): 104-110.

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, Illinois. 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., D.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., P. Dunlevy, S. Ebbert, and C. Swift. 2011. What can we learn about exposure and effects of rodenticides to nontarget wildlife from investigations following broad scale conservation use? 32nd annual meeting of the Society for Environmental Toxicology and Chemistry, November 13-17, Boston, MA. 511.

Golden, N.H., and J. Gober. 2010. Prairie dogs pesticides and protected species: concerns for anticoagulant use in a sensitive ecosystem. Proceedings from the 24th Vertebrate Pest Conference. R.M. Timm and K.A. Fagerstone, editors. Published at University of California; Davis, California. 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. 2008. Black-footed ferret reintroduction site summary of activities, Shirley Basin, Wyoming. Wyoming Game and Fish Department. 5 pp.

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, Idaho.

Henderson, F.R., P.F. Springer, and R. Adrian. 1969 (revised 1974). The black-footed ferret in South Dakota. South Dakota Department of Game, Fish and 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, September 4-6, 1973. R.L. Linder and C.N. Hillman, editors. South Dakota State University; Brookings, South Dakota. 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.

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.

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. 9 pp.

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

Keane, S.E. 2002. Effects of herring gulls and black-backed 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 the U.S. Fish and Wildlife Service; Cheyenne, Wyoming. Prepared by the 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.

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.

Licht, D.S., and S.H. Fritts. 1994. 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.

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, pp. 55-74 *in* B.D. Chepko-Sade and Z. Halpin, editors, Dispersal patterns. University of Chicago Press; Chicago, Illinois. 342 pp.

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

Mech, L.D. 1970. The wolf: The ecology and behavior of an endangered species. Natural History Press (Doubleday Publishing Company; New York). 389 pp. (Reprinted in paperback by the 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, Illinois. 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 ($LC_{50}$) 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.

Natural Science Research Laboratory. 2012. Black-tailed prairie dog. The mammals of Texas – online edition. Museum of Texas Tech University, Lubbock, TX. <http://www.nsrl.ttu.edu/tmot1/cynoludo.htm>.

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, Illinois. 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, CO. 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, TX.

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.

Raithel, C. 1991. American burying beetle (*Nicrophorus americanus*) recovery plan. U.S. Fish and Wildlife Service, Region 5. New England Field Office. 81 pp. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I028

Rattner, B.A., K.E. Horak, R.S. Lazarus, K.M. Eisenreich, C.U. Meteyer, S.F. Volker, C.M. Campton, J.D. Eisemann, and J.J. Johnston. 2012. Assessment of toxicity and potential risk of the anticoagulant rodenticide diphacinone using Eastern screech-owls (*Megascops asio*). Ecotoxicology 21: 832-846.

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. 2011. 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., and 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, and 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, PA. 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>

Scimetrics. 2012. Response letter to Environmental Protection Agency, Office of Pesticide Programs: "Re. Request for FIFRA Section 3(c)(3)(b)(i) registration of Kaput-D Prairie Dog Bait, Scimetrics registration application dated February 27, 2012, Agency Management Briefing on May 8, 2012. Scimetrics, LTD. Corp. May 15, 2012. 3 pp.

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, CO. 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, AK.

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, MT. 3 pp.

Swift, C. E. 1998. Laboratory bioassays with wild-caught black (*Rattus rattus*) and Polynesian (*R. exulans*) rats to determine minimum amounts of Ramik® Green (0.005%

diphacinone) and exposure times for field broadcast applications in Hawaii. Master's thesis, Univ. Hawaii at Manoa, Honolulu, HI.

The Peregrine Fund. 2009. Northern aplomado falcon restoration 2008 report. Notes from the field, January 15, 2009. http://blogs.peregrinefund.org/article/547

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.

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

U.S. Environmental Protection Agency. 2012a. Formal Endangered Species Act section 7 consultation initiation package to the U.S. Fish and Wildlife Service. Includes October 25, 2012, letter to Gary Frazer from Donald Brady requesting consultation and the "Ecological Risk Assessment for the Section 3 New Use Registration of Diphacinone (PC 067701) for use on Black-tailed Prairie Dogs (*Cynomys ludovicianus*)" and supporting materials including the Kaput®-D Prairie Dog Bait product label. Environmental Fate and Effects Division, Office of Pesticide Programs. 65 pp.

U.S. Environmental Protection Agency. 2012b. Proposed Decision to Register Kaput D Prairie Dog Bait (EPA File Symbol 72500-EE) to Control Black-Tailed Prairie Dogs. Approved by Lois Rossi, Director, Registration Division, Environmental Protection Agency, Washington, D.C. Dated September 10, 2012. 3 pp.

U.S. Environmental Protection Agency. 2011a. Ecological committee on federal insecticide and rodenticide act 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. 2010a. Formal Endangered Species Act section 7 consultation initiation package to the U.S. Fish and Wildlife Service. Includes September 30, 2010, letter to Gary Frazer 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 including EPA's Biological Assessment. 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. 2010b. August 3 memorandum from Angel Chiri to Jennifer Gaines. Subject: Benefits Assessment for Chlorophacinone (Rozol) Use to Control Black-Tailed Prairie Dogs, DP 374422. Office of Chemical Safety and Pollution Prevention. Washington, D.C. 16 pp.

U. S. Environmental Protection Agency. 2006. Data Review Memo, Diphacinone secondary hazard study (MRID 469119-01). Office of Prevention, Pesticides, and Toxic Substances, December 28, 2006.

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

U.S. Environmental Protection Agency. 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. 1993. Region VII letter to Kansas Parks and Wildlife regarding use of Rozol Pocket Gopher Bait to control prairie dogs. 1 pp.

U.S. Fish and Wildlife Service. 2012a. Final Biological Opinion for the Proposed Use of Rozol Prairie Dog Bait, April 9, 2012. U.S. Fish and Wildlife Service, Mountain-Prairie Region, Lakewood, CO. 122 pp.

U.S. Fish and Wildlife Service. 2012b. Endangered and threatened wildlife and plants; listing and designation of critical habitat for the Chiricahua leopard frog. Federal Register 77(54):16324-16424.

U.S. Fish and Wildlife Service. 2012c. Endangered and threatened wildlife and plants; Removal of Gray Wolf in Wyoming from the Federal List of Endangered and Threatened Wildlife and Removal of the Wyoming Wolf's Population's Status as an Experimental Population. Federal Register 77(175): 55530-55604.

U.S. Fish and Wildlife Service. 2012d. Mexican wolf recovery program: progress report #13, reporting period: January 1 - December 31, 2010. Accessed online January 2012 at: <http://www.fws.gov/southwest/es/mexicanwolf/pdf/2010_progress_report_final.pdf>

U.S. Fish and Wildlife Service. 2011a. 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. 2011b. 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. 2011c. Veterinary medical examination report. Lab Case #11-000105. National Fish and Wildlife Forensics Laboratory; Ashland, OR. 5 pp.

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

U.S. Fish and Wildlife Service. 2011e. 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. 2011f. 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. 2011g. 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. 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. 2010b. Post-delisting monitoring plan for the bald eagle (*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, MN. 75 pp.

U.S. Fish and Wildlife 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. 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. 2009b. November 12, 2009 letter from Bryan Arroyo to Debbie Edwards, U.S. Environmental Protection Agency, Office of Pesticide Programs. Recommendation to the EPA to disapprove Scimetrics application to add black-tailed prairie dog to the existing Kaput® Field Rodent Bait B pesticide label. Washington, D.C. 8 pp.

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

U.S. Fish and Wildlife Service. 2009e. 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. 2009f. 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, MI. 214 pp.

U.S. Fish and Wildlife 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. 2009h. 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. 2008a. Birds of conservation concern 2008. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management; Arlington, VA. 85 pp. <http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf>

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

U.S. Fish and Wildlife 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. 2007a Letter dated December 21 to Debbie Edwards, Office of Pesticide Programs, U.S. Environmental Protection Agency. Request to disapprove Section 24(c) Special Local Needs registration for use of Kaput Prairie Dog Bait for control of black-tailed prairie dogs. Mountain-Prairie Region; Denver, CO.

U.S. Fish and Wildlife Service. 2007b. Veterinary medical examination report. Lab Case #07-000015. National Fish and Wildlife Forensics Laboratory; Ashland, OR. 11 pp.

U.S. Fish and Wildlife Service. 2007c. Chiricahua leopard frog (*Rana chiricahuensis*) recovery plan. Region 2, U.S. Fish and Wildlife Service; Albuquerque, NM.

U.S. Fish and Wildlife Service. 2006a. 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. 2006b. 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, AZ. 46 pp.

U.S. Fish and Wildlife 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. 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. 2002a. 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, AZ. 228 pp.

U.S. Fish and Wildlife Service. 2002b. 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. 2000a. Notice of availability to review the 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. 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, TX.

U.S. Fish and Wildlife 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. 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. 1995. Recovery plan for the Mexican spotted owl. Albuquerque, NM.

U.S. Fish and Wildlife Service. 1994a. Endangered and threatened wildlife and plants; Establishment of a nonessential experimental population of black-footed ferrets in southwestern South Dakota. Federal Register 59(159):42682-42694.

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

U.S. Fish and Wildlife Service. 1992. Recovery plan for the eastern timber wolf. Twin Cities, MN. 73 pp.

U.S. Fish and Wildlife Service. 1991. Black-capped vireo (*Vireo atricapillus*) recovery plan. Austin, TX. Pp. vi + 74.

U.S. Fish and Wildlife Service. 1990. Aplomado falcon recovery plan. U.S. Fish and Wildlife Service; Albuquerque, NM. Pp v + 58 pp.

U.S. Fish and Wildlife Service. 1988. Black-footed ferret recovery plan. U.S. Fish and Wildlife Service; Denver, CO. 154 pp.

U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain wolf recovery plan. U.S. Fish and Wildlife Service; Denver, CO. 119 pp.

U.S. Fish and Wildlife 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. 1982. Mexican wolf recovery plan. U.S. Fish and Wildlife Service, Albuquerque, NM. 103 pp.

U.S. Fish and Wildlife Service. 1970. Conservation of endangered species and other fish or wildlife. Federal Register 35(106):8491-8498.

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

U.S. Fish and Wildlife Service; Montana Fish, Wildlife and 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, MT 59601.

U.S. Fish and Wildlife 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, MT 59601.

U.S. Fish and Wildlife 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 North Park, Suite 320; Helena, MT 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 Pharmacology 24(7):815-821.

Vyas N.B., C.S. Hulse, C.U. Meteyer, and C.P. Rice. Evidence of songbird intoxication from Rozol® application at a black-tailed prairie dog colony. Journal of Fish and Wildlife Management 4(1): 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, 2010, 24 days after application. Edited by the 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. 1999. Factors influencing estimation of pesticide related wildlife mortality. Toxicology and Industrial Health15:186-191.

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

Vyas, N.B., J.W. Spann, E. Albers, and D. Patterson. 2003. Pesticide-laced predator baits: considerations for prosecution and sentencing. Environmental Lawyer 9:589-608.

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.

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, CO. 59 pp.

Witmer, G.W., M.J. Pipas, and D.L. Campbell. 1995. Effectiveness of search patterns for recovery of animal carcasses in relation to pocket gopher infestation control. International Biodeterioration and Biodegradation 36: 177-187.

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/distributionmodels.html>

Yoder, C.A. 2008. Acute oral toxicity ($LD_{50}$) of chlorophacinone in black-tailed prairie dogs (*Cynomys ludovicianus*). Unpublished report, QA-1446. National Wildlife Research Center; Fort Collins, CO. 86 pp.

Young, S.P., and E.A. Goldman. 1944. The wolves of North America. American Wildlife Institute; Washington, D.C. 636 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 telephone 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 4, 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, 2008. 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.

# APPENDIX A

## October 25, 2012 Label for Kaput®-D Prairie Dog Bait



**RESTRICTED USE PESTICIDE**
**DUE TO HAZARD TO NON-TARGET 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 Certificate.**

# *Kaput*®-D Prairie Dog Bait

| | |
|---|---|
| **Active Ingredient:** | |
| Diphacinone (CAS No. 82-66-6) | 0.005% |
| **Other Ingredients** | 99.995% |
| Total | 100.000% |

**Keep Out of Reach of Children**
**CAUTION**
**Harmful if swallowed.**
**See back panel [below] for First Aid and additional Precautionary Statements.**

**EPA Reg. No. 72500-__** **EPA Est. 72500-CO-1**

**Net Weight: ____ lbs.**
**{5 through 2000 lbs.}**

ACCEPTED
OCT 25 2012
Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide Registered under EPA Reg. No. 72500-22

[Manufactured by:
Scimetrics LTD. CORP.
*New Solutions to Old Problems*
[Pest Management Solutions]
P.O. Box 1045
Wellington, CO 80549-1045
970-482-1330]

*{Back Panel/Below}*

**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 non-target 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 non-crop areas.

**2. States:** Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming. Do not apply this product within the exterior boundaries of the Crow Reservation or the Blackfeet Reservation in Montana.

**3. Application:** This product may only be used in underground applications. Do not apply bait at or above ground level. Treat only active burrows. Leave no bait on soil surface. Applicator must retrieve and dispose of any bait that is spilled above ground or placed less than 6 inches down the burrow entrance.

**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.

**7. Other:** Do not use *Kaput®-D Prairie Dog Bait* with any other anticoagulant prairie dog bait. For each treatment area, only one anticoagulant rodenticide active ingredient (diphacinone or chlorophacinone) may be used per treatment period.

**Endangered Species:** 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. When using this product, you must follow the measures contained in the Endangered Species Protection Bulletin for the county in which you are applying the product. To obtain Bulletins, no more than six months before using this product, consult http://www.epa.gov/espp/ or call 1-800-447-3813. You must use the Bulletin valid for the month in which you will apply the product.

**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 Directions:**

**Method 1: Application by Hand**: Apply ¼ cup of bait (approx. 2 ounces or 56 grams) at least 6 inches down prairie dog burrows. Make sure no bait is left on the soil surface. Applicator must retrieve and dispose of any bait that is spilled above ground or placed less than 6 inches down the burrow entrance.

**Method 2: Application by Mechanical Bait Placement Machine:** Apply ¼ cup of bait (approx. 2 ounces or 56 grams) at least 6 inches down prairie dog burrows. Apply with a mechanical bait application machine that is designed, constructed and operated in a manner that ensures bait is properly placed at least 6 inches down prairie dog burrows. Mechanical bait application machines must be calibrated to ensure that the proper amount of bait is dispensed into each prairie dog burrow. Make sure no bait is left on the soil surface. 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 4 to 5 days after the first treatment. 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. Carcass searches must be performed using a line-transect method that completely covers the baited area. Transect center lines must be not more than 200 feet (about 60 meters) apart, and should be considerably less if searches are conducted in more densely vegetated sites. Transect lines may be traveled on foot or by vehicle at a rate not to exceed 4 mph. 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 non-target animals for at least two weeks, but longer if carcasses are still being found at that time. Carcass collection 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 other methods to insure that the carcasses are inaccessible to scavengers.
All dead or dying non-target animals must be reported to the National Pesticide Information Center 1-800-858-7378 as soon as possible. Any apparently injured or sick Federally listed species must also be immediately reported by calling 303-236-7540 (if located in Kansas, Nebraska, the Dakotas, Montana, Colorado or Wyoming) or 505-248-7889 (if located in Texas, New Mexico or Oklahoma). The Black-footed Ferret Coordinator must also be contacted if ferrets are found during *Kaput®-D Prairie Dog Bait* applications or carcass searches at 970-897-2730 x224. If live black footed ferrets are found outside reintroduction sites, before, during or after *Kaput®-D Prairie Dog Bait* application, the Black-footed Ferret Coordinator must be contacted immediately and sufficient time must be allowed for the FWS to capture and relocate the black-footed ferret(s) before applying *Kaput®-D Prairie Dog Bait*.
**Second Bait Application:** 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 manner, time period and procedure as described under DIRECTIONS FOR USE instructions. Follow all Use Restrictions, Site Assessment, Application and Follow-up directions as stipulated above.

## STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.
**Pesticide Storage:** Store in original container in a cool, dry place inaccessible to children and pets.
**Pesticide Disposal:** Wastes resulting from the use of this product may be disposed of in trash or at an approved waste disposal facility.
**Container Handling:** Non-refillable container. Do not reuse or refill this container. **[Plastic:]** Completely empty container, then offer for recycling or reconditioning; or puncture and dispose of in a sanitary landfill. **[Paper:]** Completely empty container, then dispose of empty container in trash or at an approved waste disposal facility.
**Lot Number:** {Lot number or description where lot number is located}

## 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.

**Personal Protective Equipment (PPE)**
All handlers (including applicators) must wear long-sleeved shirt, long pants, shoes plus socks, and waterproof gloves. Any person who retrieves carcasses or unused bait following application of this product must wear waterproof 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 the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact the National Poison Information Center at 1-800-858-7378 for emergency medical treatment information.

**If Swallowed:** Immediately call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor.

**If on Skin or Clothing:** Take off contaminated clothing. Immediately rinse skin with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

**If in Eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

## TREATMENT FOR PET POISONING

If animal eats bait, call veterinarian or 1-800-222-1222 at once.

## NOTE TO PHYSICIAN OR VETERINARIAN

Contains Diphacinone, an anticoagulant. 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.

## WARRANTY

To the extent consistent with applicable law, Manufacturer and Seller make no warranty, express 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/handling is contrary to label instructions.

[Manufactured by:]
Scimetrics
LTD. CORP.
*New Solutions to Old Problems*
[Pest Management Solutions]
P.O. Box 1045
Wellington, CO 80549-1045
970-482-1330
mole@scimetricsltd.com
[customerservice@kaputproducts.com]
**[Made in the USA]**

**[ ] Denotes optional/alternate language**
**{ } Denotes language which does not appear on the market label**