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Memorandum

To: Deputy Regional Director, Region 2, Albuquerque, New Mexico

Through: Assistant Regional Director, Ecological Services, Region 2, Albuquerque, New Mexico

From: Field Supervisor, Oklahoma Ecological Services Office

Subject: Biological Opinion for the Oil and Gas Industry Conservation Plan Associated with Issuance of Multiple Endangered Species Act Section 10(a)(1)(B) Permits for the American Burying Beetle in Oklahoma
(Consultation No. 2014-F-0812)

Enclosed is the biological opinion regarding approval of the proposed Oil and Gas Industry Conservation Plan (ICP) and subsequent issuance of multiple incidental take permits (permits) under the ICP. The ICP describes measures Applicants will agree to implement to avoid, minimize, and mitigate for take of the endangered American burying beetle (*Nicrophorus americanus*, ABB) from oil and gas industry activities described in the ICP over a period of 2 years for construction activities, and up to 20 years for operation and maintenance. The ICP addresses the conservation needs of the ABB, pursuant to section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended (16 USC § 1531-1544). The ICP will provide the basis for the issuance of permits to oil and gas companies for activities they conduct within the ABB's current range in Oklahoma. If you have any questions regarding this biological opinion, please contact Kevin Stubbs at 918-382-4516.

The biological opinion is based on the ICP and the accompanying draft Environmental Assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA); discussions with species experts; published and unpublished literature available on the species of concern and related impacts; and other sources of information available to the U.S. Fish and Wildlife Service (Service). A complete record of this consultation is on file at the Oklahoma Ecological Services Field Office (ESFO).

Attachment

BIOLOGICAL OPINION

This provides our biological opinion for the approval of the U.S. Fish and Wildlife Service (Service) developed Oil and Gas Industry Conservation Plan Associated with Issuance of Multiple Endangered Species Act Section 10(a)(1)(B) Permits for the American Burying Beetle in Oklahoma (ICP) oil and gas related activities within the ABB's current range in Oklahoma. The ICP will provide a predictable and streamlined process which oil and gas companies may use, on a voluntary basis, to conduct their activities where they may overlap with the ABB's range in Oklahoma. Permittees that are issued a section 10(a)(1)(B) permits (Permit) under the ICP will minimize and mitigate, to the maximum extent practicable, adverse effects of incidental take from activities affecting the endangered American burying beetle (*Nicrophorus americanus*; ABB, Covered Species) pursuant to the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 - 1544).

Oil and gas industry activities described in the ICP will be covered for a period of 2 years for construction activities and up to 20 years for operation and maintenance. The ICP is intended to provide options for ESA compliance for most oil and gas activities with no federal nexus. The ICP is expected to provide long-term conservation of the ABB through implementation of avoidance, minimization, and mitigation measures, including preservation of important ABB habitats. The issuance of permits to authorize incidental take associated with the ICP are pursuant to 10(a)(1)(B) of the Act and is the action for this intra-Service consultation pursuant to section 7 of the ESA.

Consultation History

The process of developing the ICP was initiated in February of 2014 to provide potential take coverage for oil and gas activities in Oklahoma. The ICP is intended cover construction actions over a two year period and maintenance for up to 20 years. A notice of availability of the draft ICP and draft EA was published in the *Federal Register* on April 16, 2014 (FR 2014-08596).

Definitions

Action Area – All areas to be to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02).

Direct effect – Those effects that are direct or immediate effects of the project on the species or its habitat (USFWS 1998).

Effect – 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 biological opinion on the proposed action (50 CFR §402.02).

Oil and Gas Industry Conservation Plan (ICP) – The ICP is essentially a Habitat Conservation Plan (HCP). It will specify the amount of take anticipated, avoidance and minimization measures, mitigation required, and any other measures necessary to meet the issuance criteria as required by section 10(a)(2)(B) of the ESA. Unlike a traditional HCP, however, development of the ICP was undertaken by the Service, rather than individual applicants, and there is no master permit. Oil and gas companies can choose whether they wish to apply for an incidental take permit under the ICP, or conversely, whether they prefer to develop their own plan using the traditional HCP process. An applicant who chooses to participate, agrees to fully implement the

minimization and mitigation measures described in the ICP, and meets all issuance criteria would subsequently be granted an incidental take permit under the ICP in an expeditious manner.

Habitat Conservation Plan – A Habitat Conservation Plan (HCP) is a planning document that accompanies a request for an incidental take permit (pursuant to 10(a)(1)(B) of the Act) allowing non-Federal actions to take listed species while ensuring their long-term survival and enhancement. The purposes of the permit and accompanying HCP are to: (1) reduce conflicts between endangered or threatened species and economic activity, and (2) develop partnerships between the public and private sectors. Take authorized pursuant to a 10(a)(1)(B) permit is incidental to, and not the purpose of, an otherwise lawful activity.

Indirect Effect – Those effects that are caused by, or will result from, the proposed action and are later in time, but are still reasonably certain to occur (50 CFR §402.02).

Permit Area – The geographic area where the incidental take permit applies.

Planning Area – Lands and other areas encompassed by specific boundaries which are affected by the ICP and incidental take permit.

Take – To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct (16 USC §1532). *Harm* is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. *Harass* is also further defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR §17.3).

Proposed Action

We, the Service developed the short-term ICP to provide a mechanism to meet statutory and regulatory requirements by proponents engaged in geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products and maintenance, operation, repair, and decommissioning of oil and gas pipelines and well field infrastructure while promoting conservation of the endangered ABB. The ESA prohibits "take" of species listed as threatened or endangered.

The ICP is a conservation plan as required under ESA Section 10(a)(2)(A) for issuance of a 10(a)(1)(B) incidental take permit. To be authorized for incidental take through the streamlined process, applicants must:

- meet issuance criteria found at (50 CFR 13 and 17); and,
- document that their projects meet various qualifying criteria (as described in the ICP); and,
- agree to implement the avoidance, minimization, and mitigation actions described in the ICP and comply with the terms and conditions in resulting Permit(s) issued under the ICP; and,
- provide documentation that they have met the minimization and mitigation requirements for their project as calculated by the methods described in the ICP.

Following Permit issuance, Permittees must submit Individual Project Packages (IPPs) for Service approval prior to the initiation of Covered Activities occurring in occupied ABB habitat. Further discussion of requirements for Permit issuance and IPP approval is described in Section 7.0 of the ICP.

The ICP is focused on exploration, development, extraction, transport, and distribution of crude oil, natural gas, and petroleum products within the current range of the ABB in Oklahoma. Project proponents engaged in actions described as Covered Activities in section 2.0 of the ICP may participate through the ICP. Not all activities that could result in take of the ABB are covered by the ICP. Projects that have a Federal nexus, including those authorized, funded, or carried out by a Federal agency, should address their incidental take of listed species through consultation with the Service under Section 7 of the ESA, and are therefore not addressed here. The ICP, therefore, provides a streamlined compliance pathway for certain described non-Federal actions referred to as Covered Activities.

We developed the ICP in cooperation with the Oklahoma Independent Petroleum Association (OIPA), its members, and other interested oil and gas companies in an effort to best meet the current and anticipated needs of the industry and the Service's statutory and regulatory requirements.

Planning Area

The ICP Planning Area (Figure 1) encompasses the known and potential range of the ABB and its habitat in 45 counties in the state of Oklahoma. These include: Adair, Atoka, Bryan, Carter, Cherokee, Choctaw, Cleveland, Coal, Craig, Creek, Delaware, Garvin, Haskell, Hughes, Johnston, Kay, Latimer, Le Flore, Lincoln, Love, Marshall, Mayes, McClain, McCurtain, McIntosh, Murray, Muskogee, Noble, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, Wagoner, and Washington counties in Oklahoma.

Noble and Cleveland counties in Oklahoma are not currently considered to be within the range of the ABB. However, because of the proximity to occupied portions of the species range and existing potential habitat, we have included these counties in the Planning Area at this time to prevent delays in permitting if ABBs are found within county boundaries during the term of the ICP. The conservation program (minimization and mitigation measures) associated with the ICP only apply in occupied ABB habitat within the ABB range.

American Burying Beetle
Oil and Gas Conservation Plan
Planning Area

Figure 1. Planning Area for the American Burying Beetle ICP.

Land within the Planning Area includes undeveloped land as well as agricultural lands, and rural and urban development. The Planning Area includes numerous national wildlife refuges,

wildlife management areas, state parks, and other lands managed for conservation. The vast size of the Planning Area includes significant diversity in habitats, resources, and degrees of development.

Covered Activities

Only actions listed and described in section 2.0 of the ICP as "Covered Activities" are eligible to receive incidental take authorization through the ICP. Industry standards, disturbance area estimates, and averages were obtained primarily from oil and gas industry representatives (primarily OIPA members) and were used when estimating the overall oil and gas development that may occur within the Planning Area throughout the ICP term.

All Covered Activities associated with each project must be fully contained within the ICP Planning Area in order to be eligible to participate through the plan. Therefore, pipelines or other infrastructure that extend beyond the ICP Planning Area boundaries are not eligible to participate in the ICP and project proponents should seek incidental take authorization independent of the ICP, as needed.

For the purposes of the ICP, Covered Activities are categorized and defined as "Upstream Production" and "Midstream Development", which are commonly used terms in the crude oil, natural gas, and petroleum products industries. There may be some overlap between the two categories and different Federal agencies may define "upstream" and "midstream" differently than the definitions in the ICP. For a complete description of Covered Activities, see Section 2.0 of the ICP (***http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm***). The following provides a brief overview of Covered Activities under the ICP.

<u>Upstream Production</u>

Upstream production, as defined by the ICP, includes activities associated with exploration for oil, natural gas, and other petroleum products and development of the infrastructure required to extract those resources. Covered activities associated with upstream production include:

- Geophysical Exploration – also known as seismic exploration
- Construction, operation, and maintenance of new and existing well field infrastructure and decommissioning of obsolete facilities, including:
    - Well pads
    - Drilling and hydraulic fracturing
    - Gas flaring
    - Work and access roads
    - Electrical distribution lines (voltage must be 34.5 kilovolts (kV) or less)
    - Off-site impoundments
    - Communication towers

More specific descriptions of upstream activities are described in section 2.1 of the ICP and incorporated herein by reference.

<u>Midstream Development</u>

Midstream development, as defined in the ICP, includes gathering, processing and treatment, transmission, and distribution of crude oil, natural gas, or other petroleum products. Petroleum

products may include unprocessed natural gas liquid or condensate streams (including methane, ethane, propane, butane, and pentane). Refined oil products including gasoline, diesel, and kerosene may also be transported via pipeline. Covered Activities associated with midstream development include the following:

- Construction of gathering, transmission, and distribution pipelines
- Construction of associated surface facilities, including:
    - Access roads
    - Booster, compressor, and pump stations
    - Meter stations, mainline valves, pig launchers and receivers, regulator facilities, and other required facilities
    - Natural gas processing and treatment facilities
    - Communication towers
    - Electric distribution lines (voltage must 34.5 kV or less)
    - Electric substations
- Operation and maintenance of pipeline and associated surface facilities
- Decommissioning and reclamation of pipeline and associated surface facilities

Pipelines located within the boundaries of well pads are included in upstream production, while gathering, transmission, and distribution pipelines are considered midstream development.

More specific descriptions of midstream activities are provided in section 2.2 of the ICP and are incorporated herein by reference.

<u>Spills or Releases of Crude Oil, Natural Gas, or Petroleum Products are NOT Covered Under the ICP</u>

Crude oil, natural gas, and petroleum products (including fuel and other operational fluids) spills or releases associated with construction, operation, or maintenance actions are not covered under the ICP. Such spills or releases may impact vegetation and soils and may cause affected areas to become unsuitable for the ABB. To avoid and minimize chance of contamination, project proponents develop spill response protocols as required in the Spill Prevention Control and Countermeasures (SPCC) section of the Oil Pollution Act (40 CFR §112.3). The SPCC plan describes spill prevention, preparedness, and response to prevent discharges to navigable waters and adjoining shorelines.

Project proponents are required to respond to spills per the Clean Water Act (CWA) (33 U.S.C Title 33 Ch 26), the OPA (33 U.S.C Title 33 Ch. 40) and Oklahoma Corporation Commission rules (O.S. § Title 12 Ch. 3 sec 52). Most spills are reported to the appropriate state or federal agency; however, some smaller spills may not require reporting, according to oil and gas industry representatives. Response and cleanup of spills are not Covered Activities under the ICP. If the Environmental Protection Agency (EPA) is involved with a response, then EPA may consult with the Service through Section 7 of the ESA regarding effects to threatened and endangered species associated with response activities. Incidental take could be addressed through Section 7 consultation with EPA, if appropriate.

Any injury to natural resources, including the ABB, associated with a release of oil or hazardous substances or the response to a release of oil or hazardous substances is not covered under the ICP and may constitute a violation of Section 9 of the ESA. Such injury(s) may be addressed

under the Natural Resource Damage provisions in the CWA (33 USC §§ 1251, et seq.), OPA (33 USC §§ 2701, et seq.), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC §§ 9601, et seq.), National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300), and/or other appropriate laws and regulations.

Minimization and Mitigation Measures

Section 10(a)(2)(B) of the ESA requires that conservation programs specify what steps an applicant will take to minimize and mitigate the impacts likely to result from taking that occurs incidental to carrying out otherwise lawful activities. Before issuing a Permit, the Service must find that the applicant will minimize and mitigate the impacts of such taking to the maximum extent practicable. The measures described here are intended to minimize and mitigate those impacts that cannot be avoided. Minimization and mitigation measures are required for covered activities occurring in occupied ABB habitat (ABB habitat where ABBs are documented through a valid survey or is assumed). Minimization and mitigation measures are not required for activities occurring in areas unfavorable for the ABB (see Section 3.1.2.1) or within the effective area of a valid negative survey (as described in the Service's American Burying Beetle Oklahoma Presence/Absence Live-trapping Survey Guidance dated March 5, 2014), as take is not expected in these areas.

The Service identified areas, known as ABB Conservation Priority Areas (CPAs; Figure 2), where positive surveys were relatively concentrated over the last 10 years. These Conservation Priority Areas could also indicate good locations for mitigation, conservation and recovery activities. Section 3.1.7 of the ICP describes the process used to delineate ABB CPAs. Focus areas in Oklahoma for potential habitat conservation are located within Atoka, Coal, Hughes, Pittsburg, Latimer, Haskell, Leflore, Muskogee, and Osage Counties.

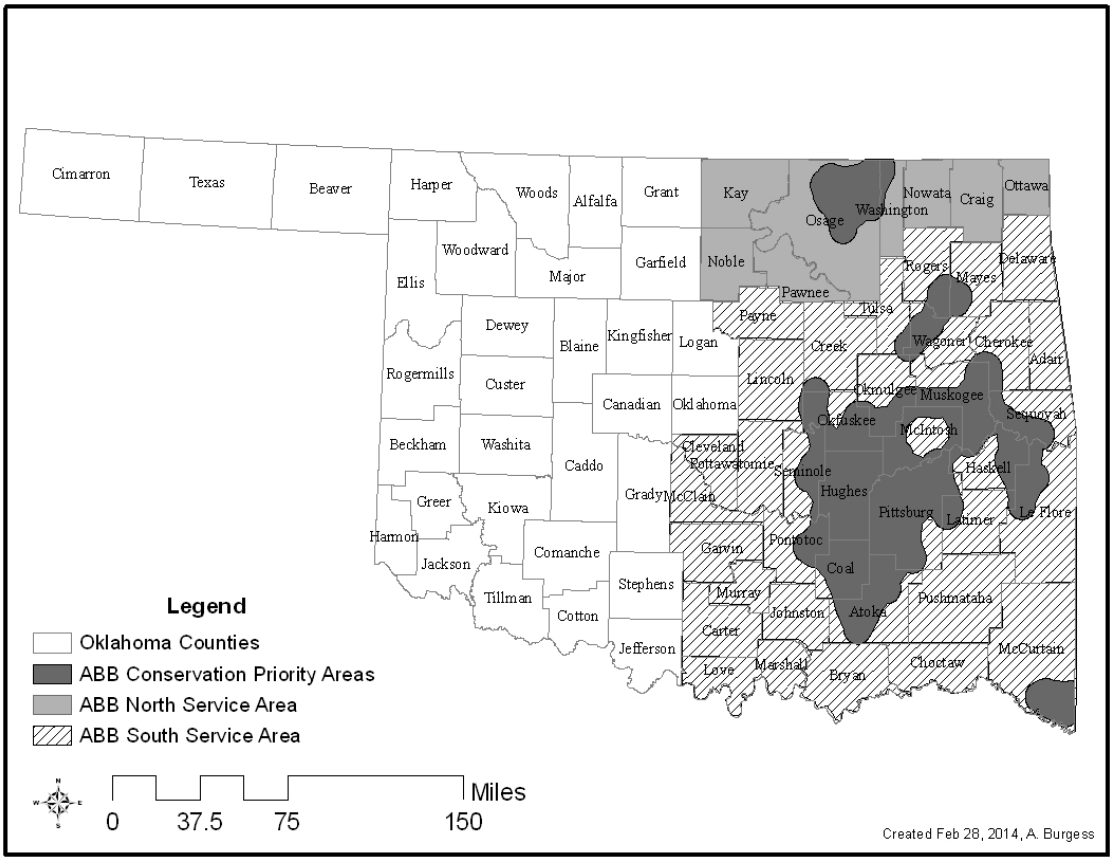
Project proponents that choose to apply for a Permit to participate in the ICP will describe and document their compliance with these measures and will include an annual summary of these actions in the annual report, described further in Section 7.3 of the ICP.

A more detailed description of minimization and mitigation measures are described in section 4.0 of the ICP and are incorporated herein by reference. Mitigation ratios from the ICP are provided below.

Table 1, Mitigation Ratios for ICP Planning Area. Ratios = acres of impact : acres of mitigation.

	Areas of Impact		
Impact Period	ABB Range (but not within CPA)	Conservation Priority Area	Mitigation Land
Temporary	1:0.25	1:0.5	1:1.5*
Permanent Cover Change	1:0.5	1:1	1:2*
Permanent	1:1	1:2	1:3*
*Mitigation Land ratio is equal to the CPA ratio plus the mitigation acre(s) lost.			

Figure 2, ABB Mitigation Service Areas and Conservation Priority Areas for the ICP Planning Area



Interrelated and Interdependent Actions

In addition to meeting the Section 10(a)(1)(B) and (2)(A) requirements of the ESA for issuance of incidental take permits, any permits issued through the ICP must address any interrelated and interdependent actions connected with the projects. The ICP is limited to covered activities but includes most oil and gas related actions. Take related to Covered Activities is covered under the ICP. Any take of the ABB resulting from activities not described within the Covered Activities section (Section 2.0) is not covered under the ICP.

We have examined activities that could be considered interrelated or interdependent and have either incorporated those activities into the ICP (e.g., transmission lines that connect power to oil and gas operations are covered) or addressed the issues by not covering certain activities (e.g., projects that cross the Planning Area boundaries are not eligible for the ICP and oil spills are not covered). Therefore, there are no further interrelated or interdependent actions to address here.

AMERICAN BURYING BEETLE

Species Description

The ABB is the largest silphid (carrion beetle) in North America, reaching 1.0 to 1.8 inches in length (Wilson 1971, Anderson 1982, Backlund and Marrone 1997). Size, particularly pronotal width, is highly correlated with weight (Kozol et al. 1988). Pronotal width of ABBs ranged from

0.344 – 0.500 inches in a laboratory study and 0.314 – 0.497 inches at Block Island. The beetles are 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 of 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. Age of 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; Scott and Traniello 1987; Wilson and Fudge 1984). The ABB is a nocturnal species that lives only for one year. The beetles are active in the summer months and bury themselves in the soil for the duration of the winter. Immature beetles (tenerals) emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990a). Adults and larvae are dependent on carrion for food and reproduction. They must compete for carrion with other invertebrate species, as well as vertebrate species.

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 Oklahoma, this typically occurs from late September and until mid-May (USFWS 2008b), approximately 8 to 9 months. However, the length of the inactive period can fluctuate depending on temperature. Recent studies indicate that ABBs bury to depths ranging from 0 to 8 inches in Arkansas (Schnell et al. 2007). Others have found depths ranging from 0 – 27 inches (Hoback 2011). Habitat structure (i.e., woodland vs. grassland) does not appear to be an influencing factor in over-winter survival rate in Oklahoma (Holloway and Schnell 1997).

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

Summer Active Period: The ABB is active in the summer months, emerging from their winter inactive period when ambient nocturnal air temperatures consistently exceed 60º F. 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). During the daytime, ABBs are believed to bury under the vegetation litter. The ABB begin rearing broods soon after emergence from overwintering. During late May and early June ABBs secure a mate and carcass for reproduction. The reproductive process takes approximately 48-69 days.

In Oklahoma, ABBs are typically active from mid-May to late-September. Weather, such as rain and strong winds, result in reduced ABB activity (Bedick et al. 1999). However, on Block Island, Rhode Island, burying beetles were successfully trapped repeatedly on both rainy and windy nights provided the temperature was above 59º F (15º C, Kozol et al. 1988). 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).

Movement

ABBs are nocturnal and have been reported moving distances ranging from 0.10 to 2.6 miles in various parts of their range. Having wings, ABBs are strong fliers and have been reported moving nightly distances ranging from 0.16 to 7.24 km (0.10 to 4.5 miles) in various parts of their range (Bedick et al. 1999, Creighton and Schnell 1998, Jurzenski et al. 2011, Schnell et al. 1997-2006). In Oklahoma, ABBs have been recorded to move approximately 10 km (6.2 miles) in 6 nights (Creighton and Schnell 1998). In Nebraska, one ABB was reported to move, wind-aided, approximately 30 km (18.6 miles) in one night (Jurzenski et al. 2011) establishing the longest record of a 1-night movement by an ABB and demonstrating a potential dispersal distance of almost 30 km (19 miles).

Feeding

When not involved with brood rearing, carrion selection by adult ABBs for food can include an array of available carrion species and size (Trumbo 1992). ABBs also capture and consume live insects. Burying beetles are capable of finding a carcass between one and 48 hours after death at a distance 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, and temperature (Ratcliffe 1996). Kozol et al. (1988) found no significant difference in the ABBs preference for avian verses mammalian carcasses. At Fort Chaffee, Holloway and Schnell (1997) found that ABBs numbers were higher in areas with high densities of small mammals (USFWS 2008b).

Habitat

Feeding Habitat: ABBs are considered feeding habitat generalists and have been successfully live-trapped in several vegetation types including native grasslands, grazed pasture, riparian zones, coniferous forests, mature forest, deciduous forest with little undergrowth, 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, USFWS 2008b, Walker 1957). 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).

Using baited pitfall traps, Holloway and Schnell (1997), found significant correlation between the number of ABBs captured and the biomass of mammals (0-200 g), and combined mammals and birds at Fort Chaffee, Arkansas.

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). At Fort Chaffee, where ABBs tended to avoid soils with less than 40 percent sand, greater than 50 percent silt, and greater than 20 percent clay (Schnell and Hiott 2005). In 1996, more than 300 ABBs were captured in Nebraska habitats consisting of grassland prairie, forest edge, and scrubland (Ratcliffe 1996). Some surveys have found certain soil types such as very xeric (dry), saturated, or loose, sandy soils to be unsuitable for carcass burial and thus are unlikely habitats.

Reproduction Habitat: While studies indicate that the ABB is a habitat generalist in terms of feeding, it is likely more restricted when selecting burial sites for breeding. Anderson (1982) postulated that paired ABBs placed on carcasses would be more reproductively successful in forested habitats due to the rich, loose soils conducive to digging. Lomolino and Creighton (1996) found reproductive success was higher in forest verses grassland habitat, because more carcasses were buried in the forested habitat than the grassland. Carcasses may be more difficult to secure in grassland due to the near absence of a litter layer and may be more difficult to bury due to the tendency of grassland soils to be more compact than those in forest. However, of the carcasses buried, habitat characteristics did not significantly influence brood size. Holloway and Schnell (1997) found significant correlations between the numbers of ABBs caught in traps and the biomass of mammals and birds, irrespective of the predominant vegetation (USFWS 2008b). In Oklahoma, ABBs are thought to select undisturbed, mature oak-hickory forests with substantial litter layers and deep, loose soils in grasslands or bottomland forests where the substrate is conducive to burial of carcass (Lomolino and Creighton 1996; Creighton et al. 1993).

Reproduction

Reproductive activity usually begins in mid-May to June once temperatures become suitable and is completed in mid-August. Immediately upon emergence from their winter hibernation, ABBs begin searching for a mate and proper sized carcass for reproduction. Burying beetles are capable of finding a carcass between one and 48 hours after death at a distance up to 2 miles (3.22 km – Ratcliffe 1996). 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). In Nebraska, Bedick et al. (1999) found that ABBs reproduce only once per year. However, in a laboratory setting, Lomolino and Creighton (1993) found that five of eight ABB pairs succeeded in producing a second brood.

Immediately upon emergence from their winter hibernation, ABBs begin searching for a mate and a proper carcass for reproduction. 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).

The ABB typically out-competes other burying beetles as a result of its larger size (Kozol et al. 1988). The pair buries the carrion within a brood chamber constructed around the carcass.

Male and female ABBs typically cooperatively bury a carcass, but individuals of either sex are capable of burying a carcass alone (Kozol et al. 1988). Once underground, both parents strip the carcass of 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. Brood sizes of ABBs can sometimes exceed 25 larvae, but 12-18 is more typical (Kozol 1990b). 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 1995). The reproductive process from carcass burial to eclosure (emergence from pupae) is about 48 to 65 days (Bedick et al. 1999, Kozol 1995, Ratcliffe 1996). Females are reproductively capable immediately upon eclosure. The young beetles emerging in summer over-winter as adults, and comprise the breeding population the following summer (Kozol 1990a).

While the ABB has life history requirements similar to other carrion beetles, it is the largest *Nicrophorus* in North America and requires a larger carrion item to reach its maximum reproductive potential (i.e., to raise a maximum number of offspring) than the other burying beetles (USFWS 1991, Kozol et al. 1988, Trumbo 1992). Preferred carrion sources for reproduction are dead birds and mammals weighing from 1.7-10.5 ounces (48.19 – 297.67 g), with an optimum weight of 3.5-7.0 ounces (99.22 – 198.45 g, USFWS 1991).

Status and Distribution

Status: The ABB was proposed for federal-listing in October 1988 (53 FR 39617) and designated as an endangered species on July 13, 1989 (54 FR 29652), and retains this status. Critical habitat has not been designated for the ABB. The Final Recovery Plan was signed on September 27, 1991. At that time (1991), only two, disjunct, natural populations occurred at the extremities of the species historic range of 35 states, i.e., four counties in Oklahoma and one small island off the coast of Rhode Island (USFWS 2008a). Due to the severity of the species decline, and uncertainty about the causes for that decline, the focus was on recovery actions targeted to significant near-term improvement in the status of the species, rather than addressing the range of objectives and criteria to bring about full recovery. Therefore, criteria were developed for downlisting, but not for recovery (USFWS 1991, 2008a). The recovery objectives from the 1991 recovery plan and the criteria for achieving them are provided below.

(1) Reduce the immediacy of the threat of extinction…,

- Protect and maintain the two extant populations (i.e., in 1991),
- Re-establish (or locate and protect) at least two additional self-sustaining wild populations of 500 or more animals each, one in the eastern and one in the western part of the species historic range

(2) Improve status of ABB so that it can be reclassified from endangered to threatened.

- Re-establish three populations of the species (or discover additional populations) within each of four broad geographical areas of its historical range: the Northeast, the Southeast, the Midwest and the Great Lakes States…;
- Each population should contain a minimum of 500 adults as estimated by capture rates per trap night and black lighting effort; and
- Each population is to be demonstrably self-sustaining for at least five consecutive years (or is sustainable with established long-term management programs).

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 (USFWS 2008a). Currently at least four eco-regions support ABB populations estimated at greater than 1,000 ABBs (USFWS 2008a). Based on extinction modeling, Amaral et al. (2005) surmised that populations of greater than 1,000 ABBs have 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. However, the 2008 five year review (USFWS 2008a) found that, based on the information available, the ABB remains endangered throughout its current range due to lack of populations in the Southeast and Great Lakes States and remaining threats to the populations (USFWS 2008a).

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). However, documentation of records is not uniform throughout the 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). 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.

Currently, the ABB is known to occur in eight states: on 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), Chautauqua Hills region of southeastern Kansas (Sikes and Raithel 2002), south-central South Dakota (Backlund and Marrone 1995, Ratcliffe 1996), northeast Texas (Godwin 2003), and Missouri (personal communication with Bob Mertz, St. Louis Zoo, May 30, 2013). The ABBs in Missouri are part of a nonessential experimental population (under section 10(j) of the ESA) that was reintroduced in 2012. Most populations are located on private land. Populations known to exist on public land include: Ouachita National Forest, Arkansas / Oklahoma; Ozark-St. Francis National Forests, Arkansas; Camp Gruber, Oklahoma; Fort Chaffee, Arkansas; Lake Eufaula, Oklahoma; Sequoyah National Wildlife Refuge, Oklahoma; Block Island National Wildlife Refuge, Rhode Island; Valentine National Wildlife Refuge, Nebraska; and Camp Maxey, Texas.

Confirmed Oklahoma ABB sightings since 1992 include the following counties: Atoka, Bryan, Cherokee, Choctaw, Coal, Craig, Creek, Haskell, Hughes, Johnston, Latimer, Le Flore, Marshall, Mayes, McCurtain, McIntosh, Muskogee, Okfuskee, Okmulgee, Osage, Pittsburg, Pontotoc, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, and Wagoner, and Washington (29 counties). Additional counties with ABB habitat and potential occurrence due the proximity to the above counties include: Adair, Carter, Delaware, Garvin, Kay, Lincoln, Love, McClain, Murray, Nowata, Ottawa, Pawnee, Payne, and Pottawatomie.

Numerous ABB surveys have been conducted throughout eastern Oklahoma. The majority of these surveys are undertaken to determine whether ABBs were located in areas anticipated to have soil disturbance actions associated with development projects. Most survey data are

collected sporadically and without systematic or complete coverage across Oklahoma. Presently, eastern Oklahoma contains a large concentration of ABBs within their historic range, at Camp Gruber in Muskogee County. In 2007, a total of 676 ABBs were captured in 1,305 trap nights at Camp Gruber. In 2009, a total of 423 ABBs were captured at the 59 stationary locations at Camp Gruber. In 2010, reports from researchers at The Nature Conservancy's Tallgrass Prairie Preserve in Osage County indicated a healthy population of approximately 1,400 ABBs (C Hall, Augustana College, pers.comm. 2011). Camp Gruber and the Tallgrass Prairie Preserve represent high densities of ABBs localized into smaller areas.

In Texas, the ABB has been found on Camp Maxey, Lamar County from 2004 - 2008, and a single ABB was documented at the Nature Conservancy's Lennox Woods, Red River County in 2004. No ABBs have been documented at Camp Maxey from 2009 - 2012, despite intensive surveying.

The sentinel population of ABBs on Block Island off the coast of Rhode Island is stable, as is the population of ABBs in southern Tripp County, South Dakota. 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. Hoback, University of Nebraska, pers. comm., March 24, 2011) and that population has increased in recent years with relief from the drought. Based on trapping efforts over the last 2 years in the Nebraska Sandhills, many more ABBs occur in that population than previously recognized. In 2010, more than 1,000 ABBs were trapped on and near Project lands in Nebraska with relatively limited trapping. Population levels 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 Camp Gruber in eastern Oklahoma have robust populations 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 ABBs in northern Lamar County, Texas, may be declining (USFWS 2008a).

Reasons for decline: The ABB's uneven distribution and density, and their vulnerability to extinction are likely due to the species having specialized resource requirements with carrion being a finite resource widely scattered in space and time (Karr 1982, Pimm et al. 1988, Peck and Kaulbars 1987). 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).

Since the middle of the 19th century, certain animal species in the favored weight range for ABBs 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 black-tailed prairie dogs mammals may also have supported ABBs (USFWS 2008a). 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 meso-carnivores becoming more abundant. Mid-sized carnivores prey on small mammals and birds and directly compete with carrion beetles for carrion.

Fragmentation of large contiguous habitats into smaller pieces or patches of habitat may increase species richness, but the species composition usually changes. Fragmentation of forests and grasslands cause a decrease of indigenous species and an increase in meso-carnivores that thrive in areas disturbed by humans such as: American crow (*Corvus brachyrhynchos)*, raccoon (*Procyon lotor)*, red fox (*Vulpus fulva)*, opossum (*Didelphis virginiana)*, striped skunk (*Mephitis mephitis)*, rats (*Neotoma* spp. and *Sigmodon* spp.), coyotes (*Canis latrans)*, feral cats (*Felis domesticus*), and other opportunistic predators (Wilcove et al. 1986). In this way, historically large expanses of natural habitat that once supported high densities of indigenous species are now artificially fragmented, supporting fewer or lower densities of indigenous species that once supported ABB populations, and also facilitating increased competition for limited carrion resources among the "new" predator/scavenger community. 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 range. 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) 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.

Although much of the evidence suggesting the reduction of carrion resources as a primary mechanism of decline is circumstantial, this hypothesis fits the temporal and geographical pattern of the disappearance of ABBs, and is sufficient to explain why ABBs declined while related species did not. ABBs are the largest species of burying beetle in the New World (Western Hemisphere) and 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). In a fragmented ecosystem, larger species have been shown to be negatively affected before smaller species, a phenomenon that has been well-documented with carrion and dung beetles in South America (Klein 1989).

Population Estimate: Although ABB are relatively easy to capture, population estimates of ABB are problematic. 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. This may be less of a problem for the insular population on Block Island, Rhode Island where, because of the relatively small size of the island (2,614 ha), a significant proportion of the population can be

monitored. Elsewhere, however, precise estimates of absolute or even relative densities remain a challenge (USFWS 2008a).

Because the ABB completes its lifecycle in one year, each year's population levels are largely dependent on the reproductive success of the previous year. Therefore, populations may be cyclic (due to weather, disease, etc.), with high numbers and abundance in one year, followed by a decline in numbers the succeeding year. These short-term stochastic events should not have long-term effects in robust populations (USFWS 2008a). Schnell et al. (1997-2003, 1997-2005) reported that areas of high concentration appeared to shift annually throughout Fort Chaffee, Arkansas and Camp Gruber, Oklahoma, even though land use within each area stayed relatively stable (USFWS 2008b). Losses associated with one-time or short-duration pulse are less likely to affect population survival than longer-duration adverse effects.

False negatives are possible outcomes of ABB surveys. Standard transects on Camp Gruber that resulted in ABB captures in one year failed to capture ABBs in another year. Surveys conducted in a given area have resulted in ABB captures during one survey effort, but surveys conducted in the same area within the same active season have resulted in negative ABB captures. This indicates 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).

Conservation

It is unclear if an extirpated ABB population can successfully be re-established. Individuals released at a site may disperse from the area, making it difficult to establish a self-sustaining population. A long-term reintroduction effort on Nantucket Island, Massachusetts, is still being evaluated and has not yet reached either the population size or persistence target. However, in 2011, more ABBs were caught than in any previous year and in fewer trap-nights than any year since 2006 (LoPresti et al. 2011). In Ohio, a multi-year reintroduction effort has been implemented. However, to date no ABBs have been captured in post-release years. A reintroduction effort started in Missouri in the summer of 2012 and successful reproduction of ABBs on provided carrion was documented, though it is unknown if the population will remain viable.

Protection of large areas of appropriate native habitat appears to be the best known method for enhancing the conservation of the ABB. Relatively large areas of native habitat tend to support the highest known ABB populations. Large blocks of military lands such as Ft. Chaffee in Arkansas, Camp Gruber and the McAlester Army Ammunition Plant in Oklahoma and other large areas of intact native habitat such as the Tall Grass Prairie Preserve support relatively large and secure ABB populations. Creating or protecting more secure and actively managed lands in areas known to support ABBs should make populations more viable and contribute towards recovery. Additional lands were added and managed at the TNC Tall Grass Prairie Preserve through ABB mitigation funds and two ABB mitigation banks have been established that should contribute to the recovery of the species.

Threats

The American Burying Beetle Recovery Plan (USFWS 1991) and the 5-yr status review of the species (2008a) identify the following factors as potential threats to the ABB: disease/pathogens, DDT, direct habitat loss and alteration, interspecific competition, increase in competition for

prey, increase in edge habitat, decrease in abundance of prey, loss of genetic diversity in isolated populations, agricultural and grazing practices, and invasive species. None of these theories alone adequately explain why the ABB declined while congeneric species are still relatively common rangewide [there are eight sympatric congeners which are not in peril (Sikes and Raithel 2002)].

Direct Habitat Loss and Alteration

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) reduced the carrion prey base of the appropriate size for ABB reproduction, and (2) increased the vertebrate scavenger competition for this prey (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999) due to the ABBs relatively large size and specialized breeding behavior (Creighton et al. 2007).

Projects that cause ABB habitat fragmentation are common. For example, between October 1, 2012, and September 30, 2013, the Service's Oklahoma Field Office reviewed 777 proposed projects in Oklahoma that may have impacted the ABB. Projects evaluated included pipelines, roads, quarries, communication towers, residential housing development, bridges, mining, petroleum production, commercial development, recreational development, transmission lines, and water and wastewater treatment facilities. Impacts from these activities varied in size and duration, with projects such as quarries being hundreds of acres and having permanent impacts, to water treatment facilities of a few acres with both permanent and temporary impacts.

Land conversion to agriculture and development, logging, fire suppression, and intensive domestic livestock grazing are the primary causes of habitat loss and fragmentation within eastern Oklahoma today. For example, large areas of native grasslands have been converted to introduced grasses such as fescue and bermuda varieties to improve pastures for intensive cattle grazing operations. Since European settlement, fires have been largely suppressed within eastern Oklahoma, leading to changes in community types and species composition. Riparian areas and bottomland habitats have been severely degraded not only as a result of conversion to agriculture and logging, but also because of inundation by numerous reservoirs (Ruth 2006). The anthropogenic breakdown of barriers to dispersal also has permitted the invasion of non-indigenous species (Northern Prairie Wildlife Research Center 2006) such as johnsongrass (*Sorghum halepense)*, Russian olive (*Elaeagnus augustifolia)*, saltcedar (*Tamarix ramosissima)*, and *Sericea lespedeza*.

Interspecific competition

For most guilds (a group of organisms that exhibit similar habitat requirements and that respond in a similar way to changes in their environment), larger species tend to feed on larger prey, occupy a greater diversity of habitats, dominate in interference competition, and maintain larger home ranges, but may suffer from exploitative competition from smaller species (Ashmole 1968, Gittleman 1985, Hespenheide 1971, Rosenzweig 1968, Schoener and Gorman 1968, Werner 1974, Wilson 1975, and Zaret 1980). Larger prey is less abundant than smaller prey (Peters 1983, Brown and Maurer 1987, Damuth 1991, and Lawton 1990) and larger guild members require larger home ranges. In contrast to other guild members, the ABB must range over a

larger area and a greater diversity of habitats to find suitable carcasses. In addition, larger carcasses are harder to bury than smaller ones (Creighton et al. 2007). While large size alone does not necessarily confer endangerment, rarity and extinctions tend to be higher for the larger species within trophic levels or guilds (Diamond 1984; Martin and Klein 1984; Vrba 1984; Owen-Smith 1988; and Stevens 1992). Although less than 2 grams in weight, the ABB is nevertheless the largest member of a guild that specializes on vertebrate carcasses, which are rare and unpredictable resources.

Size appears to be the most important determinant of success in competition for securing carrion; the largest individuals displace smaller burying beetles (Kozol et al. 1988). ABBs have been recorded as commandeering a carcass that has been buried by another burying beetle species. However, factors other than size (e.g., temperature or activity patterns) might also affect the outcome of competition (Wilson and Fudge 1984). Trumbo (1992) showed that the potential for competition for carrion from other burying beetles species (i.e., congeners) increased with carcass size, and Scott et al. (1987) found the same results with carrion-feeding flies. Habitat fragmentation caused increased vertebrate scavenger pressure, which decreased availability of carrion of the appropriate size, and increased competition between burying beetles (Creighton et al. 2007). As ABB populations decline, the competition between ABBs and sympatric congeners for sub-optimally sized carcasses would be expected to increase.

The ABBs most similar congener is *N. orbicollis*. Based on historical geographic range, presumably the ecological tolerances (e.g., diel periodicity, breeding season), and phylogenetic information indicates these species may be each other's closest surviving relatives (Szalanski et al. 2000). Being so similar, they likely are each other's greatest congeneric competitors (Sikes and Raithel 2002), and interspecific competition may affect populations at the local level. Typically, surveys for ABBs result in 10 or more times more *N. orbicollis* than ABBs (Lomolino and Creighton 1996, Amaral et al. 1997, Carlton and Rothwein 1998). Kozol (1989) demonstrated that *N. orbicollis* was about eight times more abundant than ABBs on Block Island, Rhode Island while Walker (1957) collected 19 times more *N. orbicollis* (175) than ABBs (9) in the single trapping array where the latter species was encountered in Tennessee. While the ABB is more successful than *N. orbicollis* in utilizing carcasses greater than 100 g, these data suggest that *N. orbicollis* may be a formidable competitor for the ABB (Sikes and Raithel 2002) and may have actually increased (have been released from competition) in those areas where ABBs disappeared (USFWS 1991). In addition, *N. marginatus* may also be a formidable competitor to ABBs. *N. marginatus* is on average slightly larger and utilizes larger carcasses than *N. orbicollis* and in Nebraska and South Dakota is typically more abundant (Backlund and Marrone 1997, Bedick et al. 1999). Another threat to ABB reproductive success is brood parasitism after the oviposition by other burying beetle species near an ABB buried carcass (Müller et al. 1998, Trumbo 1994). Trumbo (1992) found that mixed species burying beetle broods were more common on larger carcasses.

The imported fire ant (*Solenopsis invicta)* has become a formidable competitor for carrion and a potential source of mortality for burying beetles when they co-occur at a food source (Warriner 2004, Godwin and Minich 2005). Scott et al. (1987) concluded that the inability of *N. carolinus* to successfully bury carrion provided experimentally in Florida was due to interference by imported fire ants. Only 5 of 48 carcasses were successfully exploited by *N. carolinus*, despite pitfall trapping that demonstrated that *N. carolinus* was locally abundant. Collins and Scheffrahn (2005) noted that fire ants may reduce ground-nesting populations of rodents and birds, and in some instances, may completely eliminate ground-nesting species from a given area. Fire ant infestations are not evenly distributed; rather, they tend to be more numerous in open, disturbed

habitats (Carlton in lit. 1996). Of the states containing populations of ABB, fire ants now infest all or parts Arkansas**,** Oklahoma, and Texas (USDA 2003).

Loss of Genetic Diversity in Isolated Populations

Kozol et al. (1994) examined ABB genetic variation within and between the Block Island, Rhode Island population and the eastern Oklahoma and western Arkansas population. Both populations have low levels of genetic variation, and most of the variation occurs within a single population. There were no unique diagnostic bands within either population, but they found the Oklahoma-Arkansas population to be somewhat more diverse. Reduced genetic variation is often a result of founder effect, genetic drift, and inbreeding. Kozol et al. (1994) suggest that multiple bottleneck events, small population size, and high levels of inbreeding may be factors contributing to the pattern of genetic variation in ABBs.

Szalanski et al. (2000) expanded on Kozol et al.'s 1994 study and examined ABBs from five populations: Block Island in Rhode Island, Arkansas, South Dakota, Oklahoma, and Nebraska. The authors found little evidence that the five populations have maintained unique genetic variation and no evidence to suggest that these five populations should be treated as separate, genetically independent conservation segments.

Action Area

The action area, as defined here, includes all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action. The ICP Planning Area (Figure 1) is the Action Area. The ICP Planning Area encompasses the known and potential range of the ABB and its habitat in 45 counties within the state of Oklahoma, including Noble and Cleveland counties, which are not currently considered to be within the range of the ABB. However, because of the proximity to occupied portions of the species range and existing potential habitat, we have included these counties in the Planning Area.

Environmental Baseline

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species in the Action Area

The most current information for ABBs in Oklahoma can be found at the Service website: ***http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm***. Oklahoma counties with confirmed ABB sightings since 1992 include Atoka, Bryan, Cherokee, Choctaw, Coal, Craig, Creek, Haskell, Hughes, Johnston, Latimer, Le Flore, Marshall, Mayes, McCurtain, McIntosh, Muskogee, Okfuskee, Okmulgee, Osage, Pittsburg, Pontotoc, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, and Wagoner, and Washington (29 counties). Additional counties with ABB habitat and potential occurrence due the proximity to the above counties include: Adair, Carter, Delaware, Garvin, Kay, Lincoln, Love, McClain, Murray, Nowata, Ottawa, Pawnee, Payne, and Pottawatomie.

Numerous ABB surveys have been conducted throughout eastern Oklahoma. The majority of these surveys are associated with projects such as road construction, oil and gas projects, and similar development activities that may result in soil disturbance and impacts to ABB habitat. To determine whether ABBs may occur within these project areas, project proponents contract with permitted surveyors to conduct surveys for ABB. Because these surveys are associated with development projects that limit their temporal and spatial distribution, only limited conclusions can be drawn. The known ABB range in Oklahoma has expanded, but this could be explained by increased survey effort and area.

A smaller number of surveys are conducted for scientific research and are more appropriately designed to draw more specific conclusions. Scientifically designed survey data have been collected annually or biennially from MCAAP, Camp Gruber, Ouachita National Forest, Connors State College, The Nature Conservancy's Tallgrass Prairie Preserve and Weyerhaeuser lands in Oklahoma, and Fort Chaffee in Arkansas. These surveys provide trend data for the ABB. Surveys for the ABB have been conducted annually at Camp Gruber since 1992. ABB captures at these locations typically fluctuate on an annual or biennial basis, but in general ABB numbers appear stable or increasing, with the exception of the Weyerhaeuser lands. All of these areas, except for Weyerhaeuser lands in McCurtain County, provide large tracts of relatively natural habitat managed in such a way as to mimic the historic disturbance regime.

Weyerhaeuser has conducted surveys since 1997. Surveys suggest the ABB population is greatly reduced or potentially extirpated from the southern-most tip of McCurtain County. However, relatively few surveys have been conducted in this area since 2008 to verify the status in that area. The existing scientifically designed surveys indicate Camp Gruber, Fort Chaffee, and The Tallgrass Prairie Preserve represent areas with a relatively high-density of ABBs. These surveys also demonstrate that populations can fluctuate on an annual basis. In 2010, reports from researchers at The Nature Conservancy's Tallgrass Prairie Preserve in Osage County indicated a healthy population of around 1400 ABB (personal communication with Carrie Hall 2011), in 2011the population was estimated to be around 500, and in 2012 the population was estimated between 2,554 – 4,379 beetles (Howard et al. 2012).

The Service identified areas, known as ABB Conservation Priority Areas (CPAs), where positive surveys have been relatively concentrated over the last 10 years. Focus areas in Oklahoma for potential habitat conservation are located within Atoka, Coal, Hughes, Pittsburg, Latimer, Haskell, Leflore, Muskogee and Osage Counties.

Factors Affecting Species Environment within the Action Area

Adequately evaluating the effects of ICP implementation on the ABB requires that the Service 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.

Other Consultations

The Service consults on many proposed actions potentially impacting the ABB in Oklahoma. Project types evaluated included pipelines, roads, quarries, communication towers, residential housing development, bridges, mining, petroleum exploration/extraction/production, commercial development, recreational development, transmission lines, and water and waste water treatment

facilities. Impacts from these activities vary in size and duration, with projects such as quarries being hundreds of acres and having permanent impacts, to water treatment facilities of a few acres with both permanent and temporary impacts. Most of these consultations are informal, result in no take of the ABB, and thus do not provide for incidental take. However, there are several existing and at least 8 pending formal consultations that would include some level of incidental take of ABBs. Most take is related to temporary actions with soil disturbance.

There are several biological opinions with incidental take statements issued for the ABB in Oklahoma that are currently in effect:

- Department of Defense pertaining to Camp Gruber near Braggs, Oklahoma; 1993, in need of re-initiation; 35 ABBs/year;
- U.S. Forest Service regarding the Ouachita National Forest in southeast Oklahoma; September 22, 2005; 7,095 acres of permanent habitat loss; 89,700 acres of temporary habitat loss;
- Natural Resources Conservation Service for the Oklahoma Healthy Forests Reserve Program; issued September 14, 2010; 5,000 acres of habitat;
- Bureau of Land Management for Wild Horse and Burro Program; April 1, 2010; 200,000 acres of habitat;
- Rural Utility Service for a KAMO Power transmission project; June 9, 2011; 28 acres of habitat;
- RUS for Broadband Initiative Program; July 7, 2011; 1,500 acres;
- Federal Highway Administration for Oklahoma Department of Transportation activities; July 16, 2008; 5,999 acres of habitat.
- U.S. Army Corps of Engineers regarding operation of multiple reservoir and navigation projects in Kansas, Oklahoma, and Texas; April 2013, 106,990 acres of habitat, 1,100 acres potentially permanent and 105, 890 acres of temporary or periodic (flood pool acres) habitat loss;
- U.S. Army Corps of Engineers and Bureau of Indian Affairs for the construction stage on the Flanagan South Pipeline Project; July 24, 2013; a nearly 600-mile (966-kilometer), 36-inch (0.9-meter) diameter interstate crude oil pipeline that would originate in Pontiac, Illinois, and terminate in Cushing, Oklahoma; 205.5 acres (83.2 hectares) of ABB habitat: 115.5 acres (46.7 hectares) during construction, and 90 acres (36.4 hectares) during operation and maintenance activities;
- Muddy Boggy Conservation Bank regarding establishment, management and operation of a Conservation Bank for ABB, September 25, 2013, up to 1,180 acres of temporary impacts that will result in overall beneficial effects;
- ABBCB regarding establishment, management and operation of a Conservation Bank for ABB, March 17, 2014, up to 289.6 acres annually during the management that will result in overall beneficial effects;.
- Southwestern Power Administration programmatic consultation for powerline maintenance, 2008, 4,855 acres in process of reinitiation;
- Department of Energy, Clean Lines Transmission Project, approximately 700 mile transmission line from Texas County, Oklahoma to Shelby County, Tennessee, in planning phase, proposed to cross the several counties in the middle of the ICP Planning Area. Biological Assessment is being prepared but formal consultation has not been initiated yet.

Currently, more than 100 entities or individuals in Oklahoma possess valid Section 10(a)(1)(A) scientific research permits under which some authorized take of ABBs can occur. Most of these permits authorize surveys, which contribute to our understanding of where ABBs occur so that projects do not inadvertently cause take, but do not have any associated research. All research conducted under these permits must further conservation efforts for the species. The loss of some individual ABBs over the short-term from research is allowed as the research, when applied to conservation efforts, should provide long-term benefits. The Service requires that every available precaution be implemented to reduce and/or eliminate authorized take associated with research activities.

An HCP and related 10(a)(1)(B) incidental take permit was issued in 1996 to Weyerhaeuser for ABBs on their lands in southeast Oklahoma. The Weyerhaeuser HCP is valid for 35 years (1996-2031) and identifies the following as foreseeable activities likely to be implemented by Weyerhaeuser over that period: 28,000 acres (average of 800 acres per year) of forest will potentially be harvested; 16 ponds constructed; 10 or fewer food plots planted; Environmental Protection Agency-approved application of pesticides for control of pales weevil (*Hylobius pales*) damage to planted pine seedlings; right-of-way (ROW) vegetation control; 2 miles of road construction; 20 acres of mineral, oil or gas exploration; and no more than 600 acres of cattle grazing. Minimization and mitigation measures included: a research program to study the habitat affinities of the ABB; baseline surveys of the area for the ABB; incorporation of strategies developed from research in Weyerhaeuser's forest management strategy; minimization of pesticide use only use pesticides approved by the EPA; and minimize the disturbance associated with logging activities. From 1997 to 2006, Weyerhaeuser lands were surveyed for the ABB annually, and habitat sampling was conducted to determine effects from timber management on ABBs. From 1997 to 2006, the following numbers of ABBs were captured: 106, 64, 26, 41, 16, 25, 85, 19, 0, and 0, respectively. The population is potentially extirpated from this area (Schnell 2011), but survey effort has been limited since 2006.

The TransCanada Keystone Gulf Coast Pipeline's (Keystone) Habitat Conservation Plan (HCP) was issued in 2012 for the Keystone XL pipeline project, including approximately 485 miles of 36-inch diameter oil pipeline from Cushing, Oklahoma to near Nederland, Texas. The Keystone HCP is valid for 50 years and covers construction and maintenance of the pipeline. Both temporary and permanent impacts to habitat and individuals were identified in Creek, Okfuskee, Seminole, Hughes, Coal, Atoka, and Bryan counties, Oklahoma. Anticipated effects include temporary impact to up to 435 acres (176 hectares) and permanent impact to 17 acres (6.9 hectares) of potential ABB habitat by construction, impact to approximately 33 acres (13.4 hectares) of potential ABB habitat by fragmentation due to the permanent alteration of existing cover type (e.g., from forest to grassland) in areas that are not already fragmented, and 65 acres (26.3 hectares) of impacts to ABB habitat during operations and maintenance of the project (in addition to the 485 acres [196 hectares] of impacts described above). Keystone contracted with the Common Ground Capital, LLC (CGC) and WLLL, LLC (WLLL) to develop a Permittee Responsible Conservation Project Site. CGC-WLLL will manage the 865-acre "Keystone McAlester Conservation Area".

Two ABB Conservation Banks (currently about 3,600 acres) have been approved to help provide mitigation opportunities for sections 10 or 7 related impacts (Muddy Boggy and ABBCB described above under Biological Opinions).

Effects of the Action

As noted previously, the Federal Action under consideration is approval of the ICP and potential issuance of Permits to applicants for incidental take of ABBs. There are no direct effects from ICP approval or issuance of permits, but indirect effects of the action include all the impacts of implementing the ICP. Direct effects from ICP implementation include impacts from all covered activities and described in the ICP. Indirect effects also include interrelated and interdependent actions.

The proposed ICP covers multiple oil and gas related activities and each of these may result in different effects to ABBs depending on the life cycle of the ABB when the activities occur. Covered Activities are likely to result in take of ABBs in the form of mortality or injury to adults, larvae, or eggs resulting from crushing and collision; impacts to breeding, feeding, and sheltering habitat; increased habitat fragmentation; and changes from one vegetation community to another.

Take of ABBs is expected to result from human and equipment movement and ground disturbance associated with construction and installation of well pads, pipelines, access roads, electrical distribution lines and substations, and off-site reservoirs. Operation and maintenance, and decommissioning of these activities are also expected to result in take of the ABB. Activities occurring during the ABB active season could reduce the species' foraging and reproduction efficiency for the duration of the active season. Species used by ABB (for food and reproduction) and their habitat within project areas would be impacted, likely reducing the available food sources, decreasing reproductive potential, and decreasing use by ABBs in the area. Reduced availability of carrion may result from greater competition from vertebrate scavengers; this is especially true in those areas where forested ABB habitats are fragmented (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, and Bedick et al. 1999). Installation of any permanent facilities (such as access roads) would remove ABB habitat used for breeding, feeding, or sheltering.

Vegetation Removal

Activities that include removal of vegetation may cause habitat degradation, a reduction of habitat connectivity, a loss of breeding and sheltering habitat by removing vegetation and altering soil moisture (loss of vegetation decreases soil moisture), and cause a species composition change within the small community that ABBs rely on for reproduction (Grant et al. 1982). ABBs are sensitive to soil moisture and die quickly when desiccated (Bedick et al. 2006). Additionally, these activities may increase the potential for introduction of non-native or invasive species due to the removal of existing vegetation. ABBs occurring within the leaf litter or uncovered during the removal of vegetation may be wounded or killed from exposure to adverse weather conditions or crushed by vegetation removal equipment.

Use of Vehicles and Heavy Equipment

Activities requiring off-road vehicles, trucks, or heavy equipment may cause a loss of breeding and sheltering habitat (suitable soil for excavation and burial) from soil compaction, vegetation crushing and trampling, and alteration of soil moisture. Equipment causing soil compaction may crush ABBs within the area, either above ground (during active season) or below ground (during active or inactive season). During the ABB active season, equipment may crush brood chambers containing ABB adults, larvae, and eggs. Direct physical injury or mortality may result when individuals collide with equipment. In dry conditions, equipment could increase the risk of ignition of wildfire. Wildfire may cause loss of breeding, feeding, and sheltering habitat, alter

the small mammal community (for a period of time) to a less appropriate size class for optimal ABB reproduction (Kirchner et al. 2011), and injury or mortality for individuals exposed to fire. Operation fluids (e.g., fuel and oil) required for equipment maintenance may cause take of ABBs if individuals or habitat are exposed to them during the active or inactive season.

Disturbance and Movement of Soil

Movement and physical disturbance of soil during construction activities such as grading, soil excavation, and topsoil stripping may crush or expose ABBs (adults, larvae, and/or eggs during the active season; adults during the inactive season) causing injury or mortality through direct impact or exposure to desiccation.

Soil erosion occurring during construction or following installation of project facilities may bury ABB adults or broods (during active season) or overwintering adults (during inactive season) too deep for them to emerge. Additionally, it may expose ABBs to adverse environmental conditions if soils (or individuals/broods) are washed away.

Human Presence and Movement

Introducing or increasing human presence and movement within or adjacent to ABB habitat may increase the amount of crushing or trampling of vegetation, leading to habitat degradation and potential displacement of ABBs in the area.

Light

Artificial lighting used during the active season may attract ABBs, which could result in take through collision or crushing by equipment and/or increasing energetic demands. Light used during nighttime construction can disrupt ABB foraging behavior and increase predation on ABBs (USFWS 1991). Additionally, light associated with the flame of gas flares used in drilling and production of natural gas may attract ABBs if they are not shielded. Light sources are not expected to affect ABBs during the inactive season, as ABBs are not above ground during that time period.

Vegetation Maintenance

Regular vegetation maintenance within project areas may cause injury or mortality of ABBs. During the active season, ABBs exposed to mowing/vegetation equipment may be crushed or exposed to desiccation. If vegetation maintenance reduces vegetation height to less than 8 inches, the soil may dry to the point that: 1) ABBs have difficulty burying carcasses, 2) soil may not structurally support reproductive chambers, or 3) adult or larval ABBs become desiccated (Bedick et al. 2006). Maintaining grass and vegetation at less than 8 inches tall could affect ABB reproduction (during the active season) and survival when ABBs are underground (during active or inactive season). If widespread application of herbicides are used to maintain the ROW (killing all vegetation within the ROW), instead of mechanical vegetation removal (i.e., mowing) or spot-treatment of herbicides, soil may also dry causing the same impacts described above. Large mowing equipment operated within ABB habitat may cause soil compaction, resulting in take of buried ABBs during the active or inactive season (Hoback et al. 2012, Hoback 2013). Vegetation maintenance may result in temporary habitat loss, temporary habitat fragmentation, and/or alteration of ABB habitat.

Impacts Analysis and Estimated Incidental Take

The Service anticipates incidental take of ABBs will result from Covered Activities. Such take is expected to occur in the form of injury or death of adults, larvae, and eggs from by crushing or collision, or from limiting available resources, resulting in the loss of breeding, feeding, and sheltering habitat. Take of ABBs is expected to result from ground disturbance associated with construction and installation of well pads, pipelines, access roads, electrical distribution lines and substations, and off-site reservoirs. Activities related to operation and maintenance, reclamation, and decommissioning are also expected to result in take of the ABB.

Because quantification of the number of ABBs impacted incidental to Covered Activities is not possible given available data, the Service believes that relying on impacts to occupied ABB habitat is a suitable surrogate to estimate the amount of take that is likely to occur. Within the ICP, "occupied ABB habitat" is defined as areas:

1) suitable for ABB use (containing ABB habitat), AND
2) Within the effective survey radius of a valid ABB survey where ABBs were identified *or* ABBs are assumed present (no surveys have been conducted).

ABB Habitat within the ICP Planning Area

Some areas within the Planning Area are unsuitable for ABB use (i.e., areas that are developed, have unsuitable soils, or contain water). To determine how many acres within the Planning Area may be impacted by the Covered Activities in areas that are habitat for the ABB, the Service estimated the ratio of ABB habitat to areas unsuitable for the ABB using GIS and the 2006 National Land Cover Database (NLCD) (Fry et al. 2011). Permittees will likely delineate potential habitat for the ABB within their project areas at a smaller scale than the NLCD data, using different methods (for example, ground-truthing or satellite aerial photography). However, for the purpose of roughly estimating the total habitat within the Planning Area, the Service elected to use the NLCD data. Definitions for each of the land cover categories are in Table 2. Areas selected as ABB habitat included the land cover categories of Deciduous Forest, Evergreen Forest, Mixed Forest, Shrub/Scrub, Herbaceous, Woody Wetlands, Emergent Wetlands, and Hay/Pasture (Table 2). Although portions of the Woody Wetlands and Emergent Wetlands are likely unsuitable for the ABB, portions of those areas are likely suitable, especially during dry periods. Therefore, the entire category was included as habitat for this analysis. Areas unsuitable for the ABB (areas where take is not expected to occur) included the land cover categories of Open Water, Developed Open Space, Developed Low Intensity, Developed Medium Intensity, Developed High Intensity, Barren Land, and Cultivated Crops. Approximately 85.8 percent (19,612,333 acres; 7,936,830 hectares) of the Planning Area was considered ABB habitat according to NLCD data, and approximately 14.2 percent (3,245,830 acres; 1,313,541 hectares) was not considered ABB habitat.

It is likely that some additional lands within the Planning Area are not suitable for the ABB (based on vegetation type and land management practices). However, the Service does not currently have the data necessary to determine the potential suitability of the entire Planning Area using these additional factors. Therefore, for the purpose of this analysis, the Service assumes that 85.8 percent of the Planning Area may be habitat for the ABB.

Table 2. Total Acres of ABB habitat within Planning Area.

Land Cover	NLCD Land Cover Description	Habitat (Acres)	Non-Habitat (Acres)
Open Water	Areas of open water, generally with less than 25% cover of vegetation or soil.	0	658,534
Developed, Open Space	Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	0	1,071,561
Developed, Low Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.	0	244,026
Developed, Medium Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.	0	82,823
Developed, High Intensity	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.	0	37,300
Barren Land	Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.	0	36,710
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously	6,950,418	0

Land Cover	NLCD Land Cover Description	Habitat (Acres)	Non-Habitat (Acres)
	in response to seasonal change.		
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.	1,147,268	0
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.	393,081	0
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.	165,290	0
Herbaceous	Areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.	6,074,645	0
Hay/Pasture	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.	4,694,828	0
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.	0	1,114,876

Land Cover	NLCD Land Cover Description	Habitat (Acres)	Non-Habitat (Acres)
Woody Wetlands	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	155,185	0
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	31,618	0
Total Acres		19,612,333	3,245,830

Metric conversion: 1 acre = 0.4 hectares

Temporary, Permanent Cover Change, and Permanent Impacts

Impacts to ABB habitat are categorized as follows:

Temporary Impacts

Temporary impacts include areas of ground disturbance resulting from Covered Activities restored to a condition suitable for ABB use within 5 years of the impact with similar vegetative cover. The restoration timeframe of 5 years is based on the amount of time in which the Service expects most grass and shrub dominated cover types could be re-established to their previously undisturbed state based on the climate and vegetation types within the Planning Area.

The ABB is a habitat generalist and specific vegetation types required for the ABB have not been identified, but they have been documented within grassland cover types and native grasses and shrubs are a component of most areas that support ABBs in Oklahoma. Native warm season grasses can take several years to get established, but previous research suggests that 5 years is a realistic timeframe for restoration of these areas within the Planning Area (ODOT 2011, USDA 2009).

Permanent Cover Change Impacts

Permanent cover change impacts are defined here as changing a vegetation cover type to a different vegetation cover type (e.g., forest or shrubland to grassland), resulting in increased fragmentation of habitat (Oxley et al. 1974, Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999, Trumbo and Bloch 2000, Marvier et al. 2004). Similar to temporary impacts, these areas will need to be restored to a condition suitable for ABB use within 5 years. If these areas will be purposefully maintained (through vegetation control) as a different land cover type than prior to project implementation, the Service considers the vegetation cover of the area to have a permanent cover change.

Man-made changes to land cover types can create intense, sudden contrast between land cover types (i.e., a grassland ROW fragmenting a contiguous stand of forest habitat), compared to natural patchy landscapes. These cover type conversions often occur within the ROWs of linear infrastructure, including electric transmission lines, pipelines, and roadways.

Evidence suggests that permanent change in cover types, even if they are both native to the area, can increase threats to ABBs (Trumbo and Bloch 2000) by increasing the number of invasive plant species present (Marvier et al. 2004), reducing the carrion prey base of the appropriate size for ABB reproduction (Oxley et al. 1974), or increasing the scavenger competition for carrion (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999) necessary for ABB reproduction. Additionally, changing the vegetation cover type from forest to grassland provides access, which may increase human use and presence (including use of vehicles) in the area.

To determine whether a project's cover change type will be permanently altered based on the proposed vegetation maintenance activities, project proponents should determine current land cover type using standard techniques (i.e., ground truthing; analysis of recent aerial or satellite imagery; as described in Table 2, or the latest version of the Multi-Resolution Land Characteristics Consortium's National Land Cover Database, available at ***http://www.mrlc.gov/***). The land cover type prior to impacts should be compared to the expected land cover type following the action (including any proposed maintenance/vegetation management activities and requests by the landowner). If the land cover type within the action area will be different (for example, prior to impact, NLCD classified the area at forest; following the impact, the land cover type will fit in the NLCD land cover description for herbaceous) than the original cover type 5 years after the action, the area will have a "permanent cover change." By definition, a permanent cover change does not eliminate ABB habitat.

Impacts within ROWs (for projects such as pipeline and electric distribution lines) that have a permanent change in cover and are immediately adjacent and parallel to existing ROWs, may be considered temporary because they do not increase habitat fragmentation. Co-locating ROWs along existing ROWs, roads, or other interruptions in habitat does not contribute to further fragmentation or edge effect and is preferable to crossing previously undisturbed areas.

Permanent Impacts

Permanent impacts are those that eliminate ABB habitat (i.e., buildings, roads, quarries, strip mines), as well as any impact to habitat that takes more than 5 years to restore to ABB habitat. Permanent impacts to ABB habitat are expected to result in the greatest amount of take of individuals of the species.

Total Impact Estimates within Planning Area

Although it is difficult to accurately predict upstream and midstream development due to factors including fluctuating economic markets for oil and gas, resource availability, and potential technological advances, the Service developed an estimate of total impacts within the Planning Area based on a review of Oklahoma Corporation Commission (OCC) data (average number of drilled production and disposal wells from 2003 to 2012 (OCC 2012), Oklahoma Water Resources Board data (average number of water wells within the Planning Area), and in close cooperation with OIPA representatives (amount of pipeline, associated facilities, and general information).

Given our estimate that 85.8 percent of the Planning Area could be ABB habitat and the total estimated disturbance associated with Covered Activities is 37,569 acres (15,204 hectares), the Service's estimated total impact of Covered Activities to the ABB habitat is 32,234 acres (13,045 hectares) (85.8. percent of the Covered Activities estimate, Table 3). That is approximately 0.16 percent of the 19,612,333 acres (7,936,830 hectares) of suitable ABB habitat within the Planning Area that may be impacted over the duration of the ICP. The Service believes that not all ABB habitat impacts will occur in areas occupied by the ABB (determined through surveys or assuming presence). However, without knowing the specific locations of the impacts, the Service cannot estimate the exact amount of occupied ABB habitat that will be impacted. Therefore, assuming that all ABB habitat that will be impacted may be occupied (for the purpose of estimating take), we have determined that a maximum of 32,234 acres of occupied ABB habitat would be impacted.

Table 3. New impacts of Oil and Gas Development within ABB habitat (approximately 0.16 percent of the 19,612,333 acres of ABB habitat within the Planning Area).

	Acres
Planning Area Size	22,858,163
ABB Habitat within Planning Area	19,612,333
New Oil and Gas Activities Anticipated within Planning Area	37,569
New Oil and Gas Activities Anticipated within ABB Habitat	32,234

Metric conversion: 1 acre = 0.4 hectares

Effects of Interrelated and Interdependent Actions

The Service is required to evaluate the effects of the action under consideration (i.e., Service issuance of an Incidental Take Permit enabling the Project) "…together with the effects of other activities that are interrelated to, or interdependent with, that action" (50 CFR §402.02). Interrelated actions are those that are part of the larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

We have examined activities that could be considered interrelated or interdependent and have either incorporated those activities into the ICP (e.g., transmission lines that connect power to oil and gas operations are covered) or addressed the issues by not covering certain activities (e.g., projects that cross the Planning Area boundaries are not allowed to participate in the ICP and oil spills are not covered). Therefore, there are no effects from interrelated or interdependent actions.

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 biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

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 Service. Any of several private development projects may occur in Oklahoma. Portions of the Planning Area have undergone extensive urban or industrial development, while other portions are primarily agricultural and have experienced little development. Major developments have included conversion of native vegetation to agricultural crops or grazing land, urban or rural development, transportation projects, rights-of-way clearing for utilities, and development of industrial facilities. Examples include tree management and harvest on private holdings and private conversion of native prairie rangeland to cropland in Oklahoma. Construction of houses, industrial manufacturing sites, power lines and roads are also examples of private projects that could impact ABBs. 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.

There are multiple new or expanding surface coal mines in southeastern Oklahoma and scattered sand, gravel, and limestone mining operations in the Planning Area that can affect ABBs through soil disturbance. Activities that disturb soils within the current range of ABBs cause mortality of ABB adults, and (potentially) ABB larvae and eggs. These mining activities can have long-term impacts to habitat, but are limited in area and a relatively minor land use in most of the ABB range.

Pipeline projects that extend beyond the planning area are not covered in the ICP and are examples of cumulative effects. Several pipelines are discussed in the EA for the ICP and most future projects are assumed to be non-federal. Projects include the Tallgrass Energy Pony Express Pipeline Project which involves the conversion of a portion of an existing 500-mile (805-kilometer) natural gas pipeline and new construction of a 260-mile (418-kilometer), 24-inch (61-centimeter) extension from Lincoln County, Kansas to Payne County, Oklahoma. Counties intersected within the Planning Area include Kaye, Noble, and Payne. The project is slated to come online in August 2014 (Tallgrass Energy 2014). At the time the EA was published, no publicly available environmental documentation on this project was available for review. Another proposed pipeline project within the Planning Area is the Diamond Pipeline Project, which is being developed through collaboration between Valero Energy Corporation and Plains All American Pipeline Company. The proposed project would construct approximately 424 miles (682 kilometers) of 20-inch (51-centimeter) pipeline between Cushing, Oklahoma, and Memphis, Tennessee. The project is currently being evaluated, which includes route selection. Proposed project timing includes the finalization of engineering plans and permits and rights-of-way acquisition in 2014, initiation of construction in 2015, and an in-service goal of 2016. Planning Area counties currently crossed by the proposed route, from west to east, include Lincoln, Creek, Okmulgee, Muskogee, McIntosh, Haskell, and Le Flore (Peacock 2014). At the time the EA was published, no publicly available environmental documentation on this project was available for review.

Other conservation plans have been, or are being, developed to address incidental take of federally listed species from future activities not covered under the proposed ICP. A group of 19 wind energy companies, the Wind Energy Whooping Crane Action Group (WEWAG), in coordination with the Service and nine state wildlife agencies, is developing an HCP to address the potential impacts of wind energy development on several threatened and endangered or candidate species in the central US. Species currently included are the whooping crane, the lesser prairie-chicken, the interior least tern, and the piping plover. The proposed WEWAG plan area includes the approximately 200-mile (322-kilometer)-wide whooping crane migration corridor,

which overlaps numerous ICP Planning Area counties in Oklahoma (see Table 3-6 of the ICP). These projects would result in incidental take and mitigation for federally listed species, as well as additional resource impacts. Transmission lines have at least temporary effects and tend to promote development near them.

The Planning Area encompasses all or portions of 9 of the 11 State Planning Regions in Oklahoma. The Census Bureau information shows that between 2000 and 2010 a majority of the counties in Planning Area grew in population by an average of approximately 7.93 percent, ranging from a population decline of –4.05 in Ottawa County, Oklahoma, to an increase of 27.12 percent in Wagoner County, Oklahoma (U.S. Census Bureau 2010). The majority of the counties in the Planning Area are projected to grow in population between 2010 and 2040. Overall the Planning Area counties are projected to grow at an average of 20.43 percent. The area with the lowest growth is expected to be Seminole County, Oklahoma, with a decline of −11.3 percent and the highest growth rate of 47.5 percent is expected in Cleveland County, Oklahoma (Oklahoma Department of Commerce 2012a).

Residential and commercial developments are associated with population growth and 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 cause loss and further fragmentation of ABB habitat in Oklahoma, reducing incrementally the ability of the species to recover in the state. Construction activities that disturb soils within the current range of ABBs cause mortality of ABB adults, and (potentially) ABB larvae and eggs. Although direct mortality of ABBs from individual construction activities is local and constitutes a short-term adverse effect, the cumulative loss of ABBs 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 ABBs are attracted to lights. Future construction and developments of this type by state or private entities may harass ABBs and interfere with feeding or breeding by distracting the ABB.

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 Service's biological opinion that implementation of the proposed ICP is not likely to jeopardize the continued existence of the ABB. No critical habitat has been designated for this species; therefore, none would be affected. The Service’s determination is based on the following primary factors.

- Since the Recovery Plan was developed in 1991, numerous other ABB 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 (USFWS 2008a).

- Although the small population in Texas, on the periphery of the range, may be declining, available evidence indicates that populations of ABB are relatively stable in Nebraska, South Dakota, Oklahoma, Arkansas, Kansas, and Rhode Island.

- Most of the existing incidental take authorized through section 7 consultations or section 10 permits are temporary or short duration effects. Minimization and mitigation measures are included with these actions.

- Oil and gas activities covered under the ICP likely would cause take of ABBs in the form of mortality, harm, and harassment within Oklahoma. However, some of these losses constitute a one-time or short-duration pulse effect to the ABB populations in Oklahoma so they will not affect ABB populations long-term.

- Methods used to determine the amount of ABB habitat within the ICP Planning Area in Oklahoma (described in Section 3.3.2) have not been applied to other states within the ABB range. However, given that the ABB range expands well beyond Oklahoma, the Service anticipates that the overall percentage of range wide ABB habitat that may be impacted by Covered Activities in this ICP is likely much smaller than 0.16 percent (the percentage of Oklahoma ABB habitat in that may be impacted by Covered Activities).

- Loss of habitat is spread over approximately 19,612,333 acres of ABB habitat within the range in Oklahoma and a maximum of 32,234 acres (0.16 percent) is expected to be impacted. Because permanently lost acres of ABB habitat will be mitigated at a 1:1 ratio or higher, temporarily lost acres of ABB habitat will be restored and mitigated at a 1:0.25 ratio or higher, and newly fragmented acres of ABB habitat will be mitigated at a 1:0.5 ratio or higher, the protection and management in perpetuity of ABB conservation areas is expected to fully mitigate for the effects of the habitat loss during construction.

- For all areas temporarily affected by construction, ICP requirements include the restoration of the vegetation type and quality existing adjacent to the affected areas, with the exception of forested areas that will be re-vegetated but restored to a grassland vegetation type. Progress and success of habitat restoration will be monitored by Permittees. Successful restoration of areas temporarily affected by Projects will minimize adverse effects to the ecosystem necessary for survival and recovery of ABB populations.

- Protection of ABB habitat in a previously unprotected area would improve the likelihood of survival and recovery of the species. The restoration program would ensure that the acres disturbed by the Project will be either restored appropriately or mitigated at the rate for permanent impacts (1:1 or higher).

- The ABB Recovery Plan provides criteria for downlisting of the species and not for delisting, because of the limited knowledge of populations at the time the recovery plan was developed in 1991. Mitigation lands and the habitat protection it would provide are consistent with recovery actions 1.23 and 5.3 in the recovery plan (USFWS 1991).

- ABB mortality that occurs as a result of ICP implementation would constitute a short-term effect to populations, which would have minimal impact on the species as a whole and the mitigation is anticipated to provide secure areas for ABB and mitigate for these short-term effects.

The proposed action would not appreciably reduce the likelihood of survival and recovery of the ABB because conservation measures in the ICP will minimize impacts to the species, reduce the level of take, and result in long-term mitigation for impacts by preserving ABB habitat in perpetuity.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary and must be implemented by the Service so that they become binding conditions of any authorization issued to implement a project covered by this biological opinion, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the authorizations, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. The Service must monitor the progress of the action and its effect on the species [50 CFR 402.14(i)(3)].
The ICP and its associated documents clearly identify anticipated effects to the ABB likely to result from the oil and gas industry activities and the measures that are necessary and appropriate to minimize those effects. All avoidance, minimization and mitigation measures described in the ICP are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR sec. 402.14(i), and will be incorporated into any section 10(a)(1)(B) permit or permits issued. Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If Permittees fail to adhere to these terms and conditions, the take authorization provided under the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the ICP, associated reporting requirements, and provisions for disposition of dead or injured animals are described in the ICP and accompanying section 10(a)(1)(B) permit(s).

Amount or Extent of Take

The Service anticipates incidental take of ABBs will occur as a result of the proposed action in the form of harm, harass, and/or mortality. It is difficult to estimate the number of ABBs that will be taken because there is no density estimate for the Planning Area. Take of the ABB is also difficult to quantify because: 1) individuals of the species are small in size, making them difficult to locate, which makes encountering dead or injured individuals unlikely; 2) ABB losses may be masked by temporal fluctuations in numbers; 3) ABBs spend a substantial portion of their lifespan underground; and 4) the species is primarily active at night. These factors make it difficult to detect the amount of take that will occur. Although we cannot estimate the number of individual ABBs that will be incidentally taken, the Service is providing a mechanism to quantify take levels and define when take would be considered to be exceeded. For purposes of the ICP, the Service defines incidental take in terms of the number of occupied acres disturbed.

Use of Impacts to Habitat as a Proxy for Take

The use of habitat as a proxy for take of individuals of a species is consistent with existing case law. Courts have recognized that as a general matter "Congress wanted incidental take to be stated in numbers of animals, where practical, not in terms of habitat markers" (*Miccosukke Tribe of Indians or Florida v. US*, 566 F.3d 1257 [11th Cir. 2009]). However, courts have also explained that "While Congress indicated its preference for a numerical value; it anticipated situations in which impact could not be contemplated in terms of a precise number.… In the absence of a specific numerical value, however, the Fish and Wildlife Service must establish that no such numerical value could be practically obtained" (see *Arizona Cattle Growers' Association v. U.S. Fish and Wildlife Service*, 273 F.3d 1229, 1249-50 [9th Cir. 2001]). See also *Oregon Natural Resources Council v. Allen*, 476 F.3.d 1031, 1037 [9th Cir. 2007] in which the Service was directed to explain why it was unable to numerically quantify the level of take.

Based upon estimates detailed in the ICP, information exchange between oil and gas industry representatives and Service staff, and a review of publicly available information and scientific literature, it is anticipated that incidental take may occur within a maximum of 32,234 acres of occupied ABB habitat within the Action Area, in the form of harm, harassment, and/or mortality. Therefore, the following amount of incidental take will be authorized by the ICP:

- Individuals will be taken on no more than 32,234 acres of ABB habitat that occurs within the action area.

Effect of the Take

In the accompanying biological opinion, the Service has determined that this level of anticipated take is not likely to result in jeopardy of the ABB due to the long-term beneficial effects associated with the action, most importantly the permanent minimization of take and the effects of conservation of large blocks of habitat. No critical habitat has been designated for the ABB; therefore, none will be affected.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of ABBs. The Service shall:

1. Require Permittees to fully implement the ICP and comply with all terms and conditions of the issued section 10(a)(1)(B) incidental take permit(s).

The reasonable and prudent measure, with its implementing terms and conditions, is designed to minimize the impacts of incidental take that might otherwise result from ICP implementation. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Service must ensure the following terms and conditions that implement the reasonable and prudent measure described above. The terms and conditions are non-discretionary.

1.1 Ensure that ICP Permittees fully comply with avoiding and minimizing incidental take of the ABB through full implementation of the ICP.

1.2 The Service will review annual reports, notify Permittees of any suspected failures to fully implement the ICP, and suspend or revoke the permit if Permittees are not in compliance with the terms and conditions.

Review Requirements

The reasonable and prudent measure, with its implementing terms and conditions, is designed to avoid, minimize, and mitigate effects of incidental take that might otherwise result from approval of the ICP, subsequent issuance of permit(s), and full implementation of the ICP. If, during the course of the authorized activities, the level of incidental take is exceeded prior to the annual review, such incidental take represents new information requiring review of the reasonable and prudent measure provided. The Oklahoma Ecological Services Field Office must immediately provide an explanation of the causes of the taking and review the need for possible modification of the reasonable and prudent measure with the Chief of Endangered Species, Southwest Regional Office. This biological opinion will expire with the expiration of the ICP and any associated incidental take permit(s) issued for implementation of the ICP.

Reinitiation Notice

This concludes formal consultation on approval of the proposed ICP and subsequent issuance of Service 10(a)(1)(B) permit(s) to minimize and mitigate, to the maximum extent practicable, take of the endangered ABB from Covered Activities described in the ICP over a period of 2 years for construction and up to 20 years of operation and maintenance. As provided in 50 CFR Sec. 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of authorized 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 consultation; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species not considered in this biological opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any activities causing such take must cease pending reinitiation.

Approved:

Field Supervisor
Oklahoma Ecological Services Field Office

5/21/14
Date

Michelle Shaughnessy, Assistant Regional Director
Ecological Services
Region 2

5/21/14
Date

Concurrence:

Deputy Regional Director
Region 2

5/21/14
Date

Non-Concurrence:

Deputy Regional Director
Region 2

Date

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Appendix A

Before Permits can be issued under the ICP, Applicants must ensure their Covered Activities will not impact "Non-Covered Species", which include all federally-listed (other than the ABB), and proposed species, and migratory birds within the ICP Planning Area. Non-Covered species are listed below:

Federally threatened or endangered pursuant to the ESA that may occur in the planning area are the:

- American alligator (*Alligator mississippiensis*)
- Arkansas River shiner (*Notropis girardi*)
- Gray bat (*Myotis grisescens*)
- Harperella (*Ptilimnium nodosum*)
- Indiana bat (*Myotis sodalis*)
- Interior least tern (*Sterna antillarum athalassos*)
- Leopard darter (*Percina pantherina*)
- Neosho madtom (*Noturus placidus*)
- Neosho mucket (*Lampsilis rafinesqueana*)
- Ouachita rock pocketbook (*Arkansia wheeleri*)
- Ozark big-eared bat (*Corynorhius townsendii ingens*)
- Ozark cavefish (*Amblyopsis rosae*)
- Piping plover (*Charadrius melodus*)
- Rabbitsfoot (*Quadrula cylindrica cylindrica*)
- Red-cockcaded woodpecker (*Picoides borealis*)
- Scaleshell mussel (*Leptodea leptodon*)
- Whooping crane (*Grus americana*)
- Winged mapleleaf (*Quadrula fragosa*)

Species proposed for federal-listing under the ESA within the plan area:

- Northern long-eared bat (*Myotis septentrionalis*)
- Rufa red knot (*Calidris canutus*)

Non-listed, protected species within the plan area:

- Bald eagle
- Migratory Birds

A definition of 'impacts' for use in determining eligibility under the ICP is provided in the *Eligibility Determination for the American Burying Beetle Industry Conservation Plan* (Step 6, ***www.fws.gov/southwest/es/oklahoma/ABBICP.htm***) and is included below:

Any action that results in take (as defined below) of federally-listed and proposed species is considered an impact. For the purposes of this ICP, the definition of take also applies to proposed species when considering eligibility under this ICP. Although federal candidate and proposed species are not afforded the same protections as federally-listed species under the Endangered Species Act, a clear definition of impacts is provided here to ensure consistent analysis of potential impacts.

<u>Take-</u> Section 9 of the ESA prohibits "take" of threatened and endangered species. The term "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 USC §1532(3)(19)). The term "harm" is defined to include any 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, including breeding, feeding, or sheltering" (50 CFR § 17.3). The term "harass" is defined as "an 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" (50 CFR § 17.3).

Impacts to birds projected under the Migratory Bird Treaty Act and Bald and Golden Eagle include any violation of the following prohibitions: take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird or eagle, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. Migratory bird species protected by the Act are listed in 50 CFR 10.13. Further, activities that would disturb an eagle are prohibited under the BGEPA and would be considered an impact. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

If a Covered Activity will impact Non-Covered Species, project proponents are not eligible for participation under the ICP and must contact the Service to determine next steps to address any potential impacts to federally-listed or protected species and their habitats.

Additionally, the Service has provided guidance to Oil and Gas Operators that will assist with implementation of avoidance measures for federally-listed, candidate, and proposed species and protected migratory birds (*Species Take Avoidance Measures for Non-covered Species Related to Selected Oil and Gas Projects within the American Burying Beetle Range in Eastern Oklahoma* and the *Oklahoma Ecological Services Field Office Migratory Birds and Eagle Avoidance Measures from Actions Associated with Oil and Gas Projects* also available on our website at ***http://www.fws.gov/southwest/es/Oklahoma/ABBICP.htm***.).

Based on the Service's eligibility requirement under the ICP, in which potential applicants must ensure that any project they implement through the ICP will not result in impacts Non-Covered Species, the Service concludes that Covered Activities permitted under the ICP may affect, but are not likely to adversely affect the federally-listed species and will not jeopardize the continued existence of federally proposed and candidate species. Additionally, the Service and ICP participants will coordinate with the appropriate agencies, including the Oklahoma Department of Wildlife where State-listed species may be impacted.

We also considered the lesser prairie-chicken (*Tympanuchus pallidicinctus)* and black-capped vireo (*Vireo atricapilla*) in this analysis, but the ranges of fall of these two species are outside of the ABB's range, and thus were not discussed in this document.