FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
203 West Second Street
Grand Island, Nebraska 68801

May 15, 2013

FWS-NE: 2013-164

K. Nicole Gibson, Ph.D.
Endangered Species Act Lead,
U.S. Department of State
OES/FO Room 3880
Washington, D.C. 20520

Subject: Transmittal of the U.S. Fish and Wildlife Service's Biological Opinion on the Effects to Threatened and Endangered Species from the Issuance of a Presidential Permit to TransCanada Keystone XL Pipeline (Keystone) by the U.S. Department of State for the proposed construction, operation, and maintenance of the Keystone XL pipeline and associated facilities at the border and interrelated and interdependent actions.

Dear Dr. Gibson:

This document transmits the United States Fish and Wildlife Service's (USFWS) Biological Opinion (BO) regarding potential impacts of the proposed Keystone XL pipeline (Project) to the federally endangered black-footed ferret *(Mustela nigripes)*, interior least tern *(Sternula antillarum)*, whooping crane *(Grus americana)*, pallid sturgeon *(Scaphirhynchus albus)*, and American burying beetle *(Nicrophorus americanus)*(ABB); and threatened piping plover *(Charadrius melodus)* and western prairie fringed orchid *(Platanthera praeclara)*. Additionally, this BO also provides measures that would contribute to the conservation of two federal candidate bird species, the greater sage-grouse *(Centrocercus urophasianus)* and Sprague's pipit *(Anthus spragueii)*, that would likely be impacted by the Project. This consultation document has been prepared pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (Act) (16 United States Code [U.S.C.] § 1531 et seq.) and 50 Code of Federal Regulations [C.F.R] § 402 of our interagency regulations governing section 7 of the Act.

Section 7(a) (2) of the Act requires Federal agencies to consult with the USFWS to ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any federally listed species nor destroy or adversely modify critical habitat. The proposed Project is the construction and operation of a 36-inch diameter oil pipeline with associated facilities from Hardisty, Alberta, Canada to Steele City, Nebraska with two pumping stations proposed for construction in Butler and Clay counties in Kansas. The direct and indirect effects, as well as the effects from any interrelated and interdependent actions, and cumulative effects, are considered in this BO to determine if the proposed Project is likely to jeopardize the aforementioned federally listed species.

Keystone has applied to the U.S. Department of State (Department) for a Presidential Permit for the construction, connection, operation, and maintenance of the proposed Project pipeline and associated facilities at the border of the United States for importation of crude oil from Canada. The Department receives and considers such applications for Presidential Permits for facilities to transport petroleum, petroleum products, coal, and other fuels transmission projects pursuant to the President's constitutional authority, which authority the President has delegated to the Department in Executive Order (Exec. Order No.) 13337, as amended (69 Federal Register [Fed. Reg.] 25299). Under EO 13337, the Secretary of State may issue a Presidential Permit for a border crossing facility if he finds that issuing such a permit would be in the "national interest." EO 13337 also specifies a process for the Department to seek the views from certain other agencies on whether issuing a permit would be in the national interest. It was determined in consultation with other agencies (including Bureau of Land Management (BLM) and the United States Army Corps of Engineers (USACE)) that the Department would act as the lead federal agency for the environmental review of the proposed Project consistent with National Environmental Policy Act (NEPA). Consequently, the Department is also the lead agency consulting with the USFWS consistent with Section 7 of the ESA. Other federal actions associated with the proposed Project may require separate section 7 consultation with the USFWS.

Several federal agencies are cooperating agencies with the Department, and involved in some capacity with the proposed Project. The proposed Project would affect numerous rivers and wetlands, thus the USACE would issue Section 404 permits as necessary. Because the proposed Project would cross both Federal and private lands, the BLM would evaluate the proposed Project and decide whether to grant Keystone a right-of-way (ROW) authorization for a crude oil pipeline and appurtenant facilities including access roads across those federal lands pursuant to the Mineral Leasing Act (43 C.F.R Part 2880). These federal lands principally include 43 miles of pipeline ROW in Montana, and the proposed pipeline would also cross or go under Bureau of Reclamation facilities on private lands in Montana and South Dakota. The Western Area Power Administration (Western) would own a small section of a 230-kV transmission line in southern South Dakota. This line would supply upgraded load capacity and support voltage requirements for pump stations 20 and 21 (in Tripp County, South Dakota) if the proposed pipeline were to operate at full capacity sometime in the future. Finally, the Rural Utilities Service of the U.S. Department of Agriculture would provide grants to help fund construction of some of the power distribution lines that may be built to provide power to the proposed pipeline pump stations.

Project Changes since the Previous Application

Several changes have been made to the proposed Project since the Final Environmental Impact Statement (Final EIS August 2011) was released and the 2011 BO was withdrawn at the request of the Department by the USFWS on December 21, 2011. In general, there have been 64 route modifications made in Montana, 51 route modifications in South Dakota, and 16 route changes in Nebraska to accommodate landowner concerns and the results of engineering and environmental surveys, and to comply with state permitting requirements. Of these route changes, 2 in Montana, 29 in South Dakota, and 11 route changes in Nebraska are outside the previous project survey corridor. The route changes in Nebraska result from Keystone's agreement to reroute the pipeline around the Nebraska Department of Environmental Quality (NDEQ)-identified Sandhills Region. No changes have been made to the two pump station locations in Kansas. The proposed Project

now includes an ancillary facility that will be used as a rail siding and pipe storage location in North Dakota. This 60-acre pipe yard was used previously as part of TransCanada Pipeline's Bison Pipeline Project.

This BO is based on the best available scientific and commercial data, including E-mail and telephone correspondence, USFWS files, pertinent scientific literature, discussions with recognized species authorities, and other scientific sources. Further, this BO uses information from the December 21, 2012, Biological Assessment (BA) that was submitted to the USFWS by the Department (DOS 2012).

Consultation History

The USFWS's Nebraska Field Office in Grand Island, Nebraska, is delegated the lead office to conduct the consultation with the Department. However, other USFWS Ecological Services Field Offices in Montana, North Dakota, South Dakota, and Kansas were actively involved in the review of the Project during informal consultation beginning in 2008, and provided input on draft consultation documents throughout the consultation.

In September 2011, the USFWS released a BO with an incidental take statement for the American burying beetle (ABB) in South Dakota, Nebraska, and Oklahoma. Subsequently, the USFWS withdrew the BO at the Department's request based on Keystone's agreement with Nebraska to reroute the pipeline in Nebraska to avoid the NDEQ-identified Sandhills Region. Keystone has since filed a new Presidential Permit application with the Department (May 2012). In June 2012, the Department initiated section 7 consultation for the May 2012 Keystone XL Pipeline Presidential Permit application. The Department submitted to the USFWS, a draft BA for the proposed Project in September 2012. For the new application, the Department did not designate Keystone as the non-federal representative. Keystone did not include the Gulf Coast portion of the previous Keystone XL project in its May 2012 application. Keystone decided to pursue the Gulf Coast Project as a stand-alone project with independent utility. That project received the necessary permits from relevant federal and state agencies and is under construction. The proposed Project encompasses a slightly revised "Steele City" segment of the previous proposed Project and is the subject of this BO. Construction and operation of the proposed Project may affect habitats and populations of species protected under Act and by individual state legislation in the aforementioned states. This BO addresses these federally protected species and updated proposed Project information.

The following bulleted items provide a summary of correspondence, species-specific survey information, and continued informal consultation with the USFWS regarding coordination of biological surveys and determination of biological impacts from the previously proposed Project and the new proposed Project. The previously proposed Project had a different geographic scope that included Texas and Oklahoma. Meeting summaries below include Texas and Oklahoma, which were part of the previously proposed Project. They are included here to provide a sense of the extensive agency coordination that has occurred on this Project from 2008 to 2013. Supporting meeting summaries, consultation letters, and other communications are included in the 2012 BA (DOS 2012), in files at the USFWS's Nebraska Ecological Services Field Office located in Grand Island, Nebraska and other USFWS Ecological Services Field Offices in Montana, North Dakota, South Dakota, and Kansas.

- April 2008: Keystone sent initial consultation letters for the Steele City Segment (Montana, South Dakota, and Nebraska) to the USFWS, BLM, state wildlife agencies, and state natural heritage programs to request their input in identifying prominent terrestrial and aquatic resource issues or concerns that may occur within or adjacent to the ROW, focusing on species that are either sensitive (e.g., federal or state listed), have high economic value (e.g., big game, waterfowl), or are considered important resources (e.g., raptors, fish). The consultation letters included state-specific special status species tables compiled from data received from each state, USFWS, and BLM with brief descriptions of species habitat, miles of potential habitat crossed by the Project, and approximate mileposts where potential habitat was identified along the ROW.

- May 5, 2008: Keystone met with the Nebraska Game and Parks Commission (NGPC) and the USFWS at the NGPC office in Lincoln, Nebraska, to discuss issues pertaining to wildlife, special status species, and sensitive habitat that could potentially occur in the Project area. The goal of the meeting was to gather input on agency recommendations based on the information sent to them in April 2008 for species occurrence, habitat assessments, and future field surveys. Keystone incorporated comments from the meeting into survey protocols and best management practices (BMPs) documents for future agency verification.

- May 8, 2008: Keystone met with the USFWS and the Montana Fish, Wildlife, and Parks (MFWP) at the MFWP office in Helena, Montana, to discuss issues pertaining to wildlife, special status species, and sensitive habitat that could potentially occur in the Project area. The goal of the meeting was to gather input on agency recommendations based on the information sent to them in April 2008 for species occurrence, habitat assessments, and future field surveys. Keystone incorporated comments from the meeting into survey protocols and BMPs documents for future agency verification. The MFWP requested a follow-up meeting with additional technical staff from MFWP (Regions 6 and 7).

- June 10, 2008: Keystone met with staff from USFWS and South Dakota Department of Game, Fish, and Parks (SDGFP), at the SDGFP office in Pierre, South Dakota, to discuss issues pertaining to wildlife, special status species, and sensitive habitat that could potentially occur in the Project area. The goal of the meeting was to gather input on agency recommendations based on the information sent to them in April 2008 for species occurrence, habitat assessments, and future field surveys. Keystone incorporated comments from the meeting into survey protocols and BMPs for future agency verification.

- July 29, 2008: Keystone met with staff from the BLM Glasgow Field Office and MFWP Region 6 and 7 at the MFWP office in Glasgow, Montana, to discuss issues pertaining to wildlife, special status species, and sensitive habitat that could potentially occur in the Project area. The goal of the meeting was to discuss agency recommendations based on the information sent to them in April 2008 for species occurrence, habitat assessments, and future field surveys. Keystone incorporated input from the meeting into survey protocols and BMPs for future agency verification.

- December 3, 2008: Keystone received a consultation letter from the USFWS's Ecological Services Field Office in Tulsa, Oklahoma, regarding recommendations for the proposed list of threatened and endangered species about species-specific surveys, habitats of special concern, and BMPs for projects affecting rivers, streams, and tributaries. The USFWS requested formal consultation with the Department to address take of ABB.

- January/February 2009: Keystone initiated section 7 consultation with the USFWS. Keystone continued discussions with BLM, and state wildlife agency offices for Montana, South Dakota, and Nebraska that included state-specific special status species survey protocols and BMPs for the species identified as potentially occurring during the 2008 meetings. A summary of the findings from the 2008 biological field surveys was included in the discussions.

- January 27, 2009: Keystone met with staff from the USFWS and SDGFP at the SDGFP office in Pierre, South Dakota, to discuss issues pertaining to special status species surveys. The goals of the meeting were to verify Keystone's survey approach, BMPs, discuss required field surveys, and review the information that was sent to the USFWS in the January/February 2009, informal consultation package. The USFWS and SDGFP provided additional recommendations to Keystone's sensitive species mitigation approach to be updated prior to final agency concurrence.

- February 3, 2009: Keystone met with staff from the BLM Glasgow Field Office and MFWP Regions 6 and 7 at the MFWP office in Glasgow, Montana, to discuss issues pertaining to special status species surveys. The goals of the meeting were to verify Keystone's survey approach, BMPs, discuss required field surveys, and review the information that was sent to the USFWS in the January/February 2009, consultation package. The BLM and MFWP provided additional recommendations to Keystone's sensitive species mitigation approach to be updated prior to final agency concurrence.

- February 5, 2009: Keystone held a conference call with staff from the BLM Glasgow, Malta, and Miles City field offices to discuss issues pertaining to special status species surveys. The goals of the meeting were to verify Keystone's survey approach, BMPs, discuss required field surveys, and review the information that was sent to the USFWS in the January/February 2009 informal consultation package. The BLM provided additional recommendations to Keystone's sensitive species mitigation approach to be updated prior to final agency concurrence.

- February 19, 2009: Keystone met with staff from the USFWS's Nebraska Ecological Services Field Office and NGPC at the NGPC office in Lincoln, Nebraska, to discuss issues pertaining to special status species surveys. The goals of the meeting were to verify Keystone's survey approach, BMPs, discuss required field surveys, and review the information that was sent to the USFWS in the January/February 2009 informal consultation package. The USFWS and NGPC provided additional recommendations to Keystone's sensitive species mitigation approach to be updated prior to final agency concurrence.

- May 19, 2009: Keystone sent E-mail correspondence to the USFWS's Oklahoma Ecological Services Field Office regarding survey protocols for the interior least tern. Comments and

concurrence were received on the survey locations and methodology on June 17, 2009, and surveys were initiated following receipt of approval.

- June 16, 2009: Keystone held a conference call with staff from the USFWS's Oklahoma Ecological Services Field Office to discuss issues pertaining to the ABB. The goals of the meeting were to determine the next steps in the consultation process for the ABB and verify that the USFWS was receiving the information they required.

- June 25, 2009: Keystone called C. Bessken of the South Dakota Ecological Services Field Office regarding a geotech activity clearance. The USFWS discussed the need for formal section 7 consultation with the Department to address take of the ABB in South Dakota.

- March 2, 2010: Project personnel held a conference call with USFWS about endangered species and migratory bird surveys. The goal of the call was to discuss helicopter survey timing windows for raptors/rookeries and bald eagles in 2010. The need for conducting additional pedestrian surveys for piping plovers was also discussed.

- June 1, 2010: The USFWS provided the Department with comments on the Draft BA of impacts of the proposed Project to threatened and endangered species. Comments from USFWS Ecological Services Field Offices in Nebraska, South Dakota, Oklahoma, and Texas were included.

- June 3, 2010: The USFWS provided the Director of the Office of Environmental Compliance, Department of the Interior combined comments from Region 6 (Denver) and Region 2 (Albuquerque) on the Draft Environmental Impact Statement for the proposed Project.

- September 3, 2010: Keystone met with the USFWS, Keystone, the Department, and Cardno ENTRIX (a consultant), regarding the requirements for formal consultation on the effects of the Keystone XL Pipeline Project.

- September 9, 2010: A meeting was held between USFWS, BLM, and Keystone regarding mitigation and construction stipulations for greater sage-grouse.

- October 12, 2010: Meetings continued between USFWS, Keystone, NGPC, and Cardno ENTRIX regarding the Keystone XL Pipeline Project's section 7 formal consultation on federally listed species.

- December 30, 2010: The USFWS provided comments to Keystone and Cardno ENTRIX on the November 2010 draft BA of impacts to threatened and endangered species from the proposed Keystone XL pipeline.

- December 30, 2010: The USFWS provided comments on the November 29, 2010, revision of the ABB Survey Report to Keystone and Cardno ENTRIX.

- January 7, 2011: A meeting was held between the USFWS, Keystone, and Cardno ENTRIX to discuss USFWS comments on the preliminary 2011 BA.

- January 12, 2011: Meetings continued between USFWS, Keystone, NGPC, and Cardno ENTRIX regarding the Keystone XL Pipeline Project's section 7 formal consultation on federally listed species.

- February 2, 2011: Personnel from the USFWS, Keystone, the Department, and Cardno ENTRIX (for DOS) met to continue discussions about the BA needed for section 7 formal consultation on effects of the Keystone XL Pipeline Project on federally listed species.

- February 17, 2011: Personnel from the USFWS, Department, and Cardno ENTRIX met to continue discussions about the BA needed for section 7 formal consultation on effects of the Keystone XL Pipeline Project on federally listed species.

- March 24, 2011: Personnel from the USFWS, Department, Keystone, NGPC, and Cardno ENTRIX met to continue discussions about the BA needed for section 7 formal consultation on effects of the Keystone XL Pipeline Project on federally listed species.

- April 21, 2011: Personnel from the USFWS, Keystone, Department, and Cardno ENTRIX (for DOS) met to continue discussions about the BA needed for section 7 formal consultation on effects of the Keystone XL Pipeline Project to the ABB. The discussion included potential impacts to wooded areas in Oklahoma.

- April 21, 2011: Personnel from Keystone and the Department met to continue discussions about the BA needed for section 7 formal consultation on the effects of the Keystone XL Pipeline Project on federally listed species. Discussions included monitoring and habitat restoration bonding.

- April 27, 2011: Personnel from the USFWS and Department met to continue discussions about the BA needed for section 7 formal consultation on effects of the Keystone XL Pipeline Project to the ABB. The discussion included monitoring and habitat restoration bonding.

- May 19, 2011: The Department submitted the 2011 BA to the USFWS with a letter requesting initiation of formal consultation. The BA analyzed the potential effects from the proposed Project to species protected under the Act (DOS 2011).

- August 26, 2011: The Department issued the Final Environmental Impact Statement (2011 Final EIS) to cooperating agencies and the public.

- September 6, 2011: The USFWS issued their 2011 BO on the Effects to Threatened and Endangered Species from the Construction and Operation of the previously Proposed Keystone XL Pipeline.

- December 20, 2011: The Department requested that the USFWS withdraw their 2011 BO for the previously proposed Keystone XL Project.

- December 21, 2011: The USFWS withdrew their 2011 BO for the previously proposed Keystone XL Project.

- May 2012: Keystone filed a new Presidential Permit Application with the Department.

- June 27, 2012: The USFWS, Department, BLM, Montana Department of Environmental Quality (MDEQ), MFWP discussed project status and schedule of the proposed Keystone XL Project. This meeting initiated section 7 consultation with the USFWS on the proposed Project.

- July 6, 2012: Meetings between the USFWS, Department, and BLM continued regarding the section 7 consultation under the Act for the proposed Project.

- August 28, 2012: The Department submitted a species list of federally protected and candidate species and federally designated critical habitat to the USFWS for the proposed Project and requested that USFWS verify that list and information pertaining to federally protected and candidate species and federally designated critical habitat.

- September 7, 2012: Keystone submitted the TransCanada Keystone XL Pipeline Project Environmental Report to the Department with an applicant-prepared Draft BA.

- September 28, 2012: The USFWS submitted a Technical Assistance letter for the proposed Project to the Department with a list of species and potential project effects that may occur in the proposed Project area.

- October 9-10, 2012: A meeting was held between the USFWS, Department, Keystone, BLM, NGPC, NDEQ, and MFWP regarding the proposed Project's section 7 consultation under the Act. Discussion included the ABB and other federally listed species, and state-protected species, the draft BA, species surveys, avoidance, minimization, and compensation measures.

- October 19, 2012: The USFWS provided extensive comments on the draft BA for the Project.

- October 23, 2012: A meeting was held between the USFWS, Department, SDGFP, BLM, and Keystone regarding the greater sage–grouse and a compensatory mitigation plan for the species in South Dakota. Discussions included a management plan and avoidance, minimization, and mitigation strategies.

- December 14, 2012: The USFWS provided extensive comments on the draft BA for the Project.

- December 21, 2012: The Department submitted a Final 2012 BA to the USFWS with a letter requesting initiation of formal consultation. The BA analyzed the anticipated effects of the proposed Project to numerous species protected under the Act and included

avoidance, minimization, and compensation strategies. Table 1 lists the species and the effect determinations reached in the BA by the Department (DOS 2012).

- March 1, 2013: The Department issued the 2013 Draft Supplemental EIS to cooperating agencies and the public.

Species Determinations

In its BA, the Department has considered the effects of the proposed Project on federally listed species and designated critical habitat and has made several determinations of effect as shown in Table 1. Further, the Department also considered the effects of the proposed Project on candidate species. The USFWS concurs with the determinations made by the Department that the proposed Project may affect but is not likely to adversely affect the endangered black-footed ferret, interior least tern, whooping crane, and pallid sturgeon; and the threatened piping plover and western prairie fringed orchid. A detailed discussion of factors contributing to our concurrence with the above not likely to adversely affect (NLAA) determinations is included in the Conservation Measures Section of this BO with supporting information on file at the USFWS's Nebraska Ecological Services Field Office.

The USFWS acknowledges the "no effect" determinations made by the Department including the gray wolf, Eskimo curlew, Topeka shiner, and blowout penstemon. Finally, we concur with the determination that the proposed Project may affect and is likely to adversely affect the ABB. Therefore, this BO analyzes the effects of the proposed Project along with the effects of interrelated and interdependent actions on the ABB, because the Keystone XL pipeline may affect and is likely to adversely affect this species. No critical habitat has been designated for the ABB.

The BA also addressed two candidate species: the greater sage-grouse and Sprague's pipit. In its BA, the Department determined that the proposed Project may effect, but is not likely to adversely affect these species (DOS 2012). Please note that our section 7 consultation would not apply to candidate species for this Project. As such, we would defer our concurrence/nonconcurrence on this determination should either species be listed in the future. In the meantime, we commend the Department for including the greater sage-grouse and Sprague's pipit in this BA even though they are not listed. We have concluded that implementation of several measures by Keystone for the greater sage-grouse and Sprague's pipit would certainly contribute to their conservation.

Table 1. Species considered in the 2012 BA analyses for the proposed action and effect determinations.

Common Name	**Scientific Name**	**Federal Status**	**Conclusion**[1]	**Rationale**
Mammals				
Black-footed ferret	*Mustela nigripes*	Endangered Experimental Populations	NLAA/ NLAA	No potential reintroduction sites present in MT, SD, or NE; no habitat present in Project area.
Gray Wolf	*Canis lupus*	Endangered/ Experimental Populations	No Effect/ No Effect	Not Present in SD, NE, or KS; delisted in MT
Birds				
Eskimo curlew	*Numenius borealis*	Endangered	No Effect	Not present
Interior least tern	*Sternula antillarum*	Endangered	NLAA	Conservation measures adequate
Piping plover	*Charadrius melodus*	Threatened	NLAA	Conservation measures adequate
Whooping crane	*Grus americana*	Endangered	NLAA	Conservation measures adequate
Fish				
Pallid sturgeon	*Scaphirhynchus albus*	Endangered	NLAA	Conservation measures adequate
Topeka shiner	*Notropis topeka*	Endangered	No Effect	Habitat not affected
Invertebrates				
American burying beetle	*Nicrophorus americanus*	Endangered	MALAA	Habitat and individuals adversely affected
Plants				
Blowout penstemon	*Penstemon haydenii*	Endangered	NLAA	Habitat will be avoided
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	NLAA	Conservation measures adequate

[1] NLAA – May affect, not likely to adversely affect
MALAA – May affect, likely to adversely affect.

BIOLOGICAL OPINION

Description of the Proposed Action

The Federal Action under consideration is the potential issuance by the Department of a Presidential Permit to authorize the crossing of the United States-Canada border by a crude oil transmission system that extends from an oil supply hub near Hardisty, Alberta, Canada, and crosses the states of Montana, South Dakota, and Nebraska before it ends at Steele City, Nebraska (Figure 1). From Steele City, crude oil is then transported via existing pipelines to destinations in the United States. The project also includes an ancillary facility (rail siding and pipe storage location) in North Dakota and the construction of two pumping stations in Clay and Butler counties in Kansas along the existing Keystone Cushing Pipeline Extension. The scope of the proposed Presidential Permit would be for construction, connection, operation, and maintenance of the proposed Keystone XL pipeline and its associated facilities.

Keystone has applied to the Department for a Presidential Permit for the construction, connection, operation, and maintenance of the proposed Project pipeline and associated facilities at the border of the United States for importation of crude oil from Canada. The Department receives and considers such applications for Presidential Permits for facilities to transport petroleum, petroleum products, coal, and other fuels transmission projects pursuant to the President's constitutional authority, which authority the President has delegated to the Department in Exec. Order No. 13337, as amended (69 Fed. Reg. 25299). Under Exec. Order No. 13337, the Secretary of State may issue a Presidential Permit for a border crossing facility if he finds that issuing such a permit would be in the "national interest." Exec. Order No. 13337 also specifies a process for the Department to seek the views from certain other agencies on whether issuing a permit would be in the national interest. It was determined in consultation with other agencies (including BLM and the United States Army Corps of Engineers [USACE]) that the Department would act as the lead federal agency for the environmental review of the proposed Project consistent with National Environmental Policy Act (NEPA). Consequently, the Department is also the lead agency consulting with the USFWS consistent with Section 7 of the ESA.

Several federal agencies are cooperating agencies with the Department, and involved in some capacity with the proposed Project. The proposed Project would affect numerous rivers and wetlands, thus the USACE would issue Section 404 permits as necessary. Because the proposed Project would cross both public and private lands, the BLM would evaluate the proposed Project and decide whether to grant Keystone an ROW across those federal lands pursuant to ROWs under the Mineral Leasing Act (43 C.F.R. Part 2880). These federal lands principally include 43 miles of pipeline ROW in Montana, but the proposed pipeline would also cross or go under Bureau of Reclamation facilities on federal land in Montana and on private land in South Dakota. Western would own a small section of a 230-kV transmission line in southern South Dakota. This line would supply upgraded load capacity and support voltage requirements for pump stations 20 and 21 (in Tripp County, South Dakota) in the future if the proposed pipeline were to operate at full capacity sometime in the future. Finally, the Rural Utilities Service of the Department of Agriculture would provide grants to help fund construction of some of the power distribution lines that may be built to provide power to the proposed pipeline pump stations.

Project Description, Location, and Overview

From north to south, the proposed Project consists of approximately 1,204 miles of new, 36-inch diameter pipeline, with 329 miles in Canada and 875 miles in the United States from Morgan, Montana to Steele City, Nebraska. In the United States, the proposed Project would be constructed in 10 parts or 10 mainline spreads, varying in length between approximately 80 and 94 miles each, in 2014 and 2015 (Table 1) (DOS 2012). The proposed Project would involve the construction of facilities ancillary to the pipeline including pumping stations, main line valves, access roads, rail siding and pipe storage yards (Table 2) (DOS 2012).

Land Requirements

Surface disturbance associated with the construction and operation of the proposed Project by state is summarized on Table 3. Approximately 16,277 acres of land would be disturbed during construction of the proposed facilities in Montana, North Dakota, South Dakota, Nebraska, and Kansas. After construction, the temporary ROW (approximately 10,693 acres) would be restored and returned to its previous land use. After construction is complete, approximately 5,584 acres would be retained as permanent ROW and for permanent ancillary facilities. All disturbed acreage would be restored and returned to its previous aboveground land use after construction, except for approximately 286 acres of permanent ROW, which would not be restored but would serve to provide adequate space for aboveground facilities including pump stations and valves, for the life of the proposed pipeline, which is 50 years.

Pipeline Right-of-Way

The installation of the proposed 36-inch diameter pipeline would occur within a 110-foot-wide construction ROW, consisting of a 60-foot temporary construction ROW and a 50-foot permanent ROW. The construction ROW would be reduced to 85 feet in certain areas to avoid and minimize impacts on habitat for threatened and endangered species, wetlands, cultural sites, shelterbelts, residential areas, and commercial/industrial areas.

Additional Temporary Workspace Areas

In addition to the typical construction ROW, Keystone has identified typical types of additional temporary workspace areas (TWAs) that would be required. These include areas requiring special construction techniques (e.g., river, wetland, and road/rail crossings, horizontal directional drilling (HDD), entry and exit points, steep slopes, and rocky soils) and construction staging areas. These preliminary areas have been used to quantify impacts covering about 1,206 acres for the proposed Project.

Pipe Stockpile Sites, Railroad Sidings, and Contractor Yards

Extra workspace areas outside of the temporary construction ROW covering approximately 1,805 acres would be required during the construction of the proposed Project to serve as pipe storage sites, railroad sidings, and contractor yards (Table 4) (DOS 2012). Pipe stockpile sites along the pipeline route have typically been identified in proximity to railroad sidings. To the extent practical, Keystone would use existing commercial/industrial sites or sites that previously were used for construction. Existing public or private roads would be used to access each yard. Both

pipe stockpile sites and contractor yards would be used on a temporary basis and would be restored, as appropriate, upon completion of construction.

Construction Camps

Some areas within Montana, South Dakota, and Nebraska do not have sufficient temporary housing in the proposed route vicinity for all construction personnel working in those areas. Temporary work camps would be constructed to meet the workforce housing needs in these remote locations. A total of eight temporary construction camps would be established (Table 5) (DOS 2012).

Table 1. Pipeline construction spreads associated with the proposed Project

State	Miles by State	County	Spread Number	Location (Mile Post)	Approximate Length of Construction Spread (Miles)
Montana	285.65	Phillips, Valley	Spread 1	0-90	90
		Valley, McCone	Spread 2	90-151.48	61.48
		McCone, Dawson	Spread 3	151.48-197.68	46.2
		Dawson, Prairie, Fallon	Spread 4	197.68-288.63	90.95
South Dakota	315.29	Harding			
		Harding, Butte, Perkins, Meade	Spread 5	288.63-410.75	122.12
		Meade, Pennington	Spread 6	410.75-500.44	89.69
		Haakon, Jones			
		Jones, Lyman, Tripp	Spread 7	500.44-598.86	98.42
		Tripp	Spread 8	598.86-691.78	92.92
Nebraska	274.44	Tripp, Keya Paha, Boyd, Hold, Antelope			
		Antelope, Boone, Nance, Merrick, Polk	Spread 9	691.78-775.67	83.89
		Polk, York, Fillmore, Saline, Jefferson	Spread 10	775.67-875.38	99.71

Source: exp Energy Services Inc. 2012

Table 2. Description of proposed Project facilities by State.

Segment/State	Ancillary Facilities
Montana	6 pump stations, 25 main line valves (MLVs), 84 access roads
North Dakota	Rail siding, pipe storage yard
South Dakota	7 pump stations, 13 MLVs, 59 access roads
Nebraska[a]	5 pump stations, 4 MLVs, 48 access roads
Kansas	2 pump stations

[a] There were four MLVs proposed in the Final EIS for the proposed route. Other Nebraska valve locations are being determined at this time. The total number of pump stations and access roads has been preliminarily identified based on the proposed route.

Table 3. Summary of Lands Affected for the Proposed Project

		Lands Affected (Acres)	
State	**Facility**	**Construction**	**Operation**
Montana	Pipeline ROW	3,784.42	1,727.75
	Additional Temporary Workspace Areas	518.64	0.00
	Pipe Stockpile Sites, and Contractor Yards	517.28	0.00
	Construction Camp	242.88	0.00
	Pump Stations and Delivery Facilities	65.79	65.79
	Access Roads	337.03	47.41
	Rail Sidings[a] (3 Sites)	60.00	0.00
	Montana Subtotal	5,526.05	1,840.95
South Dakota	Pipeline ROW	4,153.37	1,906.83
	Additional Temporary Workspace Areas	460.37	0.00
	Pipe Stockpile Sites, and Contractor Yards	605.07	0.00
	Construction Camp	250.04	0.00
	Pump Stations and Delivery Facilities[b]	65.63	65.63
	Access Roads	222.96	24.34
	Rail Sidings[a] (3 Sites)	60.00	0.00
	South Dakota Subtotal	5,817.44	1,996.80
North Dakota	Pipeline ROW	0.00	0.00
	Additional Temporary Workspace Areas	0.00	0.00

		Lands Affected (Acres)	
State	**Facility**	**Construction**	**Operation**
	Pipe Stockpile Sites, and Contractor Yards	56.05	0.00
	Construction Camp	0.00	0.00
	Pump Stations and Delivery Facilities[b]	0.00	0.00
	Access Roads	0.00	0.00
	North Dakota Subtotal	56.05	0.00
Nebraska	Pipeline ROW	3,637.41	1,663.68
	Additional Temporary Workspace Areas	226.88	0.00
	Pipe Stockpile Sites, and Contractor Yards[c]	680.00	0.00
	Construction Camp[c]	80.00	0.00
	Pump Stations and Delivery Facilities[b]	67.12	67.12
	Access Roads	70.50	0.00
	Rail Sidings[a]	100.00	0.00
	Nebraska Subtotal	4,001.91	1,730.80
Kansas	Pipeline ROW	0.00	0.00
	Additional Temporary Workspace Areas	0.00	0.00
	Pipe Stockpile Sites, and Contractor Yards	0.00	0.00
	Construction Camp	0.00	0.00
	Pump Stations and Delivery Facilities[b]	15.15	15.15
	Access Roads	0.00	0.00
	Rail Sidings[a]	0.00	0.00
	Kansas Subtotal	15.15	15.15
Total =		**16,277.60**	**5,583.78**

[a] Rail siding acreage represents 20 acres for each site. Total acreage for rail sidings = 140 acres.

[b] Pump station acreages are a nominal number set at 15 acres. Except PS-26, actual acreage was used (7.12 acres).

[c] These are estimated acreages; locations have not been finalized at this time.

Table 4. Locations and acreages of pipe storage sites, railroad sidings, and proposed contractor yards.

State	County	Type(s) of Yards	Number of Yards	Combined Acreage
Montana	Dawson, McCone, Valley, Fallon	Contractor Yards	5	161
	Roosevelt, Sheridan, Prairie	Rail Sidings[a]	3	60
	Phillips, Dawson, McCone, Valley, Fallon	Pipe Yard Stockpile Sites	9	283
South Dakota	Tripp, Haakon, Jones	Contractor Yards	7	258

State	County	Type(s) of Yards	Number of Yards	Combined Acreage
	Hughes, Lyman, Pennington	Rail Sidings[a]	3	60
	Tripp, Haakon, Jones	Pipe Yard Stockpile Sites	11	347
North Dakota	Bowman	Pipe Yard Stockpile Sites	1	56
Nebraska	Fillmore, Greeley, Holt, Jefferson, Merrick, York	Contractor Yards	8	233
	Butler, Hamilton, Holt, Jefferson, Valley	Rail Sidings	5	100
	Antelope, Boone, Fillmore, Hamilton, Holt, Jefferson, Keya Paha, Nance	Pipe Yard Stockpile Sites	11	447
Kansas	NA	NA	NA	NA
		TOTAL		1,805

[a] Nominal Acreage of 20 acres each assigned to rail sidings.

The total acreage for the seven camps planned in Montana and South Dakota for which acreage is known equals 493 acres. Keystone is also proposing and investigating the possibility of building a temporary construction camp at a suitable location in Holt County in northern Nebraska, which would be an additional 80 acres raising the total amount to 573 acres. Camp decommissioning would be accomplished in two stages. First, all infrastructure systems would be removed and either hauled away for reuse, recycled, or disposed of in accordance with regulatory requirements. Each site would then be restored and reclaimed in accordance with permit requirements and the applicable procedures described in Keystone's Construction, Mitigation, and Reclamation Plan (CMRP) (Appendix B, DOS 2012).

Table 5. Locations and acreages of proposed construction camps.

State	County	Type(s) of Yards	Number of Yards	Combined Acreage
Montana	McCone, Valley (2), Fallon	Contractor Camps	4	243[1]
South Dakota	Tripp, Harding, Meade	Contractor Camps	3	250
North Dakota	NA	NA	NA	NA
Nebraska	Holt	Contractor Camp	1	80
Kansas	NA	NA	NA	NA
		TOTAL		573

[a] Additional camp in Valley County has not yet been sited, acreage TBD.

Access Roads

The proposed Project would use public and existing private roads to provide access to most of the construction ROW (DOS 2012). Approximately 191 temporary access roads would be needed to provide adequate access to the construction sites. Private roads and any new temporary access roads would be used and maintained only with permission of the landowner or the appropriate land management agency. Temporary and permanent disturbance estimates for access roads are based on the 30-foot roadway width required to accommodate oversized vehicles. In developing the disturbance acreages, all non-public roads were conservatively estimated to require upgrades and maintenance during construction.

Aboveground Facilities

The proposed Project would require approximately 286 acres of land, other than permanent ROW, along the proposed Project segments for aboveground facilities, including pump stations, densitometer sites, intermediate MLVs, and delivery facilities (see Table 3) (DOS 2012).

Pump Stations

New pump stations, each situated on approximately 15-acre sites, would be constructed for the proposed Project. Each new pump station would consist of up to six pumps driven by electric motors, an electrical equipment shelter, a variable frequency drive equipment shelter, an electrical substation, one sump tank, a remotely operated MLV, a communication tower (approximately 33 feet in height), a small maintenance building, and a parking area for station maintenance personnel. Stations would operate on locally purchased electric power and would be fully automated for unmanned operation. Power lines would need to be constructed by local power providers to provide electrical service to pumping stations (Table 6)

Table 6. Summary of power supply requirements for the Keystone XL Pump Stations

Pump Station Number	Approximate Milepost	Transformer Size (MVA)	Utility Supply (kV)	Length (miles)	Power Provider
Montana					
PS-09	1.2	20/27/33	115	61.8	Big Flat Electric Cooperative
PS-10	49.3	20/27/33	115	49.1	NorVal Electric Cooperative
PS-11	99	20/27/33	230	0.2	NorVal Electric Cooperative
PS-12	151.5	20/27/33	115	3.2	McCone Electric Cooperative
PS-13	203.1	20/27/33	115	15.2	Tongue River Electric Cooperative
PS-14	239.5	20/27/33	115	6.3	Montana-Dakota Utilities Company
South Dakota					
PS-15	288.6	20/27/33	115	24.5	Grand Electric Cooperative
PS-16	337.3	20/27/33	115	40.1	Grand Electric Cooperative
PS-17	391.5	20/27/33	115	10.9	Grand Electric Cooperative

Pump Station Number	Approximate Milepost	Transformer Size (MVA)	Utility Supply (kV)	Length (miles)	Power Provider
PS-18	444.6	20/27/33	115	25.9	West Central Electric Cooperative
PS-19	500.4	20/27/33	115	20.4	West Central Electric Cooperative
PS-20	550.9	20/27/33	115	17.2	Rosebud Electric Cooperative
PS-21	598.9	20/27/33	115	20.1	Rosebud Electric Cooperative
Nebraska					
PS-22	653.6	20/27/33	115	24	Nebraska Public Power District (NPPD) & Niobrara Valley Electric
PS-23	708.2	20/27/33	115	36	NPPD & Loup Valleys Rural PPD
PS-24	765	20/27/33	115	9	NPPD & Southern Power District
PS-25	818.4	20/27/33	69	1.0	Perennial PPD
PS-26	875.3	20/27/33	115	0.5	NPPD & Norris PPD
Kansas					
PS-27	49	20/27/33	115	4.6	Clay Center Public Utility
PS-29	144.5	20/27/33	115	8.9	Westar Energy

MVA = megavolt-amperes (million volt-amperes), kV = kilovolt.

Note: Mile posting for each segment of the proposed Project starts at 0.0 at the northernmost point of each segment and increases in the direction of oil flow.

Mainline Valves

Keystone proposes to construct 44 intermediate MLV sites along the new pipeline ROW. Intermediate MLVs would be sectionalizing block valves generally constructed within a fenced, 50 by 50-foot site located on the permanent easement. Remotely operated intermediate MLVs would be located at major river crossings and upstream of sensitive waterbodies and at intermediate locations. Additional remotely operated MLVs would be located at pump stations. These remotely operated valves can be activated to shut down the pipeline in the event of an emergency to minimize environmental impacts in the event of a spill.

Restoration

Construction debris on the ROW would be disposed of and work areas would be final-graded. Preconstruction contours would be restored as closely as possible. Topsoil would be spread over the ROW surface and permanent erosion controls would be installed. After backfilling, final cleanup would begin as soon as weather and site conditions permit. Preliminary cleanup would be completed within approximately 20 days after the completion of backfilling assuming appropriate weather conditions prevail (approximately 10 days in residential areas). Construction debris would be cleaned-up and taken to an appropriate disposal facility.

After permanent erosion control devices are installed and final grading complete, all disturbed work areas except annually cultivated fields would be seeded as soon as possible. Timing of the reseeding efforts would depend on weather and soil conditions and would be subject to the

prescribed rates and seed mixes specified by the landowner, land management agency, or NRCS recommendations. On agricultural lands, seeding would be conducted only as agreed upon with the landowner. In addition, landowners would be asked to report on areas where seeds may have not germinated or erosion has appeared. Keystone would then dispatch crews to repair and address the issues. Once operation begins, Keystone is required to monitor the pipeline at least 26 times per year at intervals not to exceed three weeks for revegetation following construction disturbance, erosion, other human activities occurring near the pipeline, and potential leaks. The ROW would be inspected after the first growing season to determine revegetation success and noxious weed control. Eroded areas would be repaired and areas that were unsuccessfully re-established would be revegetated by Keystone or Keystone would compensate the landowner for reseeding.

Waterbody Crossings

Perennial waterbodies would be crossed using one of four techniques: the open-cut wet method (the preferred method), dry flume method, dry dam-and-pump method, or hydraulic directional drilling (HDD). Each method is described below. In the final design phase of the proposed Project, qualified personnel would assess waterbody crossings with respect to the potential for channel aggradation or degradation and lateral channel migration. The level of assessment for each crossing would vary based on the professional judgment of the qualified design personnel.

The pipeline would be installed as necessary to address any hazards the assessment identifies. The pipeline would be installed at the design crossing depth for at least 15 feet beyond the design lateral migration zone, as determined by qualified personnel. The crossing design also would include the specification of appropriate stabilization and restoration measures. The actual crossing method employed at a perennial stream would depend on permit conditions from USACE and other relevant regulatory agencies, as well as additional conditions that may be imposed by landowners or land managers at the crossing location.

Sediment barriers such as silt fence and staked straw bales would be installed and maintained on drainages across the ROW adjacent to waterbodies and within additional TWAs to minimize the potential for sediment runoff. Silt fence and straw bales located across the working side of the ROW would be removed during the day when vehicle traffic is present and would be replaced each night. Alternatively, drivable berms could be installed and maintained across the ROW in lieu of a silt fence.

In general, equipment refueling and lubricating at waterbodies would take place in upland areas that are 100 feet or more from the water. When circumstances dictate that equipment refueling and lubricating would be necessary in or near waterbodies, Keystone would follow its Spill Prevention Control and Countermeasures Plan (SPCCP) to address the handling of fuel and other hazardous materials (DOS 2012, Appendix D). The purpose of the SPCCP is to establish procedures to prevent the discharge of hazardous or regulated materials during construction of the proposed Project. The SPCCP is designed to reduce the likelihood of a spill, provide for prompt identification and proper removal of contaminated materials if a spill does occur, comply with applicable State and Federal laws and Project permits, and to protect human health and the environment (DOS 2012, Appendix D).

After the pipeline is installed beneath the waterbody, restoration would begin. Waterbody banks would be restored to preconstruction contours or to a stable configuration. Appropriate erosion control measures such as rock riprap, gabion baskets (rock enclosed in wire bins); log walls, vegetated geogrids, or willow cuttings would be installed as necessary on steep banks in

accordance with permit requirements. More stable banks would be seeded with native grasses and mulched or covered with erosion control fabric. Waterbody banks would be temporarily stabilized within 24 hours of completing in-stream construction. Sediment barriers, such as silt fences, straw bales, or drivable berms would be maintained across the ROW at all waterbody approaches until permanent vegetation is established. Temporary equipment bridges would be removed following construction.

Wetland Crossings

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory maps were used by Keystone to identify wetlands crossed by the proposed pipeline. Pipeline construction across wetlands would be similar to typical conventional upland cross-country construction procedures, with several modifications where necessary to reduce the potential for pipeline construction to affect wetland hydrology and soil structure. The directional drilling technique may be considered in certain site-specific wetland conditions due to the presence of special-status plant or wildlife species or other factors and will be determined during the Clean Water Act Section 404 permitting process in consultation with the appropriate state USFWS Ecological Services Field Office.

The wetland crossing method used would depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated at the time of construction and can support construction equipment without equipment mats, construction would occur in a manner similar to conventional upland cross-country construction techniques. Construction equipment working in saturated wetlands would be limited to that area essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where there is no reasonable access to the ROW except through wetlands, non-essential equipment would be allowed to travel through wetlands only if the ground is firm enough or has been stabilized to avoid rutting.

Where wetland soils are saturated or inundated, the pipeline can be installed using the push-pull technique. The push-pull technique involves stringing and welding the pipeline outside the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. The prefabricated pipeline is installed in the wetland by equipping it with floats and pushing or pulling it across the water-filled trench. After the pipeline is floated into place, the floats are removed and the pipeline sinks into place. Most pipe installed in saturated wetlands would be coated with concrete or installed with set-on weights to provide negative buoyancy. Final locations requiring weighted pipe for negative buoyancy would be determined by detailed design and site conditions at the time of construction.

Decommissioning

The Pipeline Hazardous Material Safety Administration (PHMSA) has requirements that apply to decommissioning crude oil pipelines in 49 C.F.R. §§ 195.402(c) (10), 195.59, and 195.402. These regulations require that for hazardous liquid pipelines, the procedural manuals for operations, maintenance, and emergencies must include procedures for abandonment, including safe disconnection from an operating pipeline system, purging of combustibles, and sealing abandoned facilities left in place to minimize safety and environmental hazards (49 C.F.R. § 195.402). Further, these regulations require that for each abandoned onshore pipeline facility that crosses over, under, or through a commercially navigable waterway, the last operator of that facility must

file a report with PHMSA upon abandonment of that facility. The report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

Keystone will adopt operating procedures to address these requirements for the proposed Project as they have for previous pipeline projects including the existing Keystone Pipeline mainline. TransCanada typically does not abandon large-diameter pipelines but generally idles or deactivates pipe as market conditions dictate. This allows a dormant pipeline to be reactivated or converted to another purpose in the future, subject to applicable regulatory approvals. When a pipeline or a segment of a pipeline is idled or deactivated, the pipe generally is purged of its contents, filled with an inert gas, and left in place with warning signage intact. Cathodic protection (a measure used to prevent corrosion by causing a metallic structure, such as a pipeline, to act as a cathode) would be left functional as would other integrity measures such as periodic inspections under the integrity management plan. Prior to decommissioning the proposed Project, Keystone would identify the decommissioning procedures it would use along each portion of the route, identify the regulations it would be required to comply with, and submit applications for the appropriate environmental permits. At that point, Keystone and the issuing agencies would address the environmental impacts of implementing the decommissioning procedures and identify the mitigation measures required to avoid or minimize impacts.

Normal Operations

Keystone would develop and implement an annual Pipeline Maintenance Program (PMP) to ensure the integrity of the pipeline. The PMP would include valve maintenance, periodic inline inspection, and a cathodic protection program to ensure pipeline reliability. Data collected in each year of the program would be fed back into the decision-making process for the development of the following year's program (DOS 2012). The Project Operation Control Center (OCC) would be manned by experienced and highly trained personnel 24 hours per day, every day of the year in Calgary. In addition, a fully redundant backup OCC would be constructed, operated, and maintained, also in Canada. Primary and backup communications systems would provide real-time information from the pump stations to the OCC (DOS 2012). The control center would have highly sophisticated pipeline monitoring systems including multiple leak detection systems capable of identifying abnormal conditions and initiating visual and audible alarms. Automatic shut-down systems would be initiated if a valve starts to shut and all pumps upstream would turn off automatically.

The proposed Project would include a supervisory control and data acquisition (SCADA) system to constantly monitor the pipeline system (DOS 2012). The SCADA system would be installed and operated in accordance with the requirements of 49 C.F.R. § 195 and PHMSA. The SCADA facilities would be located in the OCC and along the pipeline system, and all pump stations and delivery facilities would have communication software that sends data back to the OCC. The pipeline SCADA system would allow the OCC to remotely read intermediate MLV positions, tank levels, and delivery flow and total volume. The OCC personnel would also be able to start and stop pump stations and open and close automated MLVs.

The pipeline ROW would be inspected via aerial and ground surveillance to provide prompt identification of possible encroachments or nearby construction activities, ROW erosion, exposed pipe, or any other conditions that could result in damage to the pipeline. The aerial surveillance of the pipeline ROW must be carried out at least 26 times per year and the interval between surveillance cannot exceed 3 weeks as required by 49 C.F.R. § 195.412. Landowners would be encouraged to report any pipeline integrity concerns to Keystone or to PHMSA. Intermediate MLVs and MLVs at pump stations would also be inspected. As required by 49 C.F.R. § 195.420(b), they would be inspected at intervals not to exceed 7.5 months but at least twice each calendar year (DOS 2012).

Routine Maintenance

Routine maintenance would include periodic ROW mowing in non-agricultural areas, ROW tree clearing, aerial and ground patrols of the ROW, periodic inspections of operating equipment on the ROW (e.g., MLVs, pump stations), and potential excavation of the proposed pipeline within the first 6 months to 2 years for coating and other inspections.

If Keystone would need to repair or replace a portion of the proposed pipeline or replace aboveground facilities in the ROW, appropriate agencies would be consulted prior to initiating that maintenance work. If an emergency or spill from the proposed pipeline occurs, Keystone would respond to the spill or emergency and then address any impacts in accordance with the Spill Prevention Control and Countermeasures Plan. Impacts to natural resources could be covered under a Natural Resource Damage Assessment conducted by the trustees, including the USFWS and other agencies.

The ROW would be monitored to identify any areas where soil productivity has been degraded as a result of pipeline construction, and restoration measures would be implemented to rectify any such concerns.

Conservation Measures

Conservation measures are actions that benefit or promote the recovery of listed species that are included by the Department as an integral part of the proposed Project. Conservation measures also have been identified below that would contribute to the conservation of the greater sage-grouse and Sprague's pipit. All of these conservation measures will be implemented by the applicant or power providers where specified, and serve to avoid, minimize, or compensate for Project effects on the species under review thereby supporting concurrence by the USFWS of a NLAA for all of the following species except the ABB and candidate species. General conservation measures applicable to all species are listed below followed by species-specific conservation measures for the species under consideration in this BO.

General Conservation Measures

- All equipment maintenance and repairs will be performed in upland locations at least 100 feet from all water bodies and wetlands.
- Refueling and lubrication of construction equipment will be restricted to upland areas at least 100 feet away from streams and wetlands.
- All equipment would be parked overnight at least 100 feet from a watercourse or wetland.

- Equipment will not be washed in streams or wetlands.
- Spills of fuel and other hazardous materials will be cleaned-up immediately in accordance with the SPCCP and hazardous wastes associated with spills and leaks will be disposed of in accordance with applicable laws and regulations (DOS 2012, Appendix D).
- Each construction and cleanup crew will have on site, sufficient tools and materials to stop leaks including supplies of absorbent and barrier materials that would allow for rapid containment and recovery of spilled materials.
- Keystone would mark and maintain a 100-foot area from river crossings, free from all hazardous materials, fuel storage, and vehicle fuel transfers. These buffers would be maintained during construction except when fueling and refueling the water pump near the river edge that is required for the HDD crossing and hydrostatic test water withdrawal. Water pump fueling will be completed by trained personnel, secondary containment will be used, and a spill kit will be onsite.

Black-footed Ferret

Keystone or power providers where specified have committed to incorporating the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the black-footed ferret from construction in Montana. The USFWS believes that there is no suitable habitat for the species along the proposed Project; however, the following measures have been adopted in the event that a black-footed ferret is detected:

- Provide USFWS with the results of the Montana prairie dog town surveys and continue to coordinate with the Montana USFWS Ecological Services Office to determine the need for black-footed ferret surveys, in accordance with the USFWS's Black-footed Ferret Survey Guidelines (USFWS 1989).
- Complete surveys to identify prairie dog colonies in Fallon County, Montana consistent with the Final EIS to determine if any Category 3 colonies or complexes occur and could be avoided.
- Workers will not be allowed to keep domestic pets in construction camps and/or worksites.
- Workers will be made aware of how canine distemper and sylvatic plague diseases are spread (domestic pets and fleas).
- Workers will not be allowed to feed wildlife.
- Concentrations of dead and/or apparently diseased animals (e.g., prairie dogs, ground squirrels, others) would be reported to the appropriate state and federal agencies.
- Pump Station 9 (Montana): Big Flat Electric Cooperative will provide immediate notification to the USFWS in the unlikely event that a black-footed ferret is sighted during the course of power line construction.

Interior Least Tern

Keystone or power providers where specified have committed to incorporating the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the interior least tern:

- Major rivers that contain interior least tern habitat including the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone and Missouri rivers in Montana, will be crossed using the HDD method.
- HDD boring under the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone River in Montana will result in a pipeline burial depth of 25 feet or greater below the river bed.
- Pre-construction surveys will occur within 0.25-mile from suitable breeding habitat at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana during the nesting season (from May 1 through September 1) to ensure that there are no nesting terns within 0.25-mile of the construction area. Daily surveys for nesting terns would be conducted during the nesting season when construction activities occur within 0.25-mile of potential nesting habitat.
- If interior least tern nests are found at the crossings, then Keystone would: 1) adhere to the 0.25-mile buffer of no pipeline construction activity and 2) continue to monitor nests if any are within 0.25-mile of the construction footprint until young have fledged.
- Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances.
- Down shielding of lights will be used should HDD occur at night should the HDD site lack vegetative screening, and an active interior tern nest is located within 0.25 mile from the HDD site.
- Pump Station 24 (Nebraska): The Nebraska Public Power District agrees to complete nest surveys for interior least terns within an area 0.25-mile upstream and downstream of the proposed river crossing location if construction is expected to take place during the nesting period. Construction would halt if active nests are identified within 0.25-mile of the Platte River crossing area until such time that chicks and adults leave the nest area and nesting is concluded.
- The Nebraska Public Power District will install spiral bird flight diverters on the shield wire on the line span between the banks at the Platte River crossing and one span on each side of the crossing.

Whooping Crane

Keystone or power providers where specified have committed to incorporate the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the whooping crane:

- During spring and fall whooping crane migration periods, environmental monitors will complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment following the Whooping Crane Survey Protocol developed by the USFWS and NGPC and applied to all projects when located near whooping crane habitat (USFWS 2012b) (Appendix F). If whooping cranes are sighted during the morning survey or at any time of the day, the environmental monitor

will immediately contact the USFWS and respective state agency in Nebraska, South Dakota, North Dakota, and/or Montana for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time, and work start time on the survey form. The USFWS would notify the compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program.

- Lights will be down-shielded should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat.
- Pump Station 9 (Montana): Big Flat Electric Cooperative will install avian markers and deflectors within 0.25-mile of the Milk River that will be traversed by the power line to pump station 9. The USFWS will be contacted should a whooping crane be spotted in the area of the proposed power line construction site.
- Pump Station 10 (Montana): NorVal Electric Cooperative will install bird flight diverters (BFD) in all locations where the power line comes within 0.25-mile on either side of the Milk River. Additionally, BFDs will be installed for 0.25-mile on either side of two unnamed reservoirs crossed by the proposed power line.
- Pump Station 14 (Montana): Montana Dakota Utilities will install BFDs on the static line at 50 foot spacing within 0.25-mile of Pennel Creek and within 0.25-mile of a pond located in the northwest corner of section 35, T9 North, Range 58 East.

  If a whooping crane is sighted on the ground within the transmission line project area during construction, Montana Dakota Utilities will cease construction and contact the USFWS.
- Pump Station 12 (Montana): McCone Electric Cooperative will install avian markers within 0.25-mile of Buffalo Springs Creek and the Redwater River in accordance with Avian Power Line Interaction Committee (APLIC) standards (APLIC 2012). If whooping cranes are sighted during fall and spring migrations, McCone Electric Cooperative will delay all work activity until whooping cranes have left the area and immediately contact the USFWS and MFWP for further instruction.
- Pump Station 20 (South Dakota): A total of 636 BFDs will be installed by Rosebud Electric Cooperative Inc. at three wetland areas located along the proposed power line alignment to avoid and minimize risk of collision by whooping cranes near wetland foraging and roosting habitats. Installation of BFDs will be done in accordance with specific marking locations as previously recommended by the USFWS at these three wetland areas located at Township 101 North, Range 77 West, Section 17 and the SE ¼ Section 32, and Township 100 N Range 78 West, section 10, NW1/4 Section 15.
- Pump Station 21 (South Dakota): A total of 557 BFDs will be installed by Rosebud Electric Cooperative Inc. to avoid and minimize risk of collision by whooping cranes near wetland foraging and roosting habitats. Installation of BFDs will be done in accordance with specific marking locations as previously recommended by the USFWS at these wetland areas located at Township 97 North, Range 73 West SW ¼ of section 25 and Township 95 North, Range 73 West, Sections 16 and 17.

- Pump Station 22, 23, 24, and 26 (Nebraska): The Nebraska Public Power District will complete a field review with USFWS and NGPC to determine if any areas are present with a higher probability of whooping crane use (i.e., wetlands or large ponded areas (stock ponds), meadows, and obvious flight corridors to and from such areas to feeding habitats). Spiral BFDs will be installed, consistent with APLIC standards (APLIC 2012), in appropriate areas as identified in the field review.

  The Nebraska Public Power District will complete daily presence/absence whooping crane surveys according to protocol (found in Appendix F) if construction occurs during the spring and fall migration periods in areas where such surveys are agreed to be appropriate and necessary to avoid disturbance. Should a whooping crane (s) be sighted within 0.5-mile of a work area, all work will cease until the whooping crane (s) leaves that immediate area. The USFWS and NGPC will be contacted immediately and notified of the presence of whooping crane(s).

- Pump Station 27 (Kansas): Westar Energy will install BFDs to prevent avian collisions where the power line crosses the Republican River even though an evaluation of whooping crane use indicated that it was unlikely that the species would be found in this area.

Pallid sturgeon

Keystone or power providers where specified have committed to incorporating the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the pallid sturgeon:

- Keystone will use HDD to cross the Missouri, Yellowstone, and Milk rivers where pallid sturgeons are known to occur.
- Keystone will ensure that HDD boring will result in a burial depth of 25 feet or greater below the river bed in the Missouri, Yellowstone, and Milk rivers.
- Keystone will ensure that the intake end of the pump will be screened to prevent entrainment of larval fish or debris and the intake screens will be periodically checked for fish entrainment when pumping from the Missouri, Yellowstone, and Milk rivers in Montana. Mesh size of the screen will be 0.125-inch and have an intake velocity of less than 0.5 foot/second to avoid larval entrainment and juvenile fish impingement and entrapment. Should a sturgeon become entrained, impinged, or entrapped all pumping operations will immediately cease and the compliance manager for Keystone would immediately contact the USFWS to determine if additional protection measures would be required. The conservation measure is in effect for pumping operations including HDD and hydrostatic testing.
- Keystone will maintain at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings on the Yellowstone, Missouri, and Milk rivers in Montana.
- Pump Station 10 (Montana): NorVal Electric Cooperative will not cross the Milk River with equipment. No disturbances will occur along the river banks or its associated vegetation where the power line crossing would occur.

American Burying Beetle

Keystone or power providers where specified have committed to incorporate the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the ABB:

- Construction camp near Winner, South Dakota will be built on agricultural land in coordination with USFWS.
- Two pipe stockpile sites planned for Tripp County will be placed on agricultural land in coordination with USFWS.
- When working in suitable ABB habitat in Tripp, Keya Paha, and Holt counties, all parking and staging areas will be pre-located within the approved construction footprint.
- Vehicle traffic used in support of preconstruction activities will be confined to approved access roads.
- Construction methods will be used involving sequential replacement of topsoil and re-establishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to ABB habitat.
- Prior to construction disturbance and grading for the ROW, capture and relocation of ABB will be implemented only in Nebraska where access is available to remove adult beetles from the construction ROW in accordance with the Nebraska ABB Trapping Protocol (USFWS and NGPC 2008; Appendix K, American Burying Beetle Trapping Protocol and Conservation Measures for Use in Nebraska). Capture and relocation of ABB is not authorized in South Dakota.
- Protective measures at the relocation site such as creating a tunnel in moist soil for each released ABB with a light cover (e.g., a leaf), and not releasing more than 50 ABB at any one site will be implemented to increase the survivability of relocated ABB.
- Mowing and windrowing vegetation will be conducted after the capture and relocation period to temporarily reduce habitat suitability by drying out the soil surface if construction is not planned to be started prior to the next capture and relocate window. Windrowing, which refers to removal of mowed vegetation from an area to avoid accumulation of grass clippings on the soil surface, will be done to remove vegetation residue. Mowing will be done so that vegetation is at most 8 inches in height. Mowing and windrowing will be implemented only in Nebraska. Mowing and windrowing cannot be used in South Dakota as an avoidance and minimization measure because of concerns there about habitat loss for other species, including grassland birds.
- After the capture and relocation efforts are completed, the ROW will be disturbed (graded) prior to the next June ABB active period in Nebraska (e.g., capture and relocate efforts take place during the August active period, and the ROW disturbance would take place prior to the following June active period). June and August active periods are times when ABB are active and above ground. Adult, reproductive ABB are active and above ground in June; adult and offspring ABB are active and above ground in August.

- In areas where the ROW could not be disturbed (graded) before the next activity period, capture and relocation efforts will be repeated in Nebraska (e.g., capture and relocation efforts would be repeated during the June active period, and the ROW would be disturbed prior to the August active period).
- After capture and relocation efforts are completed in Nebraska, a biologist from Keystone will travel the ROW every couple of days during the ABB active period (June through September) to remove any carcasses that may be present within the ROW that may otherwise be attractive to the ABB.
- Keystone will train all workers operating in ABB habitat and would include discussion of habitat, biology, reasons for their decline, and responsibilities of all workers for the protection of the species (including removing food wastes from the ROW each day, reporting any ABB sightings to an environmental inspector, and avoiding bringing dogs and cats to the ROW). Keystone will produce a full color Endangered Species Card with a picture of the ABB and all of this information summarized on the card. The card will be handed out to all construction workers operating in ABB habitat.
- Signs will be posted at all access points to the ROW highlighting the areas as ABB habitat and reminding workers to follow special restrictions in the area.
- Keystone will down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS in instances when construction activities would occur in suitable habitat areas in Keya Paha, Holt, and Tripp counties to avoid attracting the species to the construction site. Keystone will down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS at ancillary facilities within areas occupied by the ABB.
- Keystone will provide compensation for temporary construction and permanent operations impacts to the ABB as part of a Habitat Conservation Trust (ABB Trust) in areas where the species is likely to be impacted including: southwest of Highway 18 in Tripp County, South Dakota and west of Highway 281 in Keya Paha and Holt counties in Nebraska. The Habitat Conservation Trust would be managed by a nongovernment organization experienced in the management of funds for habitat projects. Funds would be used to acquire land though purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. Compensation would be based on total acres impacted where ABB presence was confirmed in Nebraska (see Appendix D for calculation method). Compensation would be calculated based on total acres impacted and would be modified by habitat quality rating multipliers with prime habitat compensation at 3 times the total impact acres; good habitat at 2 times the total impact acres; fair habitat at 1 times the total impact acres; and marginal habitat at 0.5 times the total impact acres. No compensation would be provided for poor habitat. In Nebraska only, no compensation would be provided for habitat where ABB have not been found.
- In South Dakota, compensation will be provided based only on habitat quality rating multipliers and not ABB survey information. Temporary habitat impacts will be scaled for the period of time anticipated for recovery of vegetation cover at 4 years over the 50-year life of the proposed Project or 8 percent of total calculated impacts. All compensation would be based on habitat ratings and compliant with agreements between the Department, USFWS, and Keystone.

- Keystone will provide funding for compliance monitoring upon issuance of a Presidential Permit and prior to initiating Project construction in South Dakota and Nebraska. The Department will designate USFWS or an agreed-upon qualified third-party that would work with USFWS to ensure that vegetation restoration efforts were successful for ABB habitat, as agreed between the Department, USFWS, and Keystone.
- Keystone will reseed disturbed areas in prime, good, fair, and marginal ABB habitats with a seed mix that corresponds to the appropriate Construction/Reclamation (Con/Rec) unit for that property. Reclamation measure and seed mixes for each Con/Rec are provided in Appendix R of the Supplemental DEIS. Should a landowner-directed seed mix be determined to not result in full restoration as stipulated in the Reclamation Performance Bond then the subject acreage amount reseeded will be debited from temporary ABB habitat impacts and credited to permanent ABB habitat impacts and the total donation amount to the ABB Trust will be recalculated.
- Keystone will set aside funds for a restoration performance bond (see Appendix E for calculation method) upon issuance of a Presidential Permit and prior to initiating Project construction in South Dakota and Nebraska. The bond would be applied to supplemental vegetation restoration that could be necessary if restoration for ABB beetle habitat failed, as agreed between the Department, USFWS, and Keystone.
- Pump Station 22 (Nebraska): The Nebraska Public Power District will schedule line construction activities for this line segment for during the ABB dormant or inactive time in the winter when soil would be frozen to avoid soil compaction (September 15 to April 1). The Nebraska Public Power District will coordinate with USFWS and NGPC to determine appropriate measures to minimize potential impacts if such scheduling cannot be accomplished due to unexpected circumstances, including weather delays.

Piping Plover

Keystone or power providers where specified have committed to incorporating the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the piping plover:

- The Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana will be crossed using the HDD method which would result in a burial depth of 25 feet or greater below the river bed.
- If construction were to occur during the piping plover nesting season (from April 15 through September 1), Keystone would conduct pre-construction surveys within 0.25-mile from suitable nesting habitat at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana to ensure that there are no nesting pairs within 0.25-mile of the construction area. Daily surveys for nesting plovers will be conducted when construction activities occur within 0.25-mile of potential nesting habitat during the nesting season.
- If a piping plover nest(s) are found at the crossings, then Keystone will: 1) adhere to the 0.25-mile buffer of no construction activity and 2) continue to monitor nests if any are within 0.25-mile of the construction footprint until the young have fledged.

- Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting piping plovers in coordination with the USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to piping plover nests or other modifications depending on the circumstances.
- Down shielding of lights will be used should HDD occur at night, should the HDD site lack vegetative screening, and an active piping plover nest is located within 0.25 mile from the HDD sites.
- Pump Station 9 (Montana): Big Flat Electric Cooperative designed and located the power line to this pump station so that it is 3 miles east of any piping plover nesting or habitat areas. If nesting piping plovers are found to be present based on surveys for the species, all construction would cease until piping plover chicks fledge from the site.
- Pump Station 10 (Montana): NorVal Electric Cooperative will install BFD in all locations where the power line comes within 0.25-mile on either side of the Milk River. Additionally, BFDs will be installed for 0.25-mile on either side of two unnamed reservoirs crossed by the proposed power line.
- Pump Station 24 (Nebraska): The Nebraska Public Power District agrees to complete nest surveys for piping plovers within an area 0.25-mile upstream and downstream of the proposed river crossing location if construction is expected to take place during the nesting period. Construction would halt if active nests are identified within 0.25-mile of the Platte River crossing area until such time that chicks and adults leave the nest area.

  The Nebraska Public Power District will install spiral BFDs on the shield wire on the line span between the banks at the Platte River crossing and one span on each side of the crossing.

Western Prairie Fringed Orchid

Keystone or power providers where specified have committed to implementation of the following conservation measures for the western prairie fringed orchid where suitable habitat is present. Habitat suitability surveys will be done by a person who has demonstrated qualifications in completing surveys and is knowledgeable about the habitat requirements for the species. The person selected to conduct surveys will submit documentation of survey qualifications to the USFWS for review and approval.

- Complete habitat suitability surveys prior to construction. Survey results will be submitted to the USFWS for review.
- Keystone will re-route the pipeline around individual plants or populations within the proposed Project footprint to the extent practicable and/or allowed by the landowner. Compensation through a Habitat Conservation Trust will be provided in areas that cannot be avoided.
- Keystone will transplant individual plants that would be affected by construction activities to other locations where suitable habitat is available, when feasible and/or when approved by the land owner if on private land. This action will be done in coordination with USFWS.

- Keystone will reduce the width of the construction ROW, the amount of reduction dependent on the circumstances, in areas where orchid populations have been identified. This will be done in coordination with USFWS.
- Keystone will salvage and segregate topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW.
- Keystone will provide compensation for suitable western prairie fringed orchid habitat in a Habitat Conservation Trust. Areas along the proposed Project where the species is likely to occur include: southwest of Highway 18 in Tripp County, South Dakota and Keya Paha, Holt, Rock, Antelope, and Boone counties in Nebraska. The Habitat Conservation Trust would be managed by a nongovernment organization experienced in the management of funds for habitat projects. Funds would be used to acquire land though purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. Compensation will be based on total acres impacted where suitable western prairie fringed orchid habitat is present regardless of presence/absence survey results. Habitat surveys will be used to evaluate western prairie fringed orchid habitat. Compensation would be calculated based on total acres impacted multiplied by 31 percent, the probability of encountering a western prairie fringed orchid during the course of survey work (NGPC 2013) (see Appendix G for calculation method). A 3:1 habitat mitigation ratio would be applied to the habitat expected to contain WPFO to offset temporal loss of habitat from between the time construction began to the time orchid habitat is fully restored and that figure would be multiplied by the value of an acre of land (Appendix G).
- Keystone will restore and monitor construction-related impacts to wet meadow habitats identified as suitable for the western prairie fringed orchid consistent with USACE guidelines as follows. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. If this seeding cannot be accomplished by September 15 the year of project completion, then an erosion blanket shall be placed on the disturbed areas. The erosion blanket shall remain in place until ground cover of desirable species reaches 75%. If the seeding can be accomplished by September 15, all seeded areas shall be properly mulched to prevent additional erosion.
- Pump Station 22, 23, 24 (Nebraska): The Nebraska Public Power District will complete field surveys for the western prairie fringed orchid during the appropriate bloom periods only in areas along the final line routes that are considered suitable. The Nebraska Public Power District will delineate and mark areas where western prairie fringed orchid habitat is present as “avoidance areas” where placement of structures and construction traffic will not occur.

Greater Sage-Grouse

The Department has coordinated with the USFWS, BLM, MFWP, and the SDGFP to consider the effects of the proposed Project on the greater sage-grouse, including the effects of habitat fragmentation. Several conservation measures would be implemented by Keystone or power providers where specified to avoid, minimize, and compensate for impacts to the sage-grouse. Many of these were described in *An Approach for Implementing Mitigation Measures to Minimize*

the Effects of Construction and Operation of the Keystone XL Pipeline Project on Greater Sage-Grouse (DOS 2012, Appendix O) and *An Approach for Implementing Mitigation Measures to Minimize the Effects of Construction and Operation of the Keystone XL Pipeline Project on Greater Sage-Grouse in South Dakota; and Associated Correspondences* (DOS 2012, Appendix P). In South Dakota, this strategy was supplemented with compensatory mitigation that was outlined in a proposal submitted to SDGFP in November 2011 and revised in November 2012 (DOS 2012, Appendix P). Those measures include the following:

- Surveys will be conducted for greater sage-grouse leks prior to construction using approved methods to determine lek locations and peak number of males in attendance within 3 miles of the facility unless the facility is screened by topography; also surveys will be done for leks as identified by MFWP, BLM, and SDGFP more than 3 miles from the facility for use as a baseline to determine construction effects on sage-grouse abundance.
- A conservation plan will be developed with MFWP, SDGFP, USFWS, and BLM once the Presidential Permit is signed and before Project construction begins in Montana and South Dakota to address impacts to greater sage-grouse, including construction timing restrictions, habitat enhancement, and any mitigation measures that would be necessary to maintain the integrity of Core Areas or Preliminary Priority Habitat/Protection Priority Areas (USFWS 2012b), which encompasses lek habitats as well as other important habitat necessary for greater sage-grouse to meet life requisites (see DOS 2012: Appendices O and P, Sage Grouse Mitigation Plans).
- Protection and mitigation efforts will be followed as identified by MFWP, SDGFP, and USFWS including identification of all greater sage-grouse leks within the buffer distances from the construction ROW set forth for the greater sage-grouse by USFWS, and avoiding or restricting construction activities as specified by USFWS within buffer zones between March 1 and June 15 (see DOS 2012: Appendices O and P, Sage Grouse Mitigation Plans) unless the facility is screened by topography.
- Construction will be prohibited during March 1 to June 15 within 3 miles of active greater sage-grouse leks in suitable nesting habitat not screened by topography, with an allowance made for one-time equipment movement during mid-day hours through ROW areas with a timing restriction that does not require grading for equipment passage to lessen disturbance to sage-grouse leks.
- Construction within 2 miles of active greater sage-grouse leks on federal land will be prohibited from March 1 to June 15.
- The mound left over the trench in areas where settling would not present a path for funneling runoff down slopes in sagebrush habitat will be reduced, and additional measures would be taken to compact backfilled spoils to reduce settling to avoid funneling runoff down slopes.
- A compensatory mitigation fund for use by MDEQ, MFWP, and BLM will be established to enhance and preserve sagebrush communities for greater sage-grouse and other sagebrush-obligate species in eastern Montana (size of the fund to be based on acreage of silver sagebrush and Wyoming big sagebrush habitat disturbed during pipeline construction within sage-grouse core habitat mapped by MFWP and important habitat between approximate Mileposts 95 to 98 and 100 to 121).

- Inspection over-flights will be limited to afternoons from March 1 to June 15 during operations as practicable in sagebrush habitat designated by MFWP.
- A 4-year study will be funded by Keystone, under the direction of MDEQ, MFWP, and BLM, that would show whether the presence of the facility has affected greater sage-grouse numbers based on the peak number of male sage-grouse in attendance at leks.
- Restoration measures (i.e., application of mulch or compaction of soil after broadcast seeding, and reduced seeding rates for non-native grasses and forbs) will be implemented immediately following construction that favor the establishment of silver sagebrush and big sagebrush in disturbed areas where compatible with the surrounding land use and habitats unless otherwise requested by the affected landowner.
- Studies will be conducted by Keystone prior to construction along the route to identify areas that support stands of silver sagebrush and big sagebrush. This information will be incorporated into restoration activities to prioritize reestablishment of sagebrush communities.
- Establishment of sagebrush on reclaimed areas will be monitored and reported-on, unless otherwise requested by the landowner, annually for at least 4 years to ensure that sagebrush plants become established at densities similar to densities in adjacent sagebrush communities. Additional sagebrush seeding or planting will be implemented, if necessary.
- Criteria will be established in conjunction with MDEQ, MFWP, and BLM to determine when restoration of sagebrush communities has been successful based on pre- and post-construction studies in addition to consideration of revegetation standards.
- Locally adapted sagebrush seed will be used by Keystone for land restoration (collected within 100 miles of the areas to be reclaimed), unless otherwise requested by the effected landowner (seed would be collected as close to the Project as practicable as determined by regional seed production and availability).
- Cover and densities of native forbs and perennial grasses will be monitored exclusive of noxious weeds on reclaimed areas and reseeded with native forbs and grasses where densities are not comparable to adjacent communities.
- Keystone will work in conjunction with the landowner to appropriately manage livestock grazing of reclaimed areas until successful restoration of sagebrush communities has been achieved (livestock grazing in restored sagebrush communities may promote establishment of sagebrush).
- Measures will be implemented to reduce or eliminate colonization of reclaimed areas by noxious weeds and invasive annual grasses such as cheatgrass to the extent that these plants do not exist in undisturbed areas adjacent to the ROW (noxious weed management plans would be developed and reviewed by appropriate county weed specialists and land management agencies for each state crossed by the proposed Project).
- A compensatory mitigation fund will be established by Keystone, in consultation with SDGFP, and managed by a third party for temporary and permanent impacts to greater sage-grouse habitat. The fund will be used by SDGFP to enhance and preserve sagebrush communities within the sagebrush ecosystem in South Dakota, which is found within the

following counties: Butte, Custer, Fall River, and Harding counties and to a lesser degree, Perkins and Meade counties.

- A research fund will be developed by Keystone, in consultation with SDGFP, and managed by a third party to evaluate the effects of pipeline construction on greater sage-grouse.
- Leks will be monitored that are within 3 miles of the Project footprint in South Dakota that are within the view shed of the construction ROW if construction takes place between March 1 and June 15.
- Keystone will implement, in consultation with SDGFP, a modified 3-mile buffer from March 1 to June 15 around active greater sage-grouse leks. The buffer would be modified on a lek-by-lek basis to account for differences in topography, habitat, existing land uses, proximity of the Project to the lek, and line-of-sight between the proposed Project and each lek.
- Construction equipment activity will be restricted in South Dakota to occur only between 10 am and 2 pm to avoid impacts to breeding greater sage-grouse from March 1 through June 15 in areas where a lek is either within 3 miles of the ROW and visible from the ROW or within 1-mile of the ROW and not visible from the Project ROW.
- Pump Station 9 (Montana): Big Flat Electric Cooperative will implement mitigation measures in accordance with APLIC standards (APLIC 2012) and in coordination with the USFWS, BLM, and MFWP to avoid and minimize impacts to the greater sage-grouse. Construction of the power line will be avoided from March 1 through June 15 to avoid impacts to greater sage-grouse leks that are near the power line.

  Big Flat Electric Cooperative will also require its contractors to install a pole top raptor guard on 68 poles identified to be close enough to a lek to provide a perch and visibility of the lek for birds of prey. Pole top raptor guards will also be installed on 24 existing distribution poles to protect a long-established lek located near the new transmission line project to provide service to pump station 9. Additional pole top raptor guards may be installed pending further field assessments completed during construction.

  Big Flat Electric Cooperative will ensure reclamation of disturbed areas that favors establishment of silver sagebrush (big sagebrush is not located north of the Milk River) and other species that encourage development of suitable greater sage-grouse habitat. Only BLM-approved seed sources will be used in reclamation efforts on BLM lands.

- Pump Station 13 (Montana): Tongue River Electric Cooperative has sited the 15.3-mile long power line so that it is located in developed areas near the transportation infrastructure or agricultural land thereby avoiding areas of potential habitat.

- Pump Station 14 (Montana): Montana Dakota Utilities will reroute a portion of the transmission line serving pump station 14 to avoid two sage-grouse leks and install raptor perch guards at structures previously identified by the MFWP.

  Montana Dakota Utilities will work with TransCanada to avoid any construction of the transmission line from March 1 through June 15, if possible. If not possible, Montana Dakota Utilities would minimize disturbance to lekking sage-grouse by avoiding

construction within 1-mile of leks from 8 pm until 2 hours after sunrise the following day and monitor active leks (displaying males) within 3 miles of the Project during construction from March 1 through June 15. Montana Dakota Utilities would contact the USFWS to obtain additional guidance if construction-related disturbance of lekking sage grouse is noted.

- Pump Stations 15, 16, and 17 (South Dakota): Grand Electric Cooperative will install raptor perch deterrents (cones or spike type deterrent devices) at any power pole that is located one-mile or less from a greater sage-grouse lek for the power line alignments to pump stations 15, 16, and 17. Selection of poles to be equipped with perch deterrent devices will be done in coordination with the USFWS.

Sprague's Pipit

Conservation measures have been discussed with multiple agencies and would be implemented by Keystone or power providers where specified to avoid, minimize, and compensate for impacts to the Sprague's pipit as outlined below:

- Disturbed areas in native range will be seeded with a native seed mix after topsoil replacement.
- The Project ROW will be monitored to determine the success of revegetation after the first growing season, and areas will be reseeded where vegetation has not been successfully reestablished.
- Off-road vehicle access to the Project ROW will be controlled with the use of signs; fences with locking gates; slash and timber barriers, pipe barriers, boulders lined across the construction ROW; or planted conifers or other appropriate trees or shrubs in accordance with landowner or manager request.
- A conservation plan will be developed for the proposed Project to comply with the Migratory Bird Treaty Act and implement provisions of Exec. Order No. 13,186 by providing benefits to migratory birds and their habitats within the states where the proposed Project would be constructed, operated, and maintained.
- If construction would occur during the April 15 to July 15, the grassland ground-nesting bird nesting season, Keystone will ensure that nest-drag surveys are completed to determine the presence or absence of nests on federal land in eastern Montana.
- Construction activity will be delayed from April 15 to July 15 within 330 feet of discovered active nests in eastern Montana.
- Pump Station 9 (Montana): Big Flat Electric Cooperative will implement mitigation measures in coordination with the USFWS, BLM, and MFWP to avoid and minimize impacts to the Sprague's pipit. Preconstruction surveys for the species will be coordinated with the USFWS. Unauthorized vehicle access will be restricted by Big Flat Electric Cooperative during the course of project construction to avoid impacts to nesting birds. Big Flat Electric Cooperative will ensure that disturbed areas will be reseeded to encourage redevelopment of native range using a BLM-approved seed mix.

- Pump Station 12 (Montana): McCone Electric Cooperative will site the power line to avoid and minimize encroachment on native prairie habitats. Construction activities will occur outside of the April 15 through July 15 nesting season, if possible. If Sprague's pipit nests are discovered, construction activity will be delayed within 330 feet of the nest, until the young have fledged. McCone Electric Cooperative will ensure all areas disturbed during the course of power line construction are reseeded with a native seed mix after top soil replacement. Access to the power line ROW will be controlled via fences with locking gates, signs, and fences to avoid disturbance to nesting areas.

- Pump Station 14 (Montana): Montana Dakota Utilities will mow the ROW, unless the landowner does not approve mowing. Any mowing would be done in the fall, prior to construction, to discourage bird nesting. Montana Dakota Utilities may decide not to mow the ROW if construction is projected to commence after July 15. Sagebrush will not be mowed.

  Montana Dakota Utilities will work with TransCanada to avoid construction of the transmission line from April 15 through July 15, if possible. If construction is projected to occur in native prairie habitat during the period from April 15 through July 15, Montana Dakota Utilities will mow the ROW unless the landowner does not approve mowing. Any mowing would be done in the fall, prior to construction, to discourage bird nesting. Montana Dakota Utilities may decide not to mow the ROW if construction is projected to commence after July 15. Sagebrush will not be mowed.

Interrelated and Interdependent Actions

Interrelated actions are those actions that are a part of a larger action and depend on the larger action for their justification (50 CFR § 402.02). Interdependent actions are those actions having no independent utility apart from the proposed action (50 CFR § 402.02). The USFWS and the Department have identified three interrelated and interdependent actions. The effects of these actions are discussed in the *Effects of the Action* section of this BO. The interrelated and interdependent actions include the following:

- Electrical distribution lines and substations that would provide electrical service to pipeline pump stations;
- the Big Bend to Witten 230-kilovolt (kV) transmission line (necessary in southern South Dakota for future increase in pipeline through-put;
- The Bakken Marketlink Project near Baker, Montana.

Electrical Substations and Power Distribution Lines to Pump Stations (Montana, South Dakota, Nebraska, and Kansas)

At least 20 separate private power districts or cooperatives would construct transmission lines to deliver power to 20 pump stations located along the United States length of the pipeline from Montana to Nebraska (Table 6) (see Appendix A). The power lines needed to service pipeline pump stations would range in capacity from 69 kV to 240 kV, but the majority would have a capacity of 115 kV. Most of the lines would be strung on single pole and/or H-frame wood poles, and would typically be about 60 to 80 feet high with wire span distances from approximately 250

to 400 feet. The length of the power lines vary. Potential effects of these substations and power distribution lines are addressed in the *Effects of the Action* section in this BO.

Big Bend to Witten 230-kV Transmission Line (South Dakota)

After receipt of information on the power requirements for the proposed pump stations in South Dakota, Western conducted a joint system engineering study to determine system reliability under the proposed loads at full Project electrical energy consumption. Engineering studies determined that a 230-kV transmission line would be required to support voltage requirements for pump stations 20 and 21 in the Witten area when the proposed Project is operating at maximum capacity. To address this requirement, Western proposes to replace the existing Big Bend-Fort Thompson No. 2 230-kV Transmission Line Turning Structure located on the south side of the dam, construct a new double circuit 230-kV transmission line for approximately 1 mile south west of the dam, and construct a new Lower Brule Substation. These actions are part of the larger Big Bend to Witten 230-kV Transmission Line Project.

If a Presidential Permit is issued, Western plans to construct approximately 2.1 miles of new double-circuit transmission line from the Big Bend Dam, located near the town of Fort Thompson, South Dakota, south to a new substation, tentatively named Big Bend Substation, which would also be constructed by Western. The new 2.1-mile, 230 kV transmission line would be constructed, owned, and operated by Western, but the Big Bend Substation would be transferred after construction to the Basin Electric Power Cooperative (BEPC), which would then own and operate it. The BEPC proposes to construct, own, and operate a new 72.9-mile-long 230 kV transmission line from the proposed new Big Bend Substation to the existing Witten Substation, located near the town of Witten in Tripp County. The new Big Bend Substation and approximately 75-mile-long 230 kV transmission line would assure future electric power requirements at pump stations 20 and 21 are met without degrading system reliability if and when the proposed Project is operating at maximum capacity. The RUS is the lead agency, with Western cooperating for a separate environmental review of the Big Bend to Witten line under NEPA and the Act. Potential effects of this transmission line are addressed in the *Effects of the Action* section in this BO. Other federal actions associated with the proposed Project may require separate section 7 consultation with the USFWS.

Bakken Marketlink Project (Montana)

Keystone Marketlink, LLC, a wholly owned subsidiary of TransCanada Pipelines Limited, is proposing to construct and operate the Bakken Marketlink Project. The project would include construction of facilities to provide crude oil transportation service from near Baker, Montana, to Cushing, Oklahoma. Keystone Marketlink, LLC obtained commitments for transport of approximately 65,000 barrels per day (bpd) of crude oil through the Bakken Marketlink Project. The Bakken Marketlink Project could deliver up to 100,000 bpd to Cushing, Oklahoma depending on ultimate shipper commitments.

The Bakken Marketlink facilities in Montana would consist of piping, booster pumps, meter manifolds, and two 250,000-barrel tanks that would be used to accumulate crude from connecting third-party pipelines and terminals, as well as a 100,000-barrel tank that would be used for operational purposes. Tanks at Baker will be external floating roof tanks. The facilities in

Montana would also include a proposed NPS 16 pipeline that would be approximately 5 miles in length, originating south of pump station 14 at a third party tank farm in Fallon County, and extending to the two accumulation tanks adjacent to the proposed pump station 14. TransCanada Pipelines Limited Bakken held introductory meetings with State and local permitting agencies in 2011, and also held a meeting for potentially affected landowners along the route. Adjustments in the alignment are possible as a result of civil surveys, further landowner discussions, and permitting.

Bakken Marketlink would deliver crude oil into Cushing, Oklahoma, a key pipeline transportation and crude oil storage hub with over 50 million barrels of storage capacity. Crude oil delivered by the Bakken Marketlink Project would be received into storage tanks at Cushing and would either be pumped to the Gulf Coast Project pipeline or to other pipelines and tank farms near Cushing. The Cushing area is a major crude oil marketing, refining, and pipeline hub that provides shippers with many delivery options and market access. The proposed in service date for the Bakken Marketlink Project is projected to be the first or second quarter of 2015. Potential effects of Bakken Market Link project are described in general in the BA and the EIS, and are addressed in the *Effects of the Action* section in this document.

American Burying Beetle

Species Description

The ABB is the largest silphid (carrion beetle) in North America, reaching 1 to 1.8 inches in length (Wilson 1971, Anderson 1982, Backlund and Marrone 1997). The ABB is black with orange-red markings. The hardened elytra (wing coverings) are smooth, shiny black, and each elytron has two scallop-shaped orange-red markings. The pronotum (hard back plate on the front portion of the thorax of insects) over the mid-section between the head and wings, is circular in shape with flattened margins and a raised central portion. The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum, a feature shared with no other members of the genus in North America (USFWS 1991). The ABB also has orange-red frons (the upper, anterior part of the head), and a single orange-red marking on the clypeus, which is the lower face located just above the mandibles. Antennae are large, with notable orange club-shaped tips.

Gender can be determined from markings on the clypeus; males have a large, rectangular, red marking and females have a smaller, triangular, red marking. The age of the adults is determined by intensity of appearance. The markings of teneral ABBs (young beetles emerging during late summer) are brighter and appear more uniform in color while the exoskeleton is softer and in general more translucent. The pronotum of a mature, early summer adult tends to be darker than the markings on its elytra, with the former appearing dark orange to red and the latter appearing orange. The senescent (mature, post-breeding) ABB has pale elytral markings and are more scarred. They often have pieces missing from the margin of the pronotum or elytra, have cracks in the exoskeleton, and/or are missing appendages such as tarsi, legs, or antennae (USFWS 2008a).

Life History

The life history of the ABB is similar to that of other burying beetles (Kozol et al. 1988; Pukowski 1933; Scott and Traniello 1987; Wilson and Fudge 1984). A nocturnal species, the ABB is active

in the summer months and bury themselves in the soil during the winter. The young tenerals emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990b). Both adults and larvae are dependent on carrion for food and reproduction.

Winter Inactive Period: When the nighttime ambient air temperature is consistently below 60°F (15.5°C), ABBs bury into the soil and become inactive (USFWS 1991). In Nebraska, this typically occurs between early September to early June (W.W. Hoback, pers. comm.) and these dates are likely similar in South Dakota. However, the length of the inactive period can fluctuate depending on temperature. Recent studies indicate that ABBs bury to depths ranging from 0 to approximately 20 centimeters in Arkansas (Schnell et al. 2007) and at least 18 centimeters deep depending on the depth of frost in Nebraska and probably South Dakota.

During the winter months in the northern portion of ABB's range (i.e., South Dakota and Nebraska), soil commonly freezes to several feet below the surface. In the Nebraska Sandhills, for example, extreme penetration of frost was estimated between four feet and five feet (Floyd 1978), and water pipes to cattle tanks are still typically buried five feet to avoid freezing (K. Graham, pers. comm.). Since these depths exceed ABB burial depths, the species likely uses a survival strategy in Nebraska and South Dakota that permits the lowering of body temperature to freezing or near-freezing during the coldest portions of the winter (W.W. Hoback, pers. comm.). The lowering of body temperature slows metabolism and helps ensure fat reserves are sufficient to last until emergence in late May or early June (W.W. Hoback, pers. comm.). Additionally, recent research appears to show that ABB will burrow to below the frost line to avoid freezing as well (W.W. Hoback, pers. comm.).

Preliminary data suggest that over-wintering results in significant mortality (Bedick et al. 1999). Winter mortality may range from 25 to 70 percent depending on year, location, and availability of carrion in the fall (Schnell et al 2007; Raithel 1996-2002, unpubl. data, as cited in USFWS 2008b). Over-wintering ABBs with access to a whole vertebrate carcass in the fall had a survival rate of 77 percent versus a 45 percent survival rate for those ABBs not provisioned with a carcasses (Schnell et al. 2007).

Summer Active Period: The ABB emerges from its winter inactive period in mid to late May when ambient nocturnal air temperatures consistently exceed 60º F. In Nebraska, Bedick et al. (1999) found that ABB activity was highest when nighttime temperatures were between 59º F (15º C) and 68º F (20º C). They are most active from two to four hours after sunset, with no captures recorded immediately after dawn (Walker and Hoback 2007, Bedick et al. 1999). Weather, such as rain and strong winds can result in reduced ABB activity (Bedick et al. 1999). During the daytime, ABBs are believed to bury under the vegetation litter to avoid desiccation and predators. The ABB begin rearing broods soon after emergence in late May to early June. During late May and early June ABBs secure a mate and carcass for reproduction purposes. The reproductive process takes approximately 48-69 days. Capture rates for ABBs are highest from mid-June to early-July and again in mid-August (Kozol et al. 1988, Bedick et al. 2004, USFWS 1991) with a decrease in pitfall captures in late July (Kozol et al. 1988) because the species has gone underground tending its brood.

Feeding: Carrion selection by adult ABBs *for food* can include an array of available carrion

species and size (Trumbo 1992). However, carrion must be within a specific weight range for it to be used by ABB *for reproductive purposes*. Kozol et al. (1988) found no significant difference in the ABB's preference for avian verses mammalian carcasses. Burying beetles are capable of finding a carcass between one and 48 hours after death at a distance of up to 2 miles (3.22 km, Ratcliffe 1996). Success in finding carrion depends upon many factors including availability of optimal habitats for small vertebrates (Lomolino and Creighton 1996), density of competing invertebrate and vertebrate scavengers, individual searching ability, reproductive condition, temperature (Ratcliffe 1996) and other abiotic factors such as wind speed and humidity.

Reproduction: Upon emergence from their winter hibernation in early June, ABBs begin searching for a proper-sized carcass for reproduction in Nebraska and South Dakota. The species is able to locate carcasses using chemoreceptors on their antennae. Once a carcass has been found, inter-specific as well as intra-specific competition occurs until usually only a single dominant male and female burying beetle remain (Scott and Traniello 1989). Kozol (1991) reported that the ABB typically out-competes other burying beetles as a result of its larger size. Male and female ABBs cooperatively bury a carcass, but individuals of either sex are capable of burying a carcass alone (Kozol et al. 1988). Once underground, both parents shave off the fur or feathers, roll the carcass into a ball, and treat it with anal and oral secretions that retard the growth of mold and bacteria. The female ABB lays eggs in the soil near the carcass. Parental care in this genus is elaborate and unique because both parents participate in the rearing of young (Bartlett 1987, Fetherston et al. 1990, Scott 1990, and Trumbo 1990), with care by at least one parent, usually the female, being critical for larval survival (Ratcliffe 1996).

Brood sizes of ABBs can sometimes exceed 35 larvae, but 12-18 is more typical (Kozol 1990a). Altricial (helpless at birth), lightly hardened larvae hatch in about 12-14 days. The parents move these first instar larvae to the carcass. The developing larvae solicit feeding by stroking the mandibles of the parents. Both male and female parents regurgitate meat to the larvae. The larvae are soon capable of feeding directly from the carcass. In about 10-14 days large, third instar larvae burrow a short distance from the now-diminished carcass and form pupation cells. One or both of the parents may remain with the pupae for several days and at least one parent, usually the female, may remain with the pupae until they pupate (Kozol 1991). So, for approximately 22-28 days, adult ABBs are present with their brood. New adults emerge in about 26-51 days. The reproductive process from carcass burial to eclosure (i.e., emergence of the adult from pupae) is about 48 to 79 days (Ratcliffe 1996, Kozol 1991, Bedick et al. 1999). Females are reproductively capable immediately upon eclosure. The young beetles emerge in late summer and over-winter as adults; they comprise the breeding population the following summer (Kozol 1990b). In Nebraska, Bedick et al (1999) found that ABBs reproduce only once per year.

Movement: American burying beetles are mobile because they must be able to move to find carrion resources for feeding and reproductive purposes. The species has been reported moving distances ranging from 0.10 to 2.6 miles per day in various parts of their range. Creighton and Schnell (1998) conducted a study on movement patterns of ABBs at Camp Gruber and Fort Chaffee in 1992 and 1993. They recaptured 68 ABBs over a 12 night period; of those 68, 23 (29.5 percent) were recaptured at a site different than the original site of capture. The mean distance moved of the 23 recaptured ABBs over the 12 night sampling period was 1.21 miles for each ABB (0.10 miles per night per ABB). The minimum and maximum distance moved by an individual recaptured ABB was 0.16 mile in one night and 4.3 miles in five nights, respectively. Six ABBs

were recaptured two or three times. The mean movement for these six ABBs was 6.2 miles over six nights, 1.03 miles per night over the entire sampling period. The maximum distance moved by one of these six was 0.76 miles in one night (USFWS 2008b).

Bedick et al. (2004) reported average nightly movements of 0.62 mile, with 85 percent of recaptures moving distances of 0.31 miles per night. Schnell et al. (1997-2003) annually determined the average nightly movements of the ABB to be 0.62 miles, using marked individuals over a nine-year period at Camp Gruber. The smallest average nightly movement for any given active season over that same period was 0.52 miles. Schnell et al. (1997-2006) reported a one day movement of 2.6 miles; previously the greatest distance moved was 1.78 miles (Creighton and Schnell 1998).

Habitat: ABBs are considered habitat generalists and have been successfully live-trapped in several vegetation types including native grasslands, grazed pasture, riparian zones, coniferous forests, mature forest, and oak-hickory forest, as well as on a variety of various soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolino et al. 1995; USFWS 1991). Ecosystems supporting ABB populations are diverse and include primary forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; USFWS 1991). The ABB readily moves between different habitats (Creighton and Schnell 1998, Lomolino et al. 1995) (USFWS 2008b). Although thought to be a habitat generalist, it is likely that the ABB is more substrate (soil) specific in its selection of carrion burial sites. Soil conditions for suitable ABB habitat must be conducive to excavation by ABBs (Anderson 1982; Lomolino and Creighton 1996). Soils in the vicinity of captures are all well drained and include sandy loam and silt loam, with a clay component noted at most sites. Level topography and a well formed detritus layer at the ground surface are common (USFWS 1991). Certain soil types such as very xeric (dry), saturated, or loose, sandy soils are considered unsuitable for carcass burial and thus are unlikely habitats.

Habitat in South Dakota and Nebraska has often been categorized based on moisture, land use, and the presence of ABB from previous studies in Nebraska. For the Nebraska Sandhills population, this ranking system appears to generally describe areas of potential ABB occurrence. The following habitat descriptions for prime and good habitat are consistent with the Backlund et al. (2008) description of the best habitat for ABB in South Dakota, which they described as sandy grasslands with scattered stands of trees dominated by cottonwood, and commonly including sub-irrigated meadows and groundwater streams. As in Nebraska, the dominant land cover in the South Dakota ABB habitat is native grassland, and is primarily used for range and hay land. Low meadows are dominated by grasses and forbs typical of tallgrass prairie while the uplands consist mostly of mixed grass prairie flora.

Status and Distribution

The ABB was designated as a federally endangered species on July 13, 1989 (54 Fed. Reg. 29,652). At that time, only two, disjunct, natural populations occurred at the extremities of the species' historic range of 35 states; one population was known from four counties in Oklahoma and another population was located on a small island off the coast of Rhode Island (USFWS 2008a). Critical habitat was not designated for the ABB.

Distribution: Historically, the geographic range of the ABB included over 150 counties in 35 states, covering most of temperate eastern North America and the southern borders of three eastern Canadian provinces (USFWS 1991; Peck and Kaulbars 1987) (Figure 1). Documentation of records is not uniform throughout this broad historical range. More records exist from the Midwest into Canada and in the northeastern United States than from the southern Atlantic and Gulf of Mexico region (USFWS 1991). However, during the 20th century, the ABB disappeared from over 90 percent of its historical range (Ratcliffe 1995). The last ABB specimens along the mainland of the Atlantic seaboard, from New England to Florida, were collected in the 1940s (USFWS 1991). At the time of listing, known populations were limited to one on Block Island, Rhode Island; and one in Latimer County, Oklahoma. After the species was listed in 1989, survey efforts increased and the ABB was discovered in more locations, particularly in South Dakota, Nebraska, and Oklahoma (Figure 1).

Currently, the ABB is known to occur in eight states thanks to extensive survey efforts for the species (Figure 1). These include Block Island off the coast of Rhode Island, Nantucket Island off the coast of Massachusetts, eastern Oklahoma, western Arkansas (Carlton and Rothwein 1998), Loess Hills in south-central Nebraska and Sandhills in north-central Nebraska (Ratcliffe 1996, Bedick et al. 1999) (Figure 2), Chautauqua Hills region of southeastern Kansas (Sikes and Raithel 2002), south-central South Dakota (Backlund and Marrone 1995, 1997; Ratcliffe 1996) in Todd Tripp, Gregory, and Bennett counties, and northeast Texas (Godwin 2003). There is some concern that the population in Texas has been extirpated due to competition with fire ants (R. Harms, pers. comm.). Most populations are located on private land.

Population Estimate: Although ABB are relatively easy to capture, obtaining precise estimates of absolute or even relative densities of ABB populations remains a challenge (USFWS 2008a). The standard mark and re-capture technique used to estimate population size assumes that marked and unmarked individuals are equally likely to be captured, and that a substantial number of the animals would be recaptured from one trapping period to the next. However, due to ability of the ABBs to range widely and their reproductive strategy that includes retreating underground for several weeks, these assumptions may not apply. Because the ABB has a one-year life cycle, each year's population levels are largely dependent on the reproductive success of the previous year. Therefore, populations are likely cyclic, with high numbers and abundance in one year, followed by a decline in numbers the succeeding year. This may indicate a relatively rapid turnover rate in the trappable ABB population due to factors such as natural mortality, dispersal, and burrowing underground and attending carrion/broods (Creighton and Schnell 1998).

Reasons for decline:

There is little doubt that habitat loss and alteration affect this species at local or even regional levels, and could account for the extirpation of populations once they become isolated from others (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999). The prevailing theory regarding the ABBs' decline is habitat fragmentation (USFWS 1991) which: (1) reduces the carrion prey base of the appropriate size for ABB reproduction and (2) increases the vertebrate scavenger competition for this prey (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999) due to its relatively large size and specialized breeding behavior (Creighton et al. 2007). The ABB Recovery Plan (USFWS 1991) and the 5-yr status review of the species (2008a) also

identify the following as potential threats to the ABB: disease/pathogens, DDT, loss of genetic diversity in isolated populations, agricultural and grazing practices, and invasive species.

Habitat Loss and Fragmentation: During the westward expansion of settlement in North America, the removal of top-level carnivores such as the grey wolf (*Canis lupis)* and eastern cougar (*Puma concolor)* occurred simultaneously with land use changes that fragmented native forest and grasslands and created more edge habitats (such as the edge between forest and grassland, or grassland and cropland). These two processes resulted in mid-sized carnivores and scavengers becoming more abundant than they were in presettlement times. Mid-sized carnivores prey on small mammals and birds and scavengers directly compete with carrion beetles for carrion. Mid-sized carnivores and scavenger species include American crow (*Corvus brachyrhynchos)*, raccoon (*Procyon lotor)*, red fox (*Vulpus vulpes)*, opossum (*Didelphis virginiana)*, striped skunk (*Mephitis mephitis)*, rats (*Neotoma* spp.) and Hispid cotton rats (*Sigmodon hispidus*), coyotes (*Canis latrans)*, feral cats, and other opportunistic predators (Wilcove et al. 1986) and scavengers.

A number of these species, especially the raccoon and striped skunk, have undergone dramatic population increases over the last century (Garrott et al. 1993), and the coyote and opossum have expanded their ranges. These scavengers may extend hundreds of feet from edges into forest in eastern North America. Matthews (1995) experimentally placed 64 carcasses in various habitats in Oklahoma where ABBs and the roundneck sexton beetle (*N. orbicollis)*, another type of burying beetle and a species thought to have similar life history characteristics as that of the ABB) had been previously documented, then tracked the organisms that scavenged them. Of the carcasses, 83 percent were claimed by ants, flies, and vertebrate scavengers; about 11 percent were claimed by the roundneck sexton beetle, and only one was claimed by ABBs.

Projects that cause ABB habitat fragmentation are common. Since 2011, large tracts of native grassland have been converted to row crops in Nebraska and South Dakota due to elevated grain prices. This conversion has resulted in the loss and fragmentation of a considerable amount of habitat for the ABB. Conversion is considered a permanent loss of habitat.

Carrion requirements: Unavailability of the appropriate sized carrion for reproduction likely also caused the decline of the ABB. Data available for the ABB on Block Island, Rhode Island supports the contention that the primary mechanism for the species' rangewide declines lies in its dependence on carrion of a larger size class relative to that used by all other North American burying beetles, and that the optimum-sized carrion resource base has been reduced throughout the species' range (USFWS 1991).

American burying beetles require carcasses of 3.5 to 7.0 ounces (99.22 to 198.45 g, Kozol et al. 1988) to maximize its fecundity, whereas all other burying beetles can breed abundantly on much smaller carcasses, with the smaller species using carcasses of 0.11 to 0.18 ounces (3.12 to 5.10 g, Trumbo 1992). Since the middle of the 19th century, certain animal species in the favored weight range for ABB reproductive use have either been eliminated from North America or significantly reduced over their historic range (USFWS 1991), including the passenger pigeon (*Ectopistes migratorius)*, greater prairie chicken (*Tympanchus cupido)* and wild turkey *(Meleagris gallopavo)*. The passenger pigeon was estimated at one time to have been the most common bird in the world, numbering 3 to 5 billion (Ellsworth and McComb 2003). There were once as many passenger pigeons within the approximate historic range of the ABB as there are numbers of birds of all

species overwintering in the United States today. Wild turkeys, for example, occurred throughout the range of the ABB, and until recently, were extirpated from much of their former range. Black-tailed prairie dogs (*Cynomys ludovicianus)* which occur in the northern portion of the ABB's range have drastically declined (Miller et al. 1990) and previously dense populations of these mammals may also have been important for reproduction by ABB (USFWS 2008a).

Illumination: Although somewhat anecdotal, it is likely that the gradual lighting of the nighttime sky due to development across the central and eastern United States has also hastened the decline of the ABB. Like all insects, the ABB is attracted to light sources. Attraction to artificial light sources increases the risk or predation, increases energy requirements, and reduces recruitment of the next generation.

Climate Change: A five year review was completed for the ABB which identified the potential effects of global climate change on the ABB habitat and disease (USFWS 2008a). The frequency of extreme weather events on ABB populations, however, has not been assessed. Nevertheless, some predictions, although anecdotal, can be made about how weather events may affect the species. Section 4.14 of the Draft SEIS includes analysis regarding potential climate impacts in the region of the proposed project (DOS 2013). It includes information taken from a report that downscaled four global climate models and averaged them for eight climate regions in the U.S., as well as a review of information from other similarly downscaled global models. A gradual drying trend is predicted in the summer months in South Dakota and Nebraska through 2050. The ABB is subject to desiccation and thus, a drying trend may result in the contraction of the species' range over the next 50 years (i.e., the life of the Project) (W.W. Hoback, pers. comm.). By 2040–2069, the national average annual temperature is predicted to increase above the baseline of 1980 to 2009 by between 2.8°F and 6.6°F, depending on the model and the emissions scenario evaluated (USGCRP 2009). Although difficult to predict, a rise in temperatures could have an effect on the ABB. An elevation in winter temperatures could result in the species not going completely dormant and using extra fat reserves potentially precluding the species from being able to overwinter. This could also result in a range contraction for the species (W.W. Hoback, pers. comm.). As stated above, however, the frequency of extreme weather is not reasonably certain at this point in time.

Analysis of the Species/Critical Habitat Likely to be Effected

The ABB is likely to be adversely affected by the construction, operation, and maintenance of the Keystone XL pipeline and its associated facilities. Various types of disturbance associated with typical construction activities can result in impacts to the ABB. As noted earlier, no critical habitat has been designated for the ABB; therefore, none would be affected by the Project.

Environmental Baseline

The environmental baseline is the past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process (50 C.F.R. § 402.02). The environmental baseline is an analysis of the effects of past and ongoing human induced and natural factors, leading to the current status of the species, its habitat, and

ecosystem, within the action area (i.e., area affected by the project). The environmental baseline is a "snapshot" of the status of the ABB at the time this document was prepared.

In the United States, the ABB is known or likely to occur in the action area only in the states of South Dakota and Nebraska. Therefore, project impacts evaluated in this BO are limited to those in South Dakota and Nebraska. Other factors having little to do with construction and operation of the proposed Project, such as climate change may also affect the ABB in the future.

Status of the Species in the Action Area

The "action area" means all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action. For this consultation, the action area consists of not only areas directly impacted by the issuance of the Presidential Permit (the "Action"), but the area also indirectly effected by the proposed Keystone XL pipeline enabled by the permit. These include effects to all land disturbed by the footprint of the Project such as preconstruction, construction, operation, and reclamation activities. Lands affected include the pipeline construction ROW and land used by the above ground ancillary facilities (i.e., additional TWAs, pipe stockpile sites, rail sidings, contractor yards, construction camps, pump stations, delivery facilities and access roads). Also included as part of the action area are the effects of the interrelated and interdependent power lines that would be built by private power companies to supply electricity to 20 Project pump stations along the pipeline as well as the 230 kV transmission line in Tripp and Lyman counties in South Dakota. The facilities required by the Bakken Marketlink project are also considered interrelated and interdependent parts of the proposed Project.

American Burying Beetle

The following is a summary of the species in the proposed Project action area in South Dakota and Nebraska.

<u>South Dakota:</u> The proposed project passes through Tripp County in South Dakota, a county where ABB are known to be present. In 1995, Backlund and Marrone (1997) discovered the ABB in the large blocks of mesic grassland habitat located in the southern portion of Tripp County. The population has been monitored almost annually from 1995-2007, and appears to have remained stable in abundance and distribution (Backlund unpubl data, SDGFP Report) (Backlund and Marrone 2003). This population is likely part of the metapopulation that occurs in the Nebraska Sandhills (W.W. Hoback pers. comm.). Surveys in 2005 showed that ABBs in South Dakota are concentrated in southern Tripp County where the population is conservatively estimated to be approximately 1,000 individual ABBs in an area of approximately 220 square kilometers (54,363 acres) (Backlund et al. 2008). However, the actual number or percentage of ABB in the vicinity of the proposed Keystone XL pipeline in South Dakota cannot be determined because there have not been any surveys done at the proposed Project location.

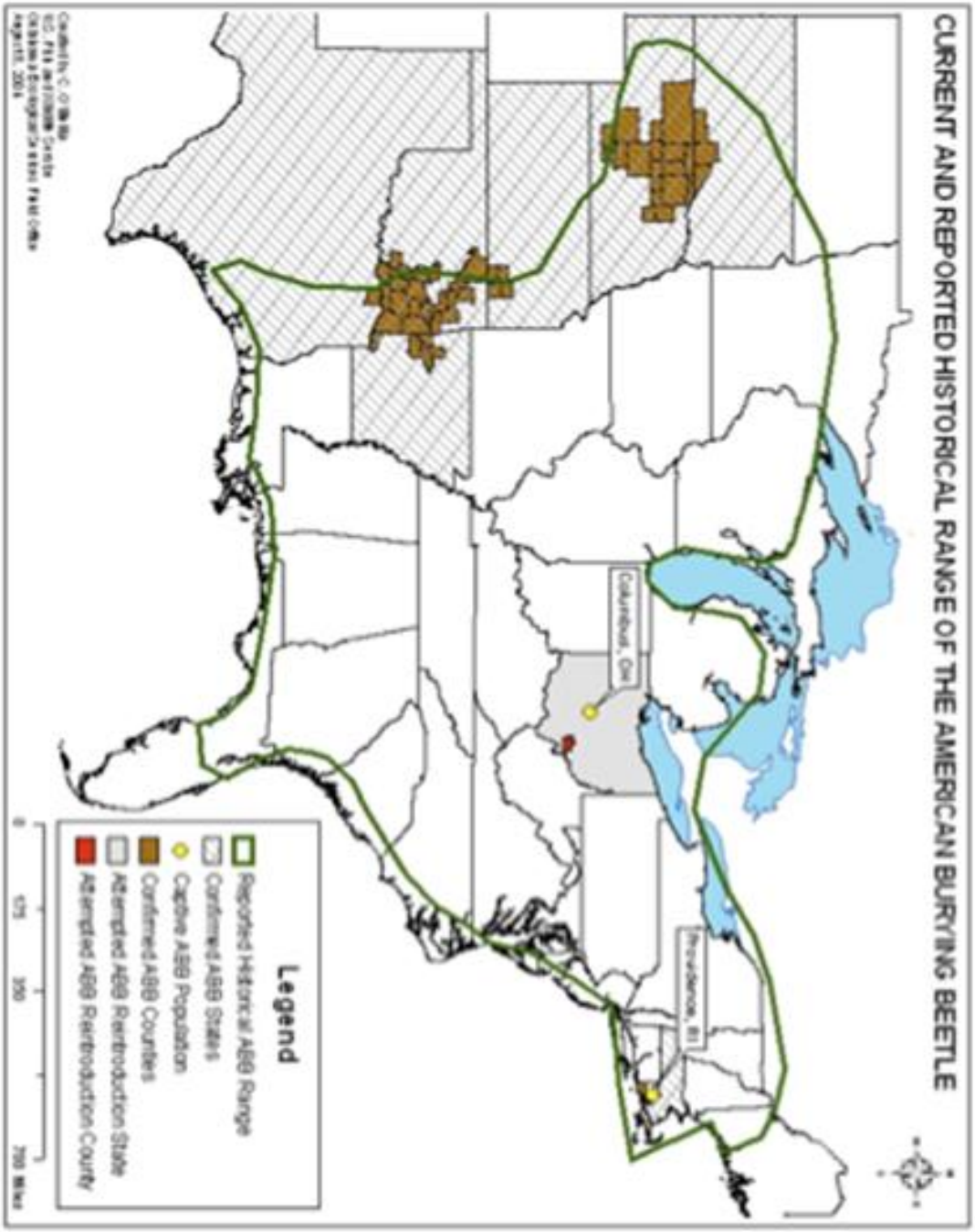

Figure 1. Historic and Current Range of the ABB.

Nebraska: The proposed project passes through three counties in Nebraska with known ABB presence (Keya Paha, Boyd, and Holt counties) and one county with historic ABB occurrence (Antelope County) (Hoback 2012). The proposed pipeline route then passes through a number of central and southern Nebraska counties where the ABB has not been found historically or in the last 10 years based on surveys done for the species.

During the summer of 2012, ABB surveys were conducted at 54 sites in northern Keya Paha, Holt, Antelope, and Boyd counties (Hoback 2012). Surveys occurred between August 2 and August 17, 2012, using standard traps baited and checked for 5 trap nights following standard trapping methods (NGPC and USFWS 2008) (Appendix B). Traps were set on road shoulders of state and county highways within suitable habitat. Ninety-five ABBs were captured at 28 sampling locations in Keya Paha and Holt counties. Capture rates ranged from 0.2 ABB per trap nights to 3.0 ABB per trap night. No ABB were caught in Boyd or Antelope counties. Captures of ABB occurred in northwestern Holt County, but not east of Highway 183. Control traps were run during sampling at sites in Holt County in accordance with protocol (see Appendix B), where ABB are known to be numerous. These traps produced between 0.7 and 7.0 ABB per trap night (Hoback 2012).

The control trap success suggests that populations of ABB to the east of the Sandhills region are not as dense as those in the Sandhills. Very little habitat to support ABB is present east of Highway 183 in Holt County or in Antelope County. The species is also susceptible to desiccation and thus, the drought conditions likely affected trapping success; the 2012 abundance of ABB may have been higher under normal conditions. Drought conditions causing low soil moisture may have affected the number of ABBs caught in 2012 surveys, but control traps did not support that conclusion. Habitat appears to be a more important indicator of abundance compared to soil moisture. Overall, few ABB were captured in 2012 compared to control sites at the same time (Hoback 2012).

Habitat Availability in the Action Area

The proposed Project would result in construction of approximately 500 miles of pipeline through South Dakota and Nebraska. Surveys of habitat suitability for ABBs along the pipeline route in South Dakota and Nebraska were conducted in 2008 to 2012 (DOS 2012). Habitat for the ABB that was crossed by the ROW and other Project facilities was classified using a rating system developed from previous studies in Nebraska. The rating system is based on soil moisture, land use, and the presence of ABB. The ABB uses similar habitat in southern South Dakota and northern Nebraska and thus, the rating system was applicable for use along the pipeline segment located in both states.

The following five habitat rating criteria were used to describe ABB habitat quality in the pipeline ROW in South Dakota and Nebraska:

> **Prime** (5): Undeveloped wet meadows dotted with trees (especially cottonwoods [*Populus deltoids*]) or forest areas visible. Water sources are available including the presence of a river, stream, or sub-irrigated soils. Cropland is not visible within the mile segment evaluated or is at a distance greater than 2 miles.
>
> **Good** (4): Native grasslands (tall or mixed grass prairie) with forbs. Low wetland meadows that are grazed by cattle or used for haying. Trees (usually cottonwoods) are present. Sources of

water are within a mile, but the area has either some cropland or light pollution such as yard lights or houses within a mile.

Fair (3): Grassland with exotic species such as brome grass (*Bromus* spp.). Soil moisture content is lower than for prime or good habitat. Row crop agriculture is located within one mile.

Marginal (2): Potential habitat restricted to one side of the pipeline ROW, with row crop agriculture on one side or dry, sandy, upland areas with exposed soil or scattered dry-adapted plant such as yucca (*Yucca* spp.).

Poor (1): Both sides of the pipeline ROW with row crop agriculture or habitat with the potential for large amounts of light pollution and disturbance associated with town or city edge.

The habitat rating considers soil characteristics and land use data (Hoback 2011a). Row crop agriculture does not support ABB populations, while grazed areas and hay meadows potentially do. Loose soils provide the best habitat for reproduction while tight clays or other tight soil types do not (A. Smith, Smith Environmental and Research Consulting House, pers. comm.). Human disturbance beyond agriculture are also considered because suitable habitat near cities is affected by light pollution, increased scavenger presence, and a different potential prey base. Dry areas are rated as less suitable because burying beetles suffer high rates of mortality due to water loss (Bedick et al. 2004). ABBs seek moist conditions during periods of inactivity under experimental conditions (Hoback 2008).

In Nebraska, after habitat is rated and mapped with windshield surveys, areas ranked 4 (good habitat) or 5 (prime habitat) are surveyed using baited pitfall traps (Hoback 2011a). Excellent habitat does not always support ABB. The species has not been captured in traps placed in habitats rated 1 (poor) or 2 (marginal) and only very rarely have they been captured in habitats rated 3 (fair). In Nebraska, areas that are rated as 3 or less are considered unsuitable to sustain ABB. Habitats rated 3 have caught ABB in traps in less than 1% of samples (3 ABB in 400 trap nights). Because of ABB dispersal abilities with typical flights of more than one mile per night (and up to seven miles), capture rates in marginal habitats are potentially the result of attraction of beetles to unsuitable habitats.

The above habitat descriptions for prime and good habitat are consistent with Backlund et al. (2008) description of the best habitat for ABB in South Dakota, which they described as sandy grasslands with scattered stands of trees dominated by cottonwood, and commonly including sub-irrigated meadows and groundwater streams. As in Nebraska, the dominant land cover in the South Dakota ABB habitat is native grassland, and is primarily used for range and hay land. Low meadows are dominated by grasses and forbs typical of tallgrass prairie while the uplands consist mostly of mixed grass prairie flora.

<u>South Dakota:</u> In South Dakota, ABBs occur south of State Highway 18 (C. Bessken, pers. comm.) in the southern half of Tripp County (Backlund et al. 2008). The Project ROW passes through about 35 miles of habitat where ABBs may occur (25 miles of prime habitat, 8 miles of good habitat, and 2 miles of fair habitat (Figure 2). Remaining habitat north of Highway 18 at about mile post (MP) 563 is fair to marginal and is outside the known range of ABBs (Figure 2). Habitat ratings from mile post (MP) 566 to MP 600 are shown in Table 7 (DOS 2012).

Nebraska: In Nebraska, the Project passes through 47 miles of habitat where ABBs may occur (23 miles of prime habitat, 16 miles of good habitat, and 8 miles of fair habitat) (Figure 2). Suitability ratings for ABB habitat crossed by the proposed Project in Nebraska are provided in Figure 2 and Table 8. Habitat ratings from mile post (MP) 601 to MP 659 are shown in Table 8 (DOS 2012).

Factors Affecting the Species within the Action Area

Adequately evaluating the effects of this proposed project on the ABB requires that the USFWS consider not only the impacts from the proposed Project, but the context in which they would likely occur. This context includes ongoing effects to ABB from current activities as well as anticipated effects from projects likely to occur in the foreseeable future.

In the northern part of their range, the primary causes of decline of the ABB are thought to be (1) pesticide use; and (2) habitat loss, degradation, and fragmentation, which correspond to a decrease in availability of suitable carrion and removal of previously suitable ABB habitat. Developed land and land that has been converted for agricultural, grazing, and other uses, often favor scavenging mammal and bird species that compete with carrion beetles for carcasses. Additionally, developing and converting land has led to declines in ground nesting birds, which probably historically provided a large portion of the carrion available to ABB. Fire suppression in prairie habitats allows the encroachment of woody plant species, particularly the eastern red cedar, which is thought to degrade habitat for burying beetles by limiting their ability to forage for carrion. In South Dakota and Nebraska, we do not have information specific to the proposed Project action area regarding the impacts of ongoing human and natural factors and how those factors may affect the use of the Keystone XL Project sites by ABB. However, it is reasonable to assume that continuing development activities such as conversion of native prairies to row crops, increased human developments or disturbances, increased lighting, and placement of man-made structures such as homes, power lines, and roads on the landscape would affect the ABB and its habitat on proposed Project lands in the same manner as elsewhere.

Shifts in land use are affecting ABB habitat within the species range. South Dakota and Nebraska are losing native prairie rangeland through conversion to cropland at an escalating rate because the accelerating use of ethanol in gasoline has increased demand for corn and consequently raised the price of the grain (GAO 2007). About a third of the average increase in harvested cultivated crop acreage on corn and soybean farms in the United States, results from the average conversion of hay, USDA Conservation Reserve Program grassland or grassland pasture (Pore, Robert. August 28, 2011).

Effects of the Action

The effects of the action are the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species for purposes of preparing a BO on the proposed action (50 CFR § 402.02). This BO does not examine any effects that the Proposed Project may contribute to climate change, consistent with the May 14, 2008, memorandum from Director Dale Hall: Expectations for Consultations on Actions that would emit Greenhouse Gases and the October 3, 2008, memorandum from the Solicitor of the Department of the

Interior: Guidance on the Applicability of the Endangered Species Act's Consultation Requirements to Proposed Actions Involving the Emission of Greenhouse Gases.

The "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 C.F.R. § 402.02). Direct and indirect effects of the Action are part of the action area and include all land disturbed by the footprint of the proposed pipeline Project pre-construction, construction, operation, and reclamation activities. This includes construction of the pipeline ROW and land affected by the above ground ancillary facilities (i.e., additional temporary work space areas, pipe stockpile sites, rail sidings, contractor yards, construction camps, pump stations, delivery facilities, and access roads). Effects to be considered also include the effects of the interrelated and interdependent power lines that would be built by private power companies to supply electricity to Project pump stations along the pipeline, as well as the 230 kV transmission line in Tripp and Lyman counties in South Dakota, and the interrelated and interdependent facility required by the Bakken Marketlink project. The action area extends generally from the border of the United States with Canada to Steele City, Nebraska, and includes pumping stations 27 and 29 in Kansas and their associated power lines.

The proposed Project requires multiple activities at different stages of construction and operation. Each of these may result in different effects to ABB depending on when during the life cycle of the ABB the activities occur. These activities include preconstruction survey and staking of all proposed Project areas. Within the ROW, construction activities would include vegetation clearing; top soil removal and grading; trench excavation, pipe fitting, lowering, welding, inspection, hydrostatic testing, and backfilling and clean up; reclamation activities, such as re-contouring where necessary, soil decompaction and seeding. Post-construction reclamation of all temporary ancillary sites would also involve decompaction of soil where necessary and re-seeding. Borrow material would be used to back fill the pipe trench; for road construction or upgrading and road crossings, and preparation of ancillary sites, as necessary. The operation of the proposed Project would cause increases in temperature around the pipeline as the heat generated by the flowing oil dissipates from the pipe through surrounding soil. Conservation measures have been incorporated into the project to avoid and minimize adverse impacts to federally listed species including the black-footed ferret, whooping crane, pallid sturgeon, least tern, piping plover, ABB, and western prairie fringed orchid to provide for their conservation.

Pre-construction Activities

The pipeline ROW and ancillary sites would be surveyed and staked prior to construction. To the extent that surveying and staking would take place during the summer periods when ABB are above ground, there is a potential of injury to or mortality of ABB from collision or crushing by truck or other vehicles used in ABB habitat in South Dakota and Nebraska. Hoback et al. (2012) found that 99 percent of a closely related species *(N. marginatus)* survived when a pickup was driven and a turn was made over soil containing those individuals; in contrast, 77.2 percent of the beetles survived when a pickup was parked over the soil containing individuals. When working in suitable ABB habitat in Tripp, Keya Paha, and Holt counties, all parking and staging areas will be pre-located within the approved construction footprint. Vehicle traffic used in support of preconstruction activities will be confined to approved access roads when accessing the construction site.

Figure 2: ABB Habitat Ratings along Pipeline Route in South Dakota and Nebraska.

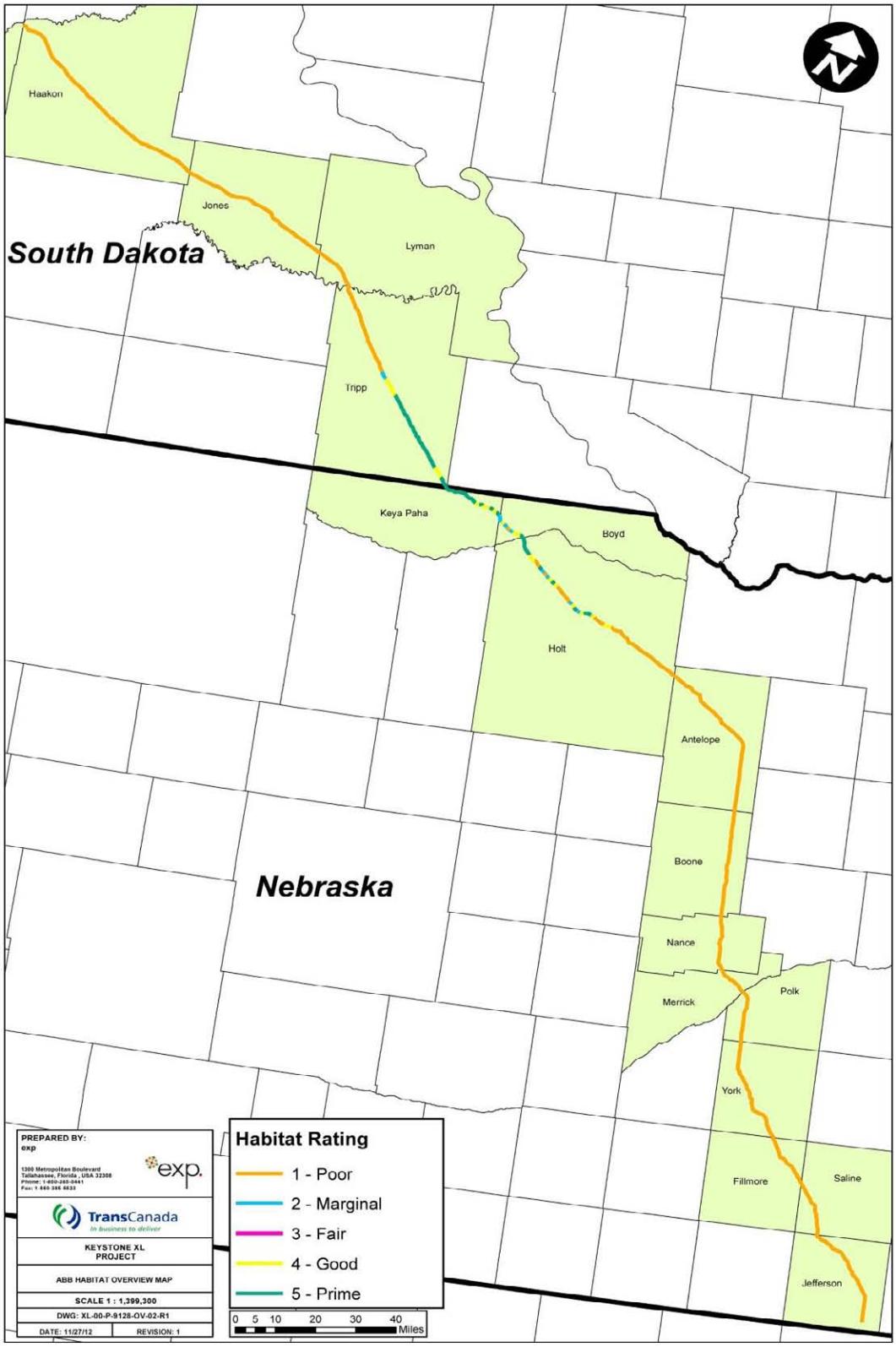

Table 7. Suitability Ratings of ABB habitat for the pipeline route in South Dakota.

County	MP	Prime	Good	Fair	Marginal	Poor	Notes
Tripp	566				x		Agricultural lands with creek bottoms
Tripp	567				x		Agricultural lands with creek bottoms
Tripp	568		x				Grassland Transition Zone
Tripp	569		x				Grassland Transition Zone
Tripp	570		x				Grassland Transition Zone
Tripp	571		x				Grassland Transition Zone
Tripp	572		x				Grassland Transition Zone
Tripp	573	x					Soil changes to sandy loam, drier
Tripp	574	x					Sub-irrigated Meadows
Tripp	575	x					Sub-irrigated Meadows
Tripp	576	x					Sub-irrigated Meadows
Tripp	577	x					Sub-irrigated Meadows
Tripp	578	x					Wet meadows
Tripp	579	x					Sub-irrigated Meadows
Tripp	580	x					Sub-irrigated Meadows
Tripp	581	x					Sub-irrigated Meadows
Tripp	582	x					Sub-irrigated Meadows
Tripp	583	x					Sub-irrigated Meadows
Tripp	584	x					Sub-irrigated Meadows
Tripp	585	x					Sub-irrigated Meadows
Tripp	586	x					Sub-irrigated Meadows
Tripp	587	x					Includes pump yard 20 site 1
Tripp	588	x					Sub-irrigated Meadows
Tripp	589	x					Sub-irrigated Meadows
Tripp	590	x					Sub-irrigated Meadows
Tripp	591	x					Sub-irrigated Meadows
Tripp	592	x					Sub-irrigated Meadows
Tripp	593	x					Sub-irrigated Meadows
Tripp	594	x					Sub-irrigated Meadows
Tripp	595		x				Upland, sandier, drier, hayed
Tripp	596		x				Upland, sandier, drier

County	MP	Prime	Good	Fair	Marginal	Poor	Notes
Tripp	597		x				Upland, sandier, drier
Tripp	598	x					Includes area for pump station-21 and access road
Tripp	599	x					Sub-irrigated Meadows
Tripp	600	x					NE border
Total Miles		**25**	**8**	**0**	**2**	**0**	

Table 8. Suitability ratings of ABB habitat for the pipeline route in Nebraska.

County	MP	Prime	Good	Fair	Marginal	Poor	Notes
Keya Paya	601	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	602	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	603	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	604	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	605	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	606	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	607	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	608	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	609	x					Includes access road 304.
Keya Paya	610		x				At Wolf Creek. Includes access road 305. Disturbance around house
Keya Paya	611	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	612		x				Some terracing and agriculture.
Keya Paya	613		x				State Highway 12, upland.
Keya Paya	614	x					Open range.
Keya Paya	615		x				Modest agricultural disturbance.
Keya Paya	616	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Keya Paya	617				x		Includes access road 306, along row crop.
Boyd	618				x		Includes access roads 307 and 308
Boyd	619		x				Rangeland or hayfields with somewhat dry

County	MP	Prime	Good	Fair	Marginal	Poor	Notes
							conditions or absence of cottonwoods.
Boyd	620				x		Row crop agriculture or alfalfa fields in the ROW.
Boyd	621					x	Center pivots.
Boyd	622				x		Row crop agriculture or alfalfa fields in the ROW.
Boyd	623		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Boyd	624		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Boyd	625	x					Niobrara River
Holt	626	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	627	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	628	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	629	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	630	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	631		x				Hayfield with alfalfa.
Holt	632		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	633					x	Center-pivot.
Holt	634					x	Center-pivot.
Holt	635	x					Includes access road 311.
Holt	636				x		Row crop agriculture or alfalfa fields in the ROW.
Holt	637					x	Row crop agriculture in all directions.
Holt	638				x		Row crop agriculture or alfalfa fields in the ROW.
Holt	639		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	640	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	641		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	642					x	Row crop agriculture in all directions.
Holt	643					x	Row crop agriculture in all directions.
Holt	644					x	Row crop agriculture in all directions.

County	MP	Prime	Good	Fair	Marginal	Poor	Notes
Holt	645					x	Row crop agriculture in all directions.
Holt	646					x	Row crop agriculture in all directions.
Holt	647				x		Row crop agriculture or alfalfa fields in the ROW.
Holt	648		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	649	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	650				x		Row crop agriculture or alfalfa fields in the ROW.
Holt	651		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	652	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	653	x					Wet meadow habitat used for grazing or haying. No agricultural disturbance nearby.
Holt	654		x				Pump station 22 is in marginal habitat because the range west is prime but a center-pivot is directly east.
Holt	655					x	Row crop agriculture in all directions.
Holt	656					x	Row crop agriculture in all directions.
Holt	657					x	Row crop agriculture in all directions.
Holt	658		x				Rangeland or hayfields with somewhat dry conditions or absence of cottonwoods.
Holt	659		x				Connects to 281 north of O'Neil/
Total Miles		**23**	**16**	**0**	**8**	**12**	

The capture relocation method, which is discussed later in the BO, will also be applied in Nebraska prior to Project construction. The ABB will be impacted though implementation of this avoidance and minimization measure as described below.

Construction Activities

Project activities would result in a variety of temporary and permanent effects to the ABB and its habitat. If construction occurs during periods when ABB are active, movement of vehicles, especially heavy equipment and other human activities in the ROW or on ancillary construction sites could cause mortality or injury of adult beetles and larvae through soil compaction. Project construction activities such as clearing and grubbing of trees and shrubs, vegetation removal, grading, removal and stockpiling of topsoil, trenching, pipe laying, soil backfilling and compaction, and final grading and reclamation activities would occur in the pipeline ROW. These ROW construction activities and construction of temporary access roads in grassland areas would result in temporary habitat loss, temporary habitat fragmentation, and/or alteration of suitable ABB

habitat. Habitat degradation from human activities, soil compaction, and vegetation disruption in pipe yards, construction camps and contractor yards would result in similar temporary loss and fragmentation of ABB habitat. The extent of such habitat loss would depend on the time necessary to successfully restore affected grassland habitats after project construction. These actions would likely cause direct injury or mortality of ABB adults, larvae, and eggs by crushing or exposure to desiccation during soil excavation.

Construction of above-ground pump stations (i.e., pump station numbers 21, 22) and construction of power lines to service these pump stations may cause the permanent loss of the ABB habitat. The proposed pump stations in ABB grassland habitat in South Dakota and Nebraska are located along or between roads that already affect ABB habitat to some extent and leave a small permanent footprint (5-15 acres), and Project facilities would not provide habitat to competing wildlife. No ABB habitat would be affected by construction of a power line to pump station 21 in South Dakota. However, there is somewhat degraded ABB habitat in the vicinity of pump station 22 in Nebraska. In recognition of the potential impact to the ABB, NPPD has agreed to schedule substation and line construction activities for the line segment serving pump station 22 for during the ABB dormant or inactive time in the winter when soil would be frozen to avoid soil compaction (September 15 to April 1).

Given the small size of the pump station footprints, lack of ABB habitat along the power line route in South Dakota and commitment made to avoid ABB along the power line route in Nebraska, the effect of that loss in terms of habitat fragmentation of large extensive grassland landscapes is likely not substantial.

Amount of ABB Habitat Affected

Permanent loss of ABB habitat shown in Tables 9 (South Dakota) and 10 (Nebraska) results from: a) habitat covered by the pipeline pump stations (i.e., pipeline pump stations being built on ABB habitat) and b) ABB habitat areas in South Dakota and Nebraska rendered permanently unsuitable habitat by heat dissipating from the operating pipeline. All other Project-related impacts to grasslands should be temporary as shown in Tables 9 (South Dakota) and 10 (Nebraska) and limited to the time necessary for successful post-construction habitat restoration. It is anticipated that the construction methods of replacing topsoil and re-establishing natural vegetation would cause restoration of natural soil hydrology within the construction ROW and avoidance of long-term impacts to ABB habitat.

South Dakota

In South Dakota, the Project ROW and ancillary sites during construction and operation would affect approximately 628.8 acres of land with reasonable potential for occurrence of the ABB (Table 9). Of this 628.8 acres south of Highway 18 in Tripp County, 401.8 acres (63.9 percent) are classified as prime ABB habitat, 117.1 acres (18.6 percent) are good ABB habitat, 80.0 acres (12.7 percent) are fair habitat, and 29.9 acres (4.7 percent) are considered marginal habitat. Within the affected area, 526.28 acres would be temporarily lost up to 4 years or longer, depending on rainfall and success of restoration efforts. Construction and operation of the Project would cause the permanent loss of more than 102.51 acres of ABB habitat in Tripp County due to pump stations and the 22-foot-wide strip centered on the pipeline and affected by heat dissipating through the soil (see Operation of the Project, Thermal Effects from Heat Dissipation).

Table 9. Estimated ABB habitat acreage impacts in South Dakota (DOS 2012).

Permanent Impact[a]	Poor	Marginal	Fair	Good	Prime
Permanent Easement (CL ROW [b])	0.00	5.34	0.00	21.34	66.14
Pump Stations	0.00	0.00	0.00	0.00	8.42
Permanent Access Road Easement	0.00	0.00	0.00	0.00	1.27
Total Acres	**0.00**	**5.34**	**0.00**	**21.34**	**75.83**
Temporary Impact[c]					
Temporary Easement (CL ROW)	0.00	20.96	0.00	85.00	263.25
Additional Temporary Workspace (CL ROW)	0.00	3.37	0.00	10.80	30.91
Auxiliary Site	0.00	0.00	80.01	0.00	29.50
Temporary Access Road Easement	0.00	0.20	0.00	0.00	2.28
Total Acres	**0.00**	**24.53**	**80.01**	**95.80**	**325.94**

[a] Permanent impacts are caused by the placement of permanent above-ground facilities (i.e., pump stations), and the 22-foot corridor spanning the center of the pipeline ROW affected by heat dissipation from the operating pipeline (see *Operation of the Project* subsection, below).
[b] CL ROW = centerline of the ROW.
[c] Temporary impacts are caused by temporary construction workspace, and construction of temporary access roads.
Note: Miles are the same for both temporary and permanent impacts as both are calculated using the pipe centerline.

Nebraska

In Nebraska, the Project would affect approximately 1,138.8 acres confirmed to be currently occupied by the ABB. Of the 1,138.8 acres, 427 acres (37.5 percent) are classified as prime ABB habitat, 269 acres (23.6 percent) are classified as good ABB habitat, 13.44 acres (1.2 percent) are fair habitat, 159 acres (14 percent) are marginal habitat and 270.3 acres (23.7 percent) are considered poor ABB habitat (Table 10); ABBs would be least likely to occur in poor habitat. Within the range of the ABB, 966.53 acres of habitat would be temporarily lost, for approximately four years or longer, depending on rainfall and success of restoration efforts. Construction of the pump stations and operation of the pipeline (see Operation of the Project, Thermal Effects from Heat Dissipation) would cause the permanent loss of approximately 172.30 acres of ABB habitat.

Mortality Estimates

South Dakota: The ABB may occur over 35 miles of the proposed pipeline route in South Dakota. However, no recent ABB presence/absence surveys were conducted along the pipeline ROW or on other Project lands in South Dakota as they were in Nebraska. However, the mortality of adult ABB caused by construction of the pipeline can be estimated by combining the number of acres affected within the ABB range in southern Tripp County (from Table 9, earlier), with the number of ABB estimated to occur per acre [from the Backlund et al. (2008) population estimate for southern Tripp County], and then using a habitat quality modifier to adjust for the likelihood of higher numbers of ABB in better habitat.

For example: 1,000 ABB/54,363 acres (Backlund et al. 2008) = 0.01839 ABB estimated per acre.

Table 10. Estimated ABB habitat acreage impacts in Nebraska (DOS 2012).

Permanent Impact[a]	Poor	Marginal	Fair	Good	Prime
Permanent Easement (CL ROW[b])	32.00	21.33	0.00	42.46	61.47
Pump Stations	0.05	14.99	0.00	0.00	0.00
Permanent Access Road Easement	0.00	0.00	0.00	0.00	0.00
Total Acres	**32.05**	**36.32**	**0.00**	**42.46**	**61.47**
Temporary Impact[c]					
Temporary Easement (CL ROW)	128.00	83.66	0.00	169.78	243.25
Additional Temporary Workspace (CL ROW)	5.63	3.84	0.00	9.75	16.64
Auxiliary Site	104.62	30.10	0.00	33.36	90.65
Temporary Access Road Easement[d]	0.00	5.08	13.44	13.70	15.02
Total Acres	**238.25**	**122.68**	**13.44**	**226.59**	**365.57**

[a] Permanent impacts are caused by the placement of permanent above-ground facilities (i.e., pump stations), and the 22-foot corridor spanning the center of the pipeline ROW affected by heat dissipation from the operating pipeline (see *Operation of the Project* subsection, below).
[b] CL ROW = centerline of the ROW.
[c] Temporary impacts are caused by temporary construction workspace, and construction of temporary access roads.
[d] Includes potential site locations in Spread 8
Note: Miles are the same for both temporary and permanent impacts as both are calculated using the pipe centerline

We do not have an estimate of ABB abundance in the immediate area of the Project; however, we do have an assessment of habitat quality. It is reasonable to assume that higher quality, prime habitat would likely support larger numbers of ABB than lower quality marginal habitat. For this reason, we assigned weighted habitat modifiers that were agreed upon by the USFWS, Department, and Keystone during the course of meetings as a way of determining ABB abundance by habitat quality ratings known from along the Project. These habitat modifiers are: prime = 4, good = 3, fair = 2, marginal = 1, poor = 0 (i.e., encountering a beetle in poor habitat is unlikely) and were used to weight higher quality habitats in our calculation. Using the acres (temporary and permanent combined) provided in the Table 9, approximately 38.67 adult ABB may be killed or injured as a result of construction activities in South Dakota (Table 11).

If construction of the pipeline and ancillary areas takes place during the breeding season in mid-summer (i.e., June1 through August 31), as would be expected given the type and extent of the project, larvae and eggs would be destroyed as well as adults. We calculated the amount of anticipated loss as follows:

Assuming a 50:50 sex ratio in the population, there may be 19.33 pairs of ABB affected by construction (38.67/2). Given the typical range of 12-18 larvae per brood, 15 larvae or eggs per pair of ABB (i.e., 290.02 offspring) (19.33 x 15) might be destroyed by construction activities on the ROW and other Project lands in South Dakota. Thus, the total number of ABB destroyed due to Project construction starting during the breeding season (June-August) in South Dakota would be 328.69 ABB (38.67 adults+290.02 offspring). This is the total anticipated number of ABB that

would be expected to be *destroyed* as a result of Project construction because adults and larvae could not be captured and relocated when they would be underground.

Table 11. Estimated number of ABB killed or injured as a result of Keystone XL pipeline construction in Tripp County, South Dakota.

Habitat Quality	Acres Impacted	ABB/Acre	Quality Modifier	Total ABB
Prime	401.8	0.018	4	28.93
Good	117.1	0.018	3	6.32
Fair	80.0	0.018	2	2.88
Marginal	29.9	0.018	1	0.54
Poor	0	0.018	0	0
Total	**628.8**			**38.67**

The USFWS is required to use the best information available in its section 7 consultations, but when estimating ABB densities based on mark-recapture studies, we also recognize that the "best" information available usually includes some uncertainty. Estimates of population densities, in South Dakota, as discussed above, are based on mark-recapture field studies, but these are somewhat dated and should not be compared with the population estimates for Nebraska. Mark-recapture studies estimate the number of animals in a population based on the proportion of marked animals recaptured during a series of trapping efforts. The method has limitations, particularly when wide-ranging and at times, potentially inaccessible (when breeding underground) species such as ABB are involved. Further, ABB are influenced by weather conditions at the time of trapping and other variables and insect populations can be cyclic. These estimates are represented by specific numbers; we recognize that they represent more a sense of scale or magnitude rather than an exact representation of ABB individuals.

Nebraska: The ABB may occur over 47 miles of the proposed pipeline route in Nebraska. However, the number of ABB killed or injured as a result of construction activities is expected to be low due to implementation of pre-construction conservation measures (i.e., especially capture and relocation; and carrion removal, mowing, and windrowing) and because the pipeline was re-routed away from areas known to have suitable habitat and an abundance of ABB in Nebraska.

The mortality of adult ABB caused by construction of the pipeline can be estimated by combining the number of acres affected within the ABB range in Keya Paha and Holt counties in Nebraska (from Table 10, earlier), with the number of ABB estimated to occur per acre as calculated from survey data from Hoback (2012), and then using a habitat quality modifier to adjust for the likelihood of higher numbers of ABB in higher quality habitat using a similar approach as was done in South Dakota and describe above.

For example: 95 ABB/14,000 acres [based on survey data from Hoback (2012) where 28 locations captured 95 ABB and each pitfall trap is assumed to have the effective ABB survey range of 500 acres] = 0.007 ABB estimated per acre.

It is important to point out that 95 ABB captured in Nebraska could vary over time. The number of ABB per trap location in 2012 ranged from 0.2-7.0 and was likely influenced by habitat

suitability, drought conditions, or other ABB life history characteristics including the ability of the species to move and habit of moving underground during reproduction. Modifiers that reflect habitat quality are: prime = 4, good = 3, fair = 2, marginal = 1, poor = 0 (i.e., encountering a beetle in poor habitat is unlikely). Using the acres (temporary and permanent combined) provided in the Table 10, approximately 18.91 ABB may be killed or injured as a result of construction activities in Nebraska (Table 12).

If construction and use of auxiliary areas takes place during the breeding season in mid-summer, larvae and eggs would be destroyed as well as adults. We calculated the amount of anticipated loss as follows:

Assuming a 50:50 sex ratio in the population, there may be 9.45 pairs of ABB affected by construction (18.91/2). Given the typical range of 12 -18 larvae per brood, perhaps 15 larvae or eggs per pair of ABB (i.e., 141.75 offspring) (9.45 x 15) might be destroyed by construction activities on the ROW and other Project lands in Nebraska. Thus, the total number of ABB destroyed if Project construction would have started during the breeding season (June-August) in Nebraska would be 160.66 ABB (18.91 adults+141.75 offspring). Implementation of the capture relocation method prior to construction actions will occur in Nebraska, however, resulting in 141.75 ABB offspring impacted out of the 160.66 ABB total. Most of these impacts will result due to harassment from use of the capture relocation method but also a small amount may also be injured or destroyed by Project construction activities. As a normal part of their life cycle, adult or senescent ABBs die in the fall after they breed. Therefore, these deaths are not included in the calculation of the number of ABB that would be destroyed if construction occurs outside of the breeding season.

Table 12. Estimated number of ABB killed or injured as a result of Keystone XL pipeline construction in Keya Paha and Holt counties, Nebraska.

Habitat Quality	Acres Impacted	ABB/Acre	Quality Modifier	Total ABB
Prime	427	0.007	4	11.96
Good	269	0.007	3	5.65
Fair	13.44	0.007	2	0.19
Marginal	159	0.007	1	1.11
Poor	270	0.007	0	0
Total	**1138**			**18.91**

Capture Relocation Method

Biologists working on ABB have long supported the use of the capture relocation method as an effective ABB avoidance and minimization measure. The capture relocation method has been utilized as an avoidance measure for ABB in Nebraska for several years on large construction projects. The capture relocation method is not a favored practice in South Dakota given public concerns about relocating ABB to areas adjacent to private lands with suitable ABB habitat. Always of concern, however, was the amount of harassment, injury, and mortality that might be associated with use of the capture relocation method. There was a concern that use of this measure may convey as much harm to the species as the project in ABB habitat itself. Recent research,

however, has provided important insight on the effectiveness and level of injury, mortality, and harassment associated with use of the capture relocation method and appears to support its use as an avoidance and minimization measure (Butler 2011; Hoback 2011b, 2012b).

We determined that use of the capture/relocation method in Nebraska is likely to reduce the level of anticipated injury and mortality of ABB (141.75 offspring) resulting from Project construction down to 22.49 ABB (15.03+0.124+7.34). That said, take of ABB through use of the capture relocation method would still occur and this would result in harassment to 119.3 ABB. Essentially, the capture relocation method involves the capture of ABB in a baited pitfall trap and relocation of individuals to suitable habitat that is at least 5 miles away. Recent research shows that there is a level of injury and death that can be expected, however, when using the capture relocation method. However, the level of injury and death that occurs as a part of the method is far less than what might be expected should the capture relocation method not be used. An estimate of the total amount of injury and death can be calculated by considering the effectiveness of the capture/relocation method, estimated injury and mortality associated with use of the capture/relocation method, and estimating level of injury and mortality that might occur once ABB are released at the relocation site.

Method Effectiveness

Butler (2011) indicated that use of the bucket method (used in the capture relocation method) does not result in the removal of 100 percent of ABB from a project site. In that study, it was determined that after 5 days of trapping, 89.4 percent of the burying beetles were removed leaving 10.6 percent of the ABB uncaptured. The likely cause for ABB not being captured is because they are not hungry and therefore not attracted to a bait source.

Thus, 141.75 ABB multiplied by 0.106 gives 126.72 ABB captured and relocated and 15.03 ABB that would likely not be captured at the Project site, but remain there and could be subject to injury or death.

Capture and Handling

Two additional sources of injury or death that must be calculated when using the capture relocation method are the number of the ABB injured or killed due from: a) capture and handling prior to relocation to a suitable habitat and b) relocation and associated intra- and inter-specific competition that may arise over scarce resources (i.e., carrion) and/or predation especially if the ABB is stressed after capture. During 2011, Hoback (2011b) reported that 5 out of 5,106 ABB captured died during the course of capture, but prior to relocation. Hoback (2011b) reported that two ABB were eaten by a shrew, one died and was partially consumed by another ABB (cause of mortality unknown, but possibly due to intraspecific competition with other ABB captured in the bucket), one ABB was eaten by hister beetles (likely due to resource competition), and another was killed by ants.

Thus, 0.000979 ABB would be expected to die during capture and handling prior to relocation (5/5,106). Multiplying 126.72 ABB captured (using the capture/relocation method) by 0.000979 equals 0.124 ABB that would be expected to be injured or die during the capture and handling phase of the capture relocation method, but prior to relocation of individuals. Thus, the resulting number of ABB remaining to be relocated is 126.60 (126.72-0.124).

Fate of Relocated Individuals

It is difficult to determine the injury or mortality that might occur to ABB once individuals are relocated to suitable habitat at least 5 miles from the site of Project disturbance. Stress, intra- and interspecific competition, predation, and other unknown factors might have a negative impact on relocated ABB or there may be no impact. For example, in August intra-specific competition may occur only at feeding sites. During the June activity period, increased competition for available carcasses required by a breeding pair may occur at the relocation sites. In 2012, Hoback (2012b) conducted research on the effect of relocating ABB by comparing the recaptures of a surrogate species *(N. marginatus)* at a control site with recaptures at a relocation site. Although no significant differences were found, mean recaptures of relocated beetles were lower (3.7 percent) than for the control (10 percent) or resident beetles (9.0 percent). Although there was no statistical difference (i.e., no effect found on the ABB resulting from relocation), we decided to utilize data from the study to estimate the level of harassment, injury, and/or mortality that might occur. An average (9.5 percent) was calculated from the control and resident beetles recapture percentages. The amount of take (5.8 percent) that could be expected based on data from a single year of a two-year study was determined by subtracting the 3.7 percent from 9.5 percent.

Thus, multiplying 126.60 (ABB that would be expected to be captured and relocated) by 0.058 equals 7.34 ABB that would be expected to be harassed, injured, and/or killed following the relocation phase of the capture relocation method. A total of 119.26 ABB could be considered successfully captured and relocated (126.60 – 7.34).

We recognize that determining the level of ABB survivorship after individuals are relocated remains difficult. For example, when considering the data from Hoback (2012b), one may also inquire as to the fate of 96.3 percent of the relocated beetles (i.e., 100 percent – 3.7 percent). As a general rule, ABB recapture rates during mark recapture studies shows that recaptures are almost always low. For example, Jurzenski et al. (2011) conducted a mark recapture study to determine the population of ABB in several counties in the Nebraska Sandhills. In that study, 378 individual ABB were captured in 2003, but only 9.1 percent were recaptured in the 10-day surveys. Hoback (2012b) found a 12.7 percent recapture rate for control burying beetles across all sites over a 10-day trapping period following the capture of 25,163 individual *N. marginatus*. Mark recapture and control trials in the aforementioned studies reported low recapture rates *even though the beetles were released where they were captured and they were not relocated to a different location.* We recognize that relocated ABB could be subject to injury or mortality due to increased risk of predation or competition of resources, but beetles may also adapt to relocation sites. Given the Hoback (2012b) and Jurzenski et al. (2011) recapture results, the USFWS believes that ABB survivorship of relocated beetles is high and comparable to non-relocated beetles.

Summary

Thus, a total level of ABB *injury and mortality* resulting from use of the capture relocation method and Project construction in South Dakota and Nebraska is 351.18 ABB. This was determined by summing the effectiveness of the capture/relocation method (possibly 15.03 ABB left at the construction site after capture and relocation), estimated injury and mortality associated with capture and handling prior to relocation (0.124 ABB), and estimated injury and mortality

associated with relocation (7.34 ABB), and take that would be expected to occur in Tripp County, South Dakota (290.02 offspring+38.67 adult ABB). Actual handling of ABB during capture and relocation is a take through *harassment* as defined by section 9 of ESA (see, 50 CFR §17.3). Thus, the take associated with harassment of ABB through use of the capture relocation method in Nebraska is 126.72 ABB. We have concluded that take which occurs as a result of harassment associated with use of the capture relocation method is preferable to take from injury and mortality that would be expected should the capture relocation method not be used. Therefore in summary, the total amount of take that would be expected to occur through use of the capture relocation method and resulting from Project construction is 477.90 ABB. We have determined that this accounts for all sources of take (i.e., harassment, injury, mortality) as defined by ESA. The project will start during the breeding season in South Dakota and thus adults and larvae are included in the take calculation.

In the previously proposed Project, the pipeline route crossed the Nebraska NDEQ-identified Sandhills Region. Surveys of ABBs showed that this area had high densities of ABB which led to a concern that the capture relocation method, which requires five trap nights, might not have been sufficient to capture all the beetles. In circumstances where beetles could not be cleared due to their high abundance, the USFWS and NGPC agreed to include an additional level of take for ABB. Since the new proposed Project avoids the area where ABB are abundant, there is no longer a concern that five trap nights will be inadequate to clear the area of ABBs.

Miscellaneous Impacts of Construction Activities

Artificial lighting during construction has the potential to attract ABB, as they are known to be positively phototrophic. Lights used during nighttime construction can disrupt ABB foraging behavior and increase predation on ABBs. However, lighting used during construction activities would be down-shielded to reduce the level of light pollution from the activity and limit the impacts to ABB to a smaller area. Localized contamination of soil from diesel fuel or oil spills could occur during refueling or maintenance. However, in the event of a spill, Keystone would implement a SPCCP for potential construction-related fuel spills which would mitigate or avoid any short-term impacts (DOS 2012, Appendix D). In addition, ABB would be unlikely to occur in areas that had been stripped of vegetation, such as the ROW or construction yards, where the refueling and maintenance of equipment would be done. Additionally, all fueling vehicles would carry sufficient absorbent material to contain and facilitate removal of up to moderate fuel spills.

Foraging efficiency of local ABBs would be reduced temporarily by construction activities and permanently from habitat fragmentation due to placement of permanent above ground facilities (pump stations in South Dakota and Nebraska). Reduced availability of carrion may result from greater competition for carrion from vertebrate scavengers attracted to edge effect of pipeline facilities.

Operation of the Project

Thermal Effects from Heat Dissipation

Transport of oil through the pipeline creates heat that is dissipated through the soil to the ground surface. A geothermal model was used to predict soil temperature changes at the ground surface and at various depths and distances from the center of the pipeline (Hazen 2011). Combined with

general assumptions about ABB life history, it is possible to estimate whether adverse impacts to ABB would likely result from the increases in soil temperatures caused by operation of the pipeline.

In northern areas of the ABB range, such as Nebraska and South Dakota, soil temperatures decline to below freezing during the winter when the beetles are underground. The ABB in northern parts of their range likely have adapted a survival strategy that requires cooling to or very near freezing to slow metabolism such that fat reserves are sufficient to last until emergence in late May or early June. Whether ABB would suffer mortality from starvation if they were prohibited from freezing is not known, but the USFWS believes that substantial decreases in the length of time that soil temperatures are below freezing might cause the beetles to use too much fat during the winter months when they are underground. In addition, warming of the soil from the pipeline may also cue the beetles to emerge prematurely (i.e., prior to midnight air temperatures reaching about 60 degrees Fahrenheit (F)). This may result in ABBs coming to the surface when air temperatures preclude foraging activity, or to use more resources to re-bury themselves in the soil, assuming temperatures are warm enough to permit such activity. Additionally, the early emergence of ABB may affect their ability to reproduce successfully because they would temporarily be out of synchrony with the vast majority of ABB in the region (i.e., ABBs overwintering outside the zone of temperature change likely would remain underground for days or weeks until natural environmental cues caused them to emerge).

Impacts from heat dissipation vary with the depth that ABBs overwinter in the soil, and there are a broad range of depths reported in the literature. Schnell et al. (2008) noted in field experiments in Arkansas that ABB overwintered at a depth of 20 cm (approximately 8 inches). However, most information refers to depth of carcass burial associated with reproduction and depths of reproductive chambers are described as “several inches” Ratcliffe (1996, p. 46), or up to 60 cm underground (approximately 24 inches) (Wilson and Fudge 1984, Pukowski 1933, and Hinton 1981; as cited in Scott 1998). The ABB is the largest carrion beetle in North America (Ratcliffe 1996), and Eggert and Sakaluk (2000) found that larger beetles buried carcasses deeper in the soil.

Thermal impacts from operation of the proposed pipeline were evaluated by conducting an analysis of modeled temperature changes (compared to background) at depths of 6 inches, 12 inches and 24 inches, and at various distances from the pipeline center line (Table 13). Two basic soil types at different water saturations were included in the analysis. The temperature modeling predicted that background temperatures (i.e., at 80 feet from the center line of the pipe) would be below freezing during the winter at a depth of 24 inches in all but the driest of the two types of soils (Table 13). In the three sandy soils prevalent in the Sandhills (i.e., SH4, SH5, and SH6), background temperatures at 12 inches depth equaled or fell below 32.0 degrees F. during seven or eight two-week intervals during the winter. However, at 11 feet from the pipe (22-foot-wide sub corridor), soil froze during four and six two-week intervals (i.e., in SH5 and SH6), and not at all in SH4 soils (Table 13). Modeling showed a reduction in the incidence of frozen soil from 25 percent (twice) to 100 percent (twice) at a depth of 12 inches and 11 feet from the pipe center line.

Because the model produces output at two-week intervals, the duration of temperature shifts would likely be substantial, and would adversely affect ABB overwintering at those depths. While acknowledging uncertainties and assumptions associated with the modeling and biology of the ABB, the USFWS nevertheless considers the modeled temperature shifts substantial enough to render habitat out to 11 feet from the pipeline (i.e., a 22-foot width) unsuitable to serve as wintering habitat for the ABB and would be considered a permanent habitat loss. It is possible that

the impact extends beyond the 22-foot width, but 11 feet from the pipe center was the maximum modeled distance that could be compared to background temperatures. Therefore, permanent impacts to ABB habitat from operation of the pipeline include the central 22-foot width affected by the heat generated during pipeline operation along the 87-mile long segment of pipeline located in ABB habitat in South Dakota and Nebraska.

Crude Oil Spills

During operation, the proposed Keystone XL pipeline is considered to be a permanent fixture underground, with operations and maintenance occurring nearly continuously for 50 years. DOS (2012) has stated that adverse effects to ABB resulting from a crude oil spill from the operating pipeline are highly improbable due to: a) the low probability of a spill, b) the low probability of a spill coinciding with the presence of ABBs, and c) the low probability of an ABB contacting the spilled product (DOS 2012).

The spill risk to a species is based upon the length of pipeline crossing its migration habitat/habitat and the spill risk incident rate as described in Section 4.14 of the Draft Supplemental Environmental Impact Statement (DOS 2013). For example, based upon a 119 mile pipeline segment that passes through native grass prairie for Sprague's pipit habitat and an incident spill risk of 0.00025 incident/ mile-year, the estimated spill risk occurrence within the habitat is 34 years or 0.030 incidences per year. For other species along the Proposed route, such as ABB, the distance of a species habitat crossed by the Proposed project route is less than that crossed for Sprague's pipit habitat; therefore, the spill risk occurrence for these other species is lower than the 0.030 incidents per year (i.e., more than 34 years before an incident occurs).

Spill volume cannot be predicted for any species mitigation habitat/habitat; however, because 80% of historical spill volumes are less than 50 barrels (bbls), the probable spill volume could be less than 50 bbls which could result in a radial impact from the pipeline of up to 112 feet (34.1 meters)(DOS 2013).

While there is still a very low probability that individual ABBs would come in contact with the oil from a spill, the more likely affect to ABB would come from soil compaction and soil disturbance during spill clean-up activities. We are not exempting any take due to oil spills because a spill is not reasonably certain to occur. If a spill would occur, however, Keystone should notify the U.S. Environmental Protection Agency (USEPA). The USEPA would consult with the USFWS on spill containment, clean-up, and restoration measures to avoid, minimize, and compensate for impacts to the ABB.

Pump Station Lighting

Lights associated with operation and security of above-ground pump stations may have an adverse effect to ABB. However, only one light above each pump station door would be used during pipeline operation and those lights would be of sodium vapor-type and down-shielded in areas within the range of ABBs in South Dakota (Pump Station 21) and Nebraska (Pump Station 22). Use of sodium vapor-type lights and down-shielding lessens the likelihood that ABB would be attracted to them.

Post-construction and Reclamation

Post-construction activities associated with reclamation, such as grading of lands to approximate pre-construction contours, would not result in additional mortality of beetles on already disturbed lands. On auxiliary lands where the grass may not have been removed, soil compaction from vehicular traffic would have rendered this area unusable for reproduction by ABB (i.e., ABB cannot bury carcasses in compacted soils). Therefore, subsurface tillage of proposed Project lands to loosen compacted soils as part of the reclamation process likely would not result in additional ABB mortality. However, if soil erosion occurs and extends to off-project lands, such erosion may disturb or expose ABB broods or over-wintering adults to adverse environmental conditions if they are displaced. Indirect mortality of eggs and larvae could occur if adults abandon active broods in occupied habitat as a result of disturbance or habitat disruption.

Table 13. The incidence of modeled soil temperatures at freezing or below (i.e., ≤ 32º F. at various distances from pipeline center line, and at different depths. Incidence of temperatures ≤ 32º F. are described in W-X-Y-Z format, where W is the incidence of freezing at the ground surface, X is the incidence of freezing at a depth of 6 inches, Y is the incidence of freezing at 12 inches and Z is the incidence at 24 inches deep. Temperature output is modeled at 2-week intervals. Differences in incidence of frozen soil between background (80 feet) and at 11 feet from the center of the pipe (i.e., a 22-foot width) are shown in bold, red, italics.

	Silty Loam Soil			Sandy Soil		
Distance from Center Line	**SH1**	**SH2**	**SH3**	**SH4**	**SH5**	**SH6**
80 ft. (BkGr)	8-***9***-***6***-0	8-8-***7***-***3***	9-***8***-***8***-***2***	8-***8***-***7***-0	8-***8***-***7***-***4***	9-***8***-***8***-***5***
11 ft.	8-***7***-***0***-0	8-8-***5***-***0***	9-***7***-***6***-***0***	8-***5***-***0***-0	8-***7***-***4***-***0***	9-***7***-***6***-***0***
7 ft.	8-5-0-0	8-6-0-0	7-6-0-0	7-3-0-0	7-5-0-0	7-6-0-0
3 ft.	8-2-0-0	6-0-0-0	5-0-0-0	6-0-0-0	4-0-0-0	4-0-0-0

Regular post-construction maintenance of the ROW through mowing in wooded areas may cause mortality of adult ABB exposed to mowing equipment. However, grassland areas would likely not be mowed as a part of regular maintenance of the ROW (J. Schmidt, pers. comm.). If mowing of the ROW reduces vegetation height to less than 8 inches, the soil may dry to the point that: a) ABBs have difficulty burying carcasses, b) soil may not structurally support reproductive chambers, or c) adult or larval ABB become desiccated (Bedick 2006). Any of these potential consequences of leaving grass and vegetation less than 8 inches tall could adversely affect ABB reproduction.

Exotic, invasive grasses are disruptive to the native ecosystem (Smith and Knapp 2001). Sod-forming, cool season grasses do not promote conservation of the ABB because they slow carcass burial (S. McPherron and W.W. Hoback, pers. comm.). Additionally, genetically modified cultivars of prairie grasses or non-local seed mixes can affect plant community structure, ecosystem function, and the short- and long-term success of grassland restorations (Gustafson et al.

2004; Annese et al. 2006, Martin et al. 2005). For this reason, Keystone will reseed disturbed areas in prime, good, fair, and marginal ABB habitats with a seed mix that matches the Con/Rec designation of the land impacted (see Appendix R of the SDEIS) unless otherwise instructed by the landowner to seed an alternative seed mix. Should the landowner-directed seed mix be determined to not result in full restoration as stipulated in the Reclamation Performance Bond, then the subject acreage amount reseeded will be debited from temporary ABB habitat impacts and credited to permanent ABB habitat impacts and the total amount to the ABB Habitat Conservation Trust will be recalculated.

Effects of Mitigation and Conservation Measures

The following agreements were developed during formal consultation and will go into effect if and only if the Department determines to issue a permit for the proposed Keystone XL pipeline and prior to construction in the states of South Dakota and Nebraska.

Monitoring Program

The Department would retain a third-party contractor to develop and implement an ABB monitoring program or ABB monitoring would be included as a possible wider project level monitoring program for the proposed Project. The program would include monitoring of incidental take of ABB. This monitoring program would be approved and overseen by Department in consultation with USFWS. Keystone would fund the monitoring program prior to construction of the proposed Project.

Monitoring would not replace the environmental quality control plan or the actions that Keystone would put in place, but is in addition to those tasks and would serve as a quality control monitor on behalf of the Department. The monitoring program would include but is not limited to, a combination of site visits, aerial surveillance, and spot checks that would be recorded in monitoring logs with photographs to provide a reasonable level of confidence that avoidance, minimization, and mitigation measures are followed. Monitoring would look at, but is not limited to, replacement of top soil; compliance with seeding specifications and seed mix; erosion control; that construction impacts match permitted footprint, and habitat restoration for the ABB. This monitoring program would identify the number of acres disturbed by the project in the states of South Dakota and Nebraska and the number of acres restored as described in the Reclamation Performance Bond stipulations (Appendix E). The information collected would be used to evaluate whether the impacts to ABB described in this BO are comparable to impacts that result from construction and operation of the proposed Project.

ABB Habitat Conservation Trust

The establishment of an ABB Habitat Conservation Trust as described in Appendix D would offset permanent and temporary losses of ABB habitat in South Dakota and Nebraska at ratios greater than 1:1, and thereby provide long-term benefits to ABB populations in those areas. Land crossed by the pipeline in South Dakota and Nebraska is almost entirely in private ownership. The ABB Habitat Conservation Trust would perpetually protect grasslands through conservation easement or purchase by fee title from willing landowners at ratios greater than 1:1, assuming lands temporarily disturbed are restored to conditions stipulated in the Reclamation Performance Bond (Appendix

E). Protection of privately-owned grasslands at greater than a 1:1 ratio would also incrementally offset habitat loss of grasslands from conversion to agriculture in the South Dakota and Nebraska. The number of acres of prime habitat lost would be mitigated at a 3:1 ratio, and the loss of good habitat would be mitigated at a 2:1 ratio.

These two classifications of quality habitat (combined) comprise 73 percent of the 274.84 acres permanently lost and 68 percent of the 1492.81 acres temporarily lost due to proposed Project construction and operation in South Dakota and Nebraska. Proper management and protection of grasslands through the Habitat Conservation Trust would more than offset permanent and temporary loss of ABB habitat due to construction and operation of the proposed Project and is consistent with recovery actions 1.23 and 5.3 in the Recovery Plan for the ABB (USFWS 1991).

Reclamation Performance Bond

To ensure restoration of disturbed areas within ABB habitat, Keystone would establish a Reclamation Performance Bond that includes the stipulated requirements in Appendix E. Written conditions would ensure this performance bond would be accessible and executed by the Department, or a third party contractor under direction of the Department, in the case that disturbed land in the ABB habitat area, as defined by the 2012 BA (DOS 2012), should fail to re-vegetate in a manner as outlined in Appendix E, <u>and</u> if Keystone fails to take corrective action. Release of funds pursuant to the Bond would be solely at the discretion of the Department after soliciting recommendations from USFWS. The establishment of the Reclamation Performance Bond serves as an additional back-up measure in the Project CMRP which would be undertaken by Keystone to successfully re-vegetate lands temporarily affected by the Project to vegetation conditions in surrounding areas.

Effects of Interrelated and Interdependent Actions

The USFWS is required to evaluate the effects of the action under consideration (i.e., Department potential issuance of a Presidential Permit enabling the proposed Project) "…together with the effects of other activities that are interrelated to, or interdependent with, that action." (50 C.F.R. § 402.02).

Power Lines to Pump Stations and Associated Substations

The construction of power lines to pump stations and the associated substations are interrelated and interdependent actions and may cause adverse impacts to ABB within the range of the species in Nebraska and South Dakota. These impacts might include mortality of ABB during construction of the power lines due to interaction with construction equipment during clearing of vegetation, soil compaction, and during excavation of holes or foundations for the power poles. Restoration of vegetation after construction would not likely cause adverse effects unless grading of undisturbed habitats are involved, and those instances should be infrequent. Maintenance of vegetation under the power lines may also result in ABB injury or mortality if mowing or use of herbicides or pesticides occurs during times when ABB are active above ground.

Only two of the 20 planned power line routes to pump stations would occur within the current occupied range of the ABB: power lines to pump stations 21 and 22 (DOS 2012). The power line

to pump station 21 would be built by Rosebud Electric Cooperative in South Dakota; alignment of that power line is unlikely to have an effect on the ABB given the lack of suitable habitat and anticipated minimal disturbance associated with the proposed power line project. The Nebraska Public Power District and Niobrara Public Power District will construct a power line to provide electrical service to pump station 22. Currently, the length and alignment of that power line is unknown, however, it appears, based on preliminary discussions that the line would be less than 5 miles in length and likely extend along an existing public roadway. Surveys for ABB done in that area did result in captures of the species in low abundance; the habitat in the area is considered marginal because it is partially overgrazed, drought-affected and several center pivots are present to irrigate row crops. Nevertheless, NPPD has agreed, in a letter dated March 4, 2013, to construct the power line during the winter months when the ground is frozen and ABB is inactive and hibernating below the frost line thereby avoiding compaction and negative impacts to the species. It is unlikely that ROW vegetation management would need to occur given that the power line would pass near corners of center pivots irrigation systems and over-grazed pasture. The power lines providing electricity to pump stations 27 and 29 in Kansas will have no effect on the ABB because there is no suitable habitat for the species there.

Big Bend to Witten 230 kV Transmission Line

In South Dakota, the principal population of ABB occurs south of Highway 18 in southern Tripp County. For this reason, impacts to ABB from construction of the pipeline Project were considered only south of Highway 18 (DOS 2012). The Big Bend to Witten 230 kV transmission line in Tripp County, South Dakota, occurs north of Highway 18, outside the southern Tripp County area where ABB occurs in substantial numbers. Therefore, impacts from this interrelated and interdependent Big Bend to Witten transmission line are not likely to result in adverse impacts to ABB.

Bakken Marketlink Project

Aside from the Keystone XL pipeline to transport the oil, this interrelated and interdependent project would consist of piping, booster pumps, meter manifolds, two storage tanks, and one operational tank near Baker, Montana. In addition, the project would include a proposed pipeline, approximately 5 miles long, originating at an existing Montana tank farm facility in Township 7N, Range 58 East, Section 4. The ABB does not occur in Montana, so the Bakken Marketlink Project would have no impact on the ABB.

Cumulative Effects

Cumulative effects are those effects of future, non-federal state, tribal, local government, and 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.

In addition to those projects with a federal nexus that undergo consultation, there are numerous actions that do not require federal funding, permitting, or authorization and consequently do not require consultation with the USFWS. Any of several private development projects may occur in South Dakota and Nebraska. Examples of these include conversion of native prairie rangeland to cropland.

When large areas of native woodland and native grasslands are affected, loss and fragmentation of these habitats incrementally reduce the recovery potential of ABBs by damaging the functionality of these supporting ecosystems. Philpott (2013) reported 1.3 acres of grassland was converted from grassland to cropland in Nebraska, South Dakota, Iowa, Minnesota, and North Dakota from 2006 to 2011, due to high grain prices and federally subsidized crop insurance. In South Dakota, over 650,000 acres of grassland was converted to corn and soybeans. In Nebraska, over 300,000 acres was converted from grass to corn and soybeans and a considerable amount of this conversion has been with the ABB range in Nebraska. For example, one owner of approximately 1,500 acres of grassland in Keya Paha County, Nebraska, converted that grassland to row crops in 2012; in 2013, approximately 720 acres are planned for conversion. Trapping for ABB adjacent to this grassland found low densities of ABB present, but all of the ABB using the converted grasslands would be lost when the grasslands are converted to row crops.

Commercial development is expanding to undeveloped lands on the periphery or in suburbs of cities. Residential developments are being constructed outside city limits or in previously undeveloped or rural areas. The specific numbers of new or anticipated projects and associated acres of disturbance are difficult if not impossible to quantify. However, it is clear that there are numerous, continuing, and expanding impacts to ABBs and their habitat from projects without a federal nexus. All of the above activities can cause loss and further fragmentation of ABB habitat in Nebraska and South Dakota. Construction activities that disturb soils within the current range of ABB cause mortality of ABB adults, and (potentially) ABB larvae and eggs. Although direct mortality of ABB from individual construction activities is local and constitutes a short-term adverse effect, the cumulative loss of ABB from multiple development projects in a larger area may eventually reduce the ability of a given population to survive in a fragmented landscape.

Lighting associated with construction of new roads (i.e., not associated with the proposed Project) and new residential developments can result in harassment and disruption of normal feeding behavior when ABB are attracted to lights. Future construction and developments of this type by state or private entities may harass the ABB and interfere with feeding or breeding by distracting the species from meeting life requisites.

Conclusion

After reviewing the current status of the ABB, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the USFWS's opinion that the proposed Project is not likely to jeopardize the continued existence of the ABB. “Jeopardize the continued existence of means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR §402.02). No critical habitat has been designated for this species; therefore, none would be affected. Our determination is based on the following primary factors.

- Since the Recovery Plan was developed in 1991, numerous other populations have been discovered, and the recovery objective of reducing the immediate threat of extinction through discovery or establishment of new populations has been met as discussed in the 5-year review completed for the ABB (USFWS 2008a). Currently, at least four eco-regions support ABB populations estimated at greater than 1,000 individual ABBs (USFWS

2008a). Based on population modeling, K. Holzer, Amaral et al. (eds) (2005) surmised that a population of greater than 1,000 ABB has the potential to remain demographically viable over the long term in the absence of severe catastrophic events or reductions in carrying capacity through reduced carcass availability, habitat loss, or fragmentation.

In 2010, more than 1,000 ABB were trapped in the eastern Sandhills in Holt County, Nebraska with relatively limited trapping. During the course of the ABB capture relocation efforts for the previously proposed Project that were done along the previous route through the Sandhills, 2,486 ABB were captured in Keya Paha, Holt, Garfield, and Wheeler Counties (TransCanada 2011), well exceeding 1,000 individuals needed for a viable population. Trapping of ABB in Tripp County, South Dakota by Backlund et al. (2008) also showed that the population there exceeds 1,000 individuals. These large ABB populations in Nebraska and South Dakota are located in the general Project area and demonstrate the large, apparently viable ABB population that occurs there. Based on these survey results and previous population modeling, we have concluded that the short term loss of ABB at the anticipated levels that are described above, resulting from the proposed Project is not likely to appreciably reduce survival and recovery of the species in the wild.

- The sentinel population of ABB on Block Island off the coast of Rhode Island is stable. The population of ABB in southern Tripp County, South Dakota is thought to be stable, however, this assertion is based on data collected eight years ago, in 2005 (Backlund et al. 2008), which may no longer be representative of the population. We are admittedly concerned about the viability status of this population. However, the USFWS has determined that Backlund et al. (2008) represents the best available scientific information for the ABB population in Tripp County. A large ABB population from the eastern Sandhills of Nebraska is one of the most abundant in the United States. The moderately large Nebraska Loess Hills population was thought to be declining in 2006 and 2007, but that short-term decline was likely caused by the effects of drought on carrion availability (W.W. Hoback, pers. comm.), and that population has increased in recent years with relief from the drought. Additionally, several habitat improvement projects in the Loess Hills have or will soon remove counterproductive red cedars from the Loess Hills, improving ABB habitat there. Population levels of ABB in Oklahoma and Arkansas fluctuate every other year or so, but downward or upward trends in the long term are difficult to ascertain. Fort Chaffee in western Arkansas and Fort Gruber in eastern Oklahoma have robust populations of ABB that, along with populations in Nebraska, are believed to be resilient to the effects of stochastic weather events (USFWS 2008a). Little information is available on trends in the small populations of ABB in Kansas and there is some evidence that a small population of ABB in northern Lamar County, Texas, may be declining (USFWS 2008a). Therefore, although one small population on the periphery of the range may be declining, available evidence indicates that populations of ABB are relatively stable further supporting the assertion that the proposed Project is not likely to appreciably reduce survival and recovery of the species in the wild.

- The loss of ABBs from a limited area in the current range of the ABB known to have a large viable population constitutes a short-term pulse of adverse effect, and has a smaller effect on the species' ability to survive than a longer-term, chronic effect. The proposed Project extends though large grassland areas which provide suitable habitat for ABB. As

such, it is reasonable to expect recolonization of areas that were disturbed during project construction from nearby areas. Additionally, ABB naturally experience fluctuations caused by poor reproduction in some years (e.g., due to weather, disease, etc.), and these short-term stochastic events do not have long-term effects in robust populations like those known in South Dakota and Nebraska. Other factors having little to do with construction and operation of the proposed Project, such as climate change may also affect the ABB in the future. However, for the reasons discussed above, the USFWS has determined that loss of ABB at the anticipated levels is not likely to appreciably reduce survival and recovery of the species in the wild.

- The cumulative effect of loss of ABB habitat from the conversion of grasslands to cropland in Nebraska and South Dakota and multiple development projects may eventually reduce the ability of a given ABB population to survive and recover in a fragmented landscape. We remain concerned about the effects of the large acreages of grasslands converted to corn and soybeans in Nebraska and South Dakota (Philpott 2013) on ABB populations. However, this level of cumulative impact apparently has not yet been reached in Nebraska and South Dakota, where ABB population levels (as shown from survey efforts) appear healthy and stable in a landscape that still consists of broad areas of native grassland. Thus, based on the best available information, current levels of moderate to high quality ABB habitat are supporting populations of ABB across the vast majority of its current range. For this reason, we have concluded that loss of ABB due to cumulative impacts is not likely to appreciably reduce survival and recovery of the species in the wild. And, for the reasons stated above, we do not believe that any loss from these cumulative effects combined with the loss from the proposed Project, is likely to jeopardize the ABB.

- A total of approximately 274.84 acres of ABB habitat would be permanently lost in South Dakota (Table 9) and Nebraska (Table 10) of which 73 percent of the same or 201.10 acres are classified as prime or good ABB habitat. Of the 1,492.81 acres of ABB habitat temporarily lost in South Dakota (Table 9) and Nebraska (Table 10) due to construction of the proposed Project, 1013.91 acres, or 68 percent is categorized a prime or good ABB habitat. However, the loss of this amount of habitat spread over approximately 82 miles of ROW (35 miles in South Dakota + 47 miles in Nebraska) and areas under isolated pump stations does not constitute a significant portion of available habitat for ABB breeding, feeding and sheltering. To put these figures into perspective, in Nebraska and South Dakota, this combined acreage represents, 0.071 percent of grasslands (1492.81/2,098,876) in the counties with ABB affected by the Project (i.e., Holt County (1,184,143 grassland acres) Keya Paha County (398,016 grassland acres), and Tripp County (516,717 grassland acres south of Highway 18)) that would be temporarily lost. Similarly, 0.013 percent of the grasslands (274.81/2,098,876) in the same area would be permanently lost. Given this acreage comparison, we have determined that these permanent and temporary habitat losses would not appreciably reduce the likelihood of survival and recovery of the ABB.

Conservation measures included as part of the Keystone XL Project especially the ABB Habitat Conservation Trust (Appendix C) would likely result in a net increase in protected ABB habitat. The Reclamation Performance Bond (Appendix E) would provide assurances that disturbed habitat would be restored following proposed Project construction. Within the context of stable or increasing populations in the northern portion of the species range, an increase in protected ABB

habitat in an area where a portion of unprotected habitat may be lost through conversion to agriculture would improve the likelihood of survival and recovery of the species. Establishment of the ABB Habitat Conservation Trust and the habitat protection it would enable are consistent with recovery actions 1.23 and 5.3 in the recovery plan (USFWS 1991). Protection of privately-owned grassland habitat that is vulnerable to loss through conversion to agriculture would be particularly beneficial and facilitate survival and recovery of the species in the northern portion of the species range. Protection of privately-owned grassland habitat that is vulnerable to loss through conversion to agriculture would be particularly beneficial and facilitate survival and recovery of the species in the northern portion of the species range. Thus, these conservation measures contribute to the recovery of the ABB.

The combination of the ABB monitoring program (Appendix C) and the Reclamation Performance Bond (Appendix E) would provide assurances that the acres disturbed by the Project would be restored appropriately. A 1:1 ratio (i.e., 3:1 or 2:1 for prime and good habitat, respectively) habitat mitigation ratio would be applied to supplemental vegetation reclamation if restoration for ABB habitat failed and Keystone fails to take corrective action. These actions are also consistent with recovery actions 1.23 and 5.3 in the recovery plan (USFWS 1991).

In Nebraska, trapping and relocating of ABB from Project lands, followed by measures to discourage reestablishment of ABB on Project lands prior to pipeline construction (e.g., carrion removal, mowing, and windrowing), would substantially reduce injury and mortality of ABB caused by construction and operation of the pipeline. Based on our calculations, 119.26 ABB would be successfully removed from Project lands using the capture relocation method, and moved to prime or good habitats at release sites known to be occupied by the species. Procedures implemented at the release site further promote ABB survival and success at their new location. These measures would minimize adverse effects to survival of the ABB population in Nebraska.

In summary, after reviewing the effects of the action, including the effects of interrelated and interdependent activities, and any cumulative effects on the ABB, we conclude that the reproduction, numbers, or distribution, of the ABB will not be reduced in such a manner that would reduce appreciably the survival and the recovery of the ABB.

Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral 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 under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Department so that they become binding conditions for any action, grant, or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Department is the lead agency with oversight of the activity covered by this incidental take statement. If the Department: (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Department must report the progress of the action and its impact on the species to the USFWS as specified in the Incidental Take Statement. [50 C.F.R § 402.14(i) (3)].

Amount and Extent of Incidental Take Anticipated

Anticipated Take from Pre-construction Activities

Incidental take of ABB associated with implementation of the pre-construction capture relocation method in Nebraska will result in the take through *harassment* of 126.72 or 127 ABB in Nebraska (141.75 x .106) (see previous section: Capture Relocation method).

Anticipated Take from Construction and Operation Activities

Incidental take in the form of *mortality or injury* of individual ABBs is likely to occur as a result of the proposed Project construction in South Dakota and Nebraska; injury and mortality could also result from use of the capture relocation method in Nebraska. We calculated a total of 351.18 or 352 ABBs that would be injured or die from capture and relocation in Nebraska and construction in both Nebraska and South Dakota.

The USFWS requires that incidental take of ABB be monitored during the Project using survey methods advocated by the USFWS and NGPC (2008) by comparing the number of ABB captured during surveys done immediately before Project construction (within 9 months; should construction begin in May, surveys would be done the previous August while ABB is active) with the number of ABBs used for calculating the incidental take (39 individual ABBs (see Table 11) and 19 individual ABBs (see Table 12)), the previously calculated level of take for adults expected in the South Dakota and Nebraska segments of the Project, respectively. Results of the Pre-construction surveys should be run through the calculations in Table 11 and 12 and then the comparison should be made. These figures are not inclusive of ABB eggs or larvae because of their difficulty in detection when underground.

Reasonable and Prudent Measures (RPMs) to Minimize Incidental Take, and Corresponding Terms and Conditions for the RPMs

The USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the ABB. In order to be exempt from the prohibitions of section 9 of the Act, Keystone and its contractors must comply with the terms and conditions, which implement the reasonable and prudent measures and outline required reporting requirements. These terms and conditions are non-discretionary.

RPM 1: Injury and mortality that occurs during the capture relocation method can be minimized to the extent possible through the use of knowledgeable field technicians experienced in the use of the American Burying Beetle Trapping Protocol, Conservation Measures, Distribution Map, and Qualification Criteria (Appendix B).

Terms and Conditions for RPM 1:

1(a): Only field technicians who have been trained and have experience trapping and relocating ABB according to the approved protocols (Appendix B) will participate in the pre-construction "clearing" effort in Nebraska. Keystone must submit in writing to the Nebraska Field Office USFWS how field technicians meet the ABB Qualification Criteria, April 2012 (USFWS 2012).

1(b): The trapping and relocation protocols will be consistently followed. These protocols are described in two December 2008 documents in Appendix B: "American Burying Beetle - Nebraska Trapping Protocol" and "Conservation Measure for the American Burying Beetle (ABB)," developed by the USFWS and NGPC. If any deviations from the protocol are necessary due to unforeseen circumstances, a change in field activity may be made only after consultation with both the USFWS Nebraska Field Office and the NGPC.

1(c): ABB must be relocated to good or prime rated habitat a distance of three to five miles from the point of capture.

1(d): To reduce the potential for post-release, intra-specific competition for carrion at relocation sites, no more than 50 beetles will be released at any re-location site, and the release site will be at least three to five miles from the capture site.

1(e): All injuries or deaths of ABBs will be recorded along with apparent cause of mortality at the time of observation, and reported immediately to Mike Fritz at the NGPC (phone 402-471-5419), and Robert Harms at the USFWS (phone 308-390-0871). Following the capture relocation effort, a report will be submitted to the Nebraska Field Supervisor, USFWS, and to the NGPC by October of the trapping year, documenting the trapping, relocation, and habitat maintenance (of cleared sites) activities. The report would include, at a minimum, a summary of mortality by age class (e.g., senescent or teneral) and site, number and age class (e.g., senescent or teneral) of ABB captured per trap night, and average catch per trap night per pipeline mile post and other Project land, and whether the site was "cleared." Where, when, and at what distance ABB were released with a habitat rating of all release sites would also be documented, along with a description of post-clearing habitat modification activities.

1(f): The Department designated point of contact would contact the USFWS point of contact when the Reasonable and Prudent Measures and Terms and Conditions set forth in the USFWS's BO are not being met to remedy the situation(s). Reinitiation of consultation will occur if incidental take associated with the capture and relocation method exceeds 10 ABB in 2013 and 10 ABB in 2014 in Nebraska. This level of take was previously developed by biologists familiar with the population and life history of the ABB in Nebraska and are included in individual recovery permits for the ABB in Nebraska.

RPM 2: Incidental take of ABBs will be monitored during Project construction.

Terms and Conditions of RPM 2:

2(a): Pre-construction ABB surveys will be conducted (within 9 months; should construction begin in May, surveys would be done the previous August while ABB is active) from pipeline mile post 566 to 600 in Tripp County, South Dakota and from mile post 600 to 659 in Keya Paha and Holt counties in Nebraska, the pipeline segment where ABB is known to occur. ABB surveys will be conducted in accordance with ABB survey protocols in Appendix B.

2(b): Results of the Pre-construction ABB surveys will be compared to the calculated amount of individual ABBs that would be taken in South Dakota (39 individual ABBs from Table 11) and Nebraska (19 individual ABBs from Table 12).

2(c): The Department designated point of contact would contact the USFWS point of contact when the Reasonable and Prudent Measures and Terms and Conditions set forth in the USFWS's BO are not being met to remedy the situation(s). Reinitiation of consultation will occur should ABB numbers resulting from Pre-construction surveys (following the calculation method in Tables 11 and 12) exceed the estimates of take calculated for South Dakota (39 individuals) or Nebraska (19 individuals).

RPM 3: Keystone will use restoration methods described in Appendix A of the BA, in conjunction with agreements developed with the USFWS and NGPC, to restore lands to the condition of adjacent land as they were found immediately prior to construction and within a time frame between May 15, 2013 and May 15, 2014 on Project ROW and work areas.

Terms and Conditions of RPM 3:

3(a): By October 1 of each year after construction, the Department would submit an annual monitoring report to the USFWS documenting the monitoring accomplished and progress of restoration of Project lands. The report would detail and document the number of acres affected by Project activities, and the number of acres meeting reclamation stipulations of the bond [Appendix E]). At the end of this Agreement, all original files and documents would be provided to the USFWS.

3(b): The Department designated point of contact would contact the USFWS point of contact when the Reasonable and Prudent Measures and Terms and Conditions set forth in the USFWS's BO are not being met and work with the Department to remedy the situation(s). Reinitiation of consultation will occur if the number of acres of ABB habitat permanently lost within the current range of the species (i.e., as calculated in the effects section of this BO - 593.1 acres) plus the number of acres in the same areas where restoration (as defined by Reclamation Bond stipulations) fails to occur by the fall of post-construction year 8, is greater than anticipated in this BO.

RPM 4: The ABB avoidance and minimization measure benefits will be maximized to reduce impacts to adult ABB; and young-of-the-year ABB which comprise the following years breeding individuals.

Terms and Conditions of RPM 4:

4(a): In Nebraska, the capture relocation method will be implemented prior to the start of Project construction.

4(b): Where capture and relocation efforts have not been completed, the proposed Project will not start during the ABB breeding season in Nebraska which extends from June 1 through August 31.

Conservation Recommendations

1. Conduct research on the ABB coordinated with the USFWS. For example, provide funding to: a) monitor use of restored Project lands by ABB or, b) evaluate success of various vegetation restoration methods or, c) investigate the effect of soil compaction on non-endangered burying beetles or, d) measure the actual temperature increases surrounding the operating pipe to determine accuracy of modeled temperature dissipation around operating pump or, conduct an ABB mark recapture study on ABB in South Dakota to assess the viability of the population.

2. The Department can promote actions supporting conservation of ABB through its responsibilities under section 7(a) (1) of the Act.

3. Minimize habitat loss and alteration by minimizing soil disturbance to the extent feasible, utilizing existing roads, staging areas, etc.

4. Develop educational/informational materials, with the assistance of the USFWS, for placement onsite to inform visitors of the potential ABB presence in the area, encourage reporting of sightings, and potentially reduce the risk of potential disturbance scenarios.

Closing Statement

This concludes formal consultation on the actions outlined in the December 21, 2012, request from the Department for formal consultation on the construction and operation of the Keystone XL pipeline, as described in the Final Biological Assessment and subsequent additions/amendments to same. As provided in 50 C.F.R. § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control is authorized by law and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, especially as this information relates to climate change and the ability of ABB to overwinter and tolerate dryer environments over the next 50 years (i.e., the life of the Project); 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

The USFWS appreciates the cooperation extended by the Department, Keystone, Hoback Consulting, and multiple USFWS Ecological Services Field Offices and State resource agencies in this consultation. If further assistance or information is required, please contact Mr. Robert R. Harms or me at the above address or telephone (308) 382-6468.

Sincerely,

Michael D. George
Nebraska Field Supervisor

cc: Regional Director, USFWS, Denver, CO

Literature Cited

Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC.Washington, D.C.

Amaral, M., A.J. Kozol, and T. French. 1997. Conservation strategy and reintroduction of the endangered American burying beetle. Northeastern Naturalist 4(3): 121-132.

Amaral, M., Morgan, R., Davidson, C., Dikeman, H., Holzer, K., and byers, O. (eds). 2005. American Burying Beetle (Nicrophorus americanus) Population and Habitat Viability Assessment: Final Report. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN. 77pp.

Anderson, R.S. 1982. On the decreasing abundance of *Nicrophorus americanus* Olivier (Coleoptera: Silphidae) in eastern North America. The Coleopterists Bulletin 36: 362-365.

Annese, V., E. Cazzato, A. Corleto. 2006. Quantitative and qualitative traits of natural ecotypes of perennial grasses (*Dactylis glomerata* L., *Festuca arundinacea* Schreb., *Phalaris tuberosa* L., *Brachypodium ruestre* (Host) R. et S.) collected in southern Italy. Genetic Resources and Crop Evolution. 53(2): 431-441.

Backlund, D.C., G.M. Marrone, C.K. Wouldiams, and K. Tillman. 2008. Population Estimate of the Endangered American Burying Beetle, *Nicrophorus americanus*, Olivier (Coleoptera: Silphidae) in South Dakota. Coleopterists Bulletin 62(1): 9-15.

Backlund, D.C. and G. M. Marrone. 1995. Surveys for the endangered American burying beetle (*Nicrophorus americanus*) in Gregory, Tripp and Todd Counties, South Dakota. Final rep. to the Service, Pierre, SD. 12 pp. Unpub. MS.

Backlund, D.C., and G.M. Marrone. 1997. New records of the endangered American burying beetle, *Nicrophorus americanus* Olivier, (Coleoptera: Silphidae) in South Dakota. Coleopterists Bulletin 51(1): 53-58.

Backlund, D. and G. Marrone. 2003. Monitoring Surveys for the American Burying Beetle (*Nicrophorus Americanus*) in Tripp and Gregory County, South Dakota.

Bartlett, J. 1987. Evidence for a sex attractant in burying beetles. Ecological Entomology 12: 471-472.

Bedick, J.C., Brett C. Ratcliffe, W. Wyatt Hoback, and Leon G. Higley. 1999. Distribution, ecology and population dynamics of the American burying beetle *Nicrophorus americanus* Olivier (Coleoptera, Silphidae)] in South-central Nebraska, USA. Journal of Insect Conservation 3(3): 171-181.

Bedick, J.C., B.C. Ratcliffe, and L.G. Higley. 2004. A new sampling protocol for the Endangered American burying beetle, *Nicrophorus americanus* Olivier (Coleoptera: Silphidae). The Coleopterist Bull. 58(1): 57-70.

Bedick, J.C., W.W. Hoback, and M.C. Albrecht. 2006. High water-loss rates and rapid dehydration in the burying beetle, *Nicrophorus marginatus*. Physiological Entomology 31: 23-29.

Butler, S, R. 2011. Tests of Marking Methods and Survey Protocols for Burying Beetles (Coleoptera: Silphidae). MS Thesis, University of Nebraska-Kearney. 100 pp.

Carlton, C.E. and F. Rothwein. 1998. The endangered American burying beetle, *Nicrophorus americanus* Olivier, at the edge of its range in Arkansas (Coleoptera: Silphidae). Coleopterists Bulletin 52: 179-185.

Creighton, J.C., C.C. Vaughn, and B.R. Chapman. 1993. Habitat preference of the endangered American burying beetle (*Nicrophorus americanus*) in Oklahoma. The Southwestern Naturalist 38: 275-277.

Creighton, J.C. and G. Schnell. 1998. Short-term movement patterns of the endangered American burying beetle *Nicrophorus americanus*. Biological Conservation 86: 281-287.

Creighton, J.C., R. Bastarache, M.V. Lomolino, M.C. Belk. 2007. Effect of forest removal on the abundance of the endangered American burying beetle, Nicrophorus americanus. J Insect Conserv, Published online: 16 October 2007.

Eggert, A. and S.K. Sakaluk. 2000. Benefits of communal breeding in burying beetles: a field experiment. Ecological Entomology 25: 262-266.

Ellsworth, J.W. and B.C. McComb. 2003. Potential effects of passenger pigeon flocks on the structure and composition of presettlement forests of eastern North America. Jour. Of Cons. Biol. 17(6): 1548-1557.

exp Energy Services Inc. 2012. TransCanada Keystone XL Pipeline Project: Environmental Report. September 7, 2012.

Fetherston, I.A., M.P. Scott, and J.F.A. Traniello. 1990. Parental care in burying beetles: The organization of male and female brood-care behavior. Ethology 85:177-190.

Floyd, R.P. 1978. Geodetic benchmarks. NOAA Manual NOS NGS 1. National Oceanic and Atmospheric Administration, Rockville, Maryland. September, 1978.

Garrott, R. A., White P.J., and Vanderbilt White C.A. 1993. Over-abundance: An Issue for Conservation Biologist? Conservation Biologist 7: 946-949.

Godwin, Wouldiam B. 2003. Report of the discovery of the American burying beetle (*Nicrophorus americanus* Oliver) at the Texas Army National Guard facility Camp Maxey, Lamar County, Texas. Unpub. MS.

Gustafson, D.J., D.J. Gibson, D.L. Nickrent. 2004. Competitive relationships of *Andrpogon gerardii* (Big Bluestem) from remnant and restored native populations and select cultivated varieties. Functional Ecology. 18: 451-457.

Hazen, B. 2011. Geothermal model predictions for the sandhills segment of the Keystone XL pipeline. Unpublished report, February, 2011. Model used: "TQUEST, A General Purpose, Finite-Element Program for One, Two and Three Dimensional Heat Transfer." Prepared for TransCanada Keystone Pipeline, LP by Northern Engineering and Scientific, Anchorage, Alaska.

Hoback, W.W. 2008. Seasonal Activity and Effects of Vegetation on Soil Use by the American Burying Beetle, *Nicrophorus americanus*, Unpublished Report, University of Nebraska at Kearney.

Hoback, W.W. 2011a. American Burying Beetle Habitat Assessment Model and Field Survey Results for Nebraska and Texas along the Keystone XL Pipeline Project and Habitat Assessment for South Dakota and Oklahoma. Revision 3. February 2011. Prepared for Keystone XL Pipeline Project.

Hoback, W.W. 2011b. Annual Report for American Burying Beetle Recovery Permit. U.S. Fish and Wildlife Service, Grand Island, NE.

Hoback, W.W. 2012. August Survey Report, Results of survey for American burying beetle, *Nicrophorus americanus*, in Northern Keya Paha, Western Boyd, Eastern Holt, and Antelope counties.

Hoback, W.W. 2012b. Report of Summer 2012 trials to test the effects of trap and relocate on burying beetles. University of Nebraska-Kearney. Project done under FWS Cooperative Agreement, U.S. Fish and Wildlife Service, Grand Island, NE.

Hoback, W.W., S. Butler, and A. Conley. 2012. Trap and Relocate effects and impact of vehicles on American burying beetle. Quarterly Report. September 15, 2012. Federal Highway Administration/Nebraska Department of Roads, Lincoln, NE.

Jurzenski, J. and W.W. Hoback. 2010. Updated distribution of American burying beetle in Nebraska and predictive model for its occurrence. Unpubl. report prepared for the U.S. Fish and Wildlife Service, Nebraska Field Office, Grand Island.

Jurzenski, J., D.G. Snethen, M. Brust, and W.W. Hoback. 2011. New Records of Carrion Beetles in Nebraska reveal increased presence of the American burying beetle, *(Nicrophorus americanus)* Olivier (Coleoptera: Silphidae). Great Plains Research 21:131-143.

Kozol, A.J., M.P. Scott, and J.A. Traniello. 1988. The American burying beetle: studies on the natural history of an endangered species. Psyche 95: 167-176.

Kozol, A.J. 1990a. *Nicrophorus americanus* 1989 laboratory population at Boston University. Report prepared for the Service, Concord, NH. Unpub. MS.

Kozol, A.J. 1990b. The natural history and reproductive strategies of the American burying beetle, *Nicrophorus americanus*. Report to the Service, Hadley, MA. Unpub. MS.

Kozol, A.J. 1991. Annual monitoring of the American burying beetle on Block Island. Report to The Nature Conservancy, 294 Washington Street, Boston, Massachusetts. Unpub. MS.

Kozol, A.J. 1995. Ecology and population genetics of the endangered American burying beetle, *Nicrophorus americanus*. Dissertation, Boston University, Massachusetts.

Lomolino, M.V., J.C. Creighton, G.D. Schnell, and D.L. Certain. 1995. Ecology and conservation of the endangered American burying beetle, *Nicrophorus americanus*. Conservation Biology 9: 605-614.

Lomolino, M.V. and J.C. Creighton. 1996. Habitat selection, breeding success and conservation of the endangered American burying beetle, *Nicrophorus americanus*. Biological Conservation 77: 235-241.

Martin, L.M., K.A. Moloney, and B.J. Wilsey. 2005. An assessment of grassland restoration success using species diversity components. Journal of Applied Ecology 42: 327-336.

Matthews, C.Y. 1995. Interspecific competition between the burying beetles *Nicrophorus americanus* and *Nicrophorus orbicollis*. M.S. Thesis, Univ. of Oklahoma, Norman. 32 pp.

Miller, B., Biggins D. and Reading R. 1990. A proposal to conserve black-footed ferrets and the prairie dog ecosystem. Environmental Management 14: 763-769.

Nebraska Game and Parks Commission and U.S. Fish and Wildlife Service. 2008. American Burying Beetle, Nebraska Trapping Protocol, Lincoln, Nebraska and Grand Island Nebraska. 5pp.

Nebraska Game and Parks Commission. 2013. Detection Probability Analysis for Western Prairie Fringed Orchid. Nebraska Heritage Database. Lincoln Nebraska.

Peck, S.B. and M.M. Kaulbars. 1987. A synopsis of the distribution and bionomics of the carrion beetles (Coleoptera: Silphidae). Proceedings of the Entomological Society of Ontario. 118: 47-81.

Pukowski, E. 1933. Okoloische untersuchungen an Necrophorus F. Z. Morphol. Okol. Tiere. 27: 518-586.

Raithel, C.J. 1996-2002. Monitoring and management of American burying beetles in Rhode Island. Section 6 Performance Reports, no. E-17-27 submitted to Service, Hadley, MA. Unpub. MS.

Ratcliffe B. 1995. Nebraska's threatened and endangered species: American burying beetle. Nebraska Games and Parks commission. Unpub. MS.

Ratcliffe, B.C. 1996. The carrion beetles (Coleoptera: Silphidae) of Nebraska. Bulletin of the Nebraska State Museum Vol. 13.

Schnell, G. D., A.H. Hiott and V. Smyth. 1997-2003. American burying beetle survey, Camp Gruber, Oklahoma. Sam Noble Oklahoma Museum of Natural History, Norman, Oklahoma. Final rep. to Camp Gruber National Guard Training Center. Unpub. MS.

Schnell, G. D., A.H. Hiott and V. Smyth. 1997-2006. Evaluation of American burying beetles on the Weyerhaeuser Habitat Conservation Plan Area. Final rep. to Weyerhaeuser Company. Unpub. MS.

Schnell, G.D., A. E. Hiott, J.C. Creighton, V.L. Smyth, and A. Komendat. 2007. Factors affecting overwinter survival of the American burying beetle, Nicrophorus americanus (Coleoptera: Silphidae). Journal of Insect Conservation DOI 10.1007/s10841-007-90865.

Schnell, G.D., A.E. Hiott, and J.C. Creighton. 2008. Factors affecting overwinter survival of the American burying beetle, Nicrophorus americanus (Coleoptera: Silphidae). Journal of Insect Conservation 12: 483-492.

Schwelling, S.R., P.S. Showalter, J.R. Singhurst, and C.D. German. 2000. Habitat prediction for Texas trailing phlox (*Phlox nivalis* ssp. *texensis*) using Landsat Thematic Mapper and ancillary biophysical data. [online] http://cswgcinnew/dm/Phlox/p120.html. Accessed 2003.

Scott, M.P. 1990. Brood guarding and the evolution of male parental care in burying beetles. Behavioral Ecology and Sociobiology 26: 31-39.

Scott, M.P. and J.F.A. Traniello. 1987. Behavioral cues trigger ovarian development in the burying beetle *Nicrophorus tomentosus*. J. Insect Physiol. 33: 693-696.

Scott, M.P. and J.F.A. Traniello. 1989. Guardians of the underworld. Natural History 6: 32-36.

Scott, M.P. 1998. The ecology and behavior of burying beetles. Annual Review of Entomology 43: 595-618.

Sikes, D.S. and Christopher J. Raithel. 2002. A review of hypotheses of decline of the endangered American burying beetle (Silphidae: *Nicrophorus americanus* Olivier). Journal of Insect Conservation 6: 103-113.

Smith, M.D. and A.K. Knapp. 2001. Physiological and morphological traits of exotic, invasive exotic, and native plant species in tallgrass prairie. International Journal of Plant Science. 162(4): 785-792.

TransCanada. 2011. Summary of August 2011 American burying beetle trap and relocate efforts in Nebraska for the Keystone XL Pipeline Project – Steele City Segment. TransCanada Keystone Pipeline, LP, Houston, TX.

Trumbo, S.T. 1990. Reproductive success, phenology, and biogeography of burying beetles (Silphidae, *Nicrophorus*). American Midland Naturalist 124(1): 1-11.

Trumbo, S.T. 1992. Monogamy to communal breeding: exploitation of a broad resource base by burying beetles (*Nicrophorus*). Ecological Entomology 17: 289-298.

United States Department of State (DOS). 2011. Keystone XL Project Final Biological Assessment. Issued May 19, 2011. 139 pp. plus appendices.

United States Department of State (DOS). 2012. Keystone XL Project Final Biological Assessment. Issued December 21, 2012. 202 pp. plus appendices.

United States Department of State (DOS). 2013. Draft Supplemental Environmental Impact Statement Keystone XL Project. Issued March 1, 2013.

United States Fish and Wildlife Service (USFWS). 1989. Black footed ferret survey guidelines for compliance with the Endangered Species Act. Denver Colorado and Albequerque, New Mexico. April 1989. 10 pp.

United States Fish and Wildlife Service (USFWS). 1991. American burying beetle (*Nicrophorus americanus*) recovery plan. Newton Corner, Massachusetts. 80 pp.

United States Fish and Wildlife Service (USFWS). 2008a. Five-year review of the status of the American Burying Beetle. June 16, 2008. Southwest Regional Office, Albuquerque, New Mexico.

United States Fish and Wildlife Service (USFWS). 2008b. December 8, 2008 letter to Kimberly D. Bose, Federal Energy Regulatory Commission, transmitting its biological opinion regarding construction and operation of the Arkoma Connector Pipeline in Atoka, Coal, and Bryan counties, Oklahoma, by MarkWest Pioneer, L.L.C.

United States Fish and Wildlife Service (USFWS). 2012. American Burying Beetle Qualification Criteria, April 2012, Oklahoma Ecological Services Field Office.

United States Fish and Wildlife Service (USFWS). 2012b. Technical Assistance Letter for the TransCanada Keystone XL Pipeline, Nebraska Ecological Services Field Office, Grand Island, Nebraska.

United States Global Change Research Program (USGCRP). 2009. Global Climate Change Impacts in the U.S.

Walker, T.L. and W. Hoback. 2007. Effects of invasive eastern red cedar on capture rates of *Nicrophorus americanus* and other Silphidae. Env. Entolol. 36(2): 297-307.

Wilcove, D.S., C.H. McLellan, and A.P. Dobson. 1986. Habitat fragmentation in the temperate zone. In M.E. Soule (ed.), Conservation Biology: The Science of Scarcity and Diversity, pp. 237-256. Sinauer Associates, Sunderlan, MA.

Wilson, E.O. 1971. The Insect Societies. Harvard University Press, Cambridge, MA.

Wilson, D.S. and J. Fudge. 1984. Burying beetles intraspecific interactions and reproductive success in the field. Ecological Entomology 9: 195-203.

References/Personal Communication

Bessken, Charlene. USFWS, South Dakota Field Office, Pierre, South Dakota. Personal communication, October, 2010.

Carlton, C.E. <ccarlton@fs.fed.us>, Fire ants in Arkansas, April 3, 1996, E-mail correspondence to Michael Amaral, USFWS, Concord, NH, regarding county by county American burying beetle surveys and fire ants in Arkansas, 2 pp. Personal communication, December 8, 2008.

Graham, Kyle J. USFWS, Fort Niobrara National Wildlife Refuge, Valentine, Nebraska. Personal communication, March 2011.

Hoback, W. Wyatt. University of Nebraska – Kearney. Personal communication, March 24, 2011.

Nebraska Public Power District. Letter dated March 4, 2013, NPPD Keystone XL T&E Species Request Response. Columbus, Nebraska.

R.R. Harms. U.S. Fish and Wildlife Service, Personal communication, March 2013

S. McPheron, University of Nebraska – Kearney. Personal communication, March 24, 2011.

PhilPott, T. 2013. King corn mowed down 2 million Acres of grassland in 5 years flat. MotherJones.News. Accessible at http://www.motherjones.com/tom-philpott/2013/02/king-corn-gobbles-climate-stabilizing-grassland-midwest

Pore, Robert. Study: Ethanol growth has influenced cropping practices. Grand Island Independent, August 28, 2011. (Newspaper article).

Smith, Amy. Smith Environmental and Research Consulting House LLC. Personal communication. April 24, 2013.

U.S. Department of the Interior. October 3, 2008, Memorandum from the Office of the Solicitor to the Secretary of the Interior. Guidance on the Applicability of the Endangered Species Act's Consultation Requirements to Proposed Actions Involving the Emission of Greenhouse Gases. Office of the Solicitor.

U.S. Fish and Wildlife Service. May 14, 2008, Memorandum from Director Dale Hall to Regional Directors 1-8. Expectations for Consultations on Actions that Would Emit Greenhouse Gases. U.S. Fish and Wildlife Service, Washington D.C.

U.S. Government Accounting Office (GAO). Interim Results: Impact of USDA payments and Sodbuster on grassland conversions to grassland. Briefing for staff of Senator Tom Harkin, Chairman, Senate Committee on Agriculture, Nutrition, and Forestry; and Representative Collin Peterson, Chairman, House Committee on Agriculture. May 24, 2007.