PROGRAMMATIC BIOLOGICAL OPINION

Environmental Protection Agency's issuance of National Pollution Discharge Elimination System construction general permits for storm water discharges associated with oil and gas construction activities in 33 counties of eastern Oklahoma and their effects to the American burying beetle

Regional Office, Region 2
U.S. Fish and Wildlife Service

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INTRODUCTION

This document represents the U. S. Fish and Wildlife Service's (Service) programmatic biological opinion (PBO) based on our review of the effects on the American burying beetle (*Nicrophorus americanus)* (ABB) from activities of applicants who are applying for coverage to the Environmental Protection Agency (EPA) for National Pollution Discharge Elimination System (NPDES) construction general permit coverage (General Permit) for the storm water discharges associated with oil and gas construction activities in 33 counties of eastern Oklahoma. This document has been prepared in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq*.) and 50 CFR § 402 of our interagency regulations governing section 7 of the ESA.

This PBO is based on the best available scientific and commercial data, including project descriptions provided by Enercon Services, Inc.(Enercon); a Biological Evaluation (BE) from EPA; electronic mail and telephone correspondence with oil and gas companies, Enercon, and EPA; Service files; pertinent scientific literature; discussions with recognized species authorities; and other reliable sources. A complete administrative record of this consultation is on file in the Service's Oklahoma Ecological Services Field Office in Tulsa.

Section 7(a)(2) of the ESA requires federal agencies to consult with the Service to insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any federally-listed species, nor destroy or adversely modify critical habitat. The federal agency or its designated representative implement section 7 of the ESA by consulting or conferring with the Service on any federal action that may affect federally-listed, or proposed threatened and endangered species, and/or designated or proposed critical habitat. The federal action agency is legally responsible for initiating formal section 7 consultation with the Service.

The purpose of this PBO is to expedite the consultation process, minimize adverse impacts to the ABB, and provide an incidental take statement for proposed oil and gas related construction activities with storm water discharges applying for NPDES General Permit coverage. This PBO considers all reasonably foreseeable pipeline installation and wellpad construction and their associated activities anticipated to: occur annually over the next 5 years; require a NPDES General Permit; follow the project description in this PBO; and occur within the 33 identified counties of eastern Oklahoma where ABBs are known to occur or are likely to occur. The PBO discloses those measures operators must adopt during construction activities to comply with eligibility requirements of the General Permit to eliminate or minimize effects to ABBs in those 33 counties in Oklahoma where it has been listed. The Service will re-evaluate this PBO annually to ensure that its continued application will not result in unacceptable affects to the ABB that would jeopardize the continued existence of the species.

Consultation Approach

Wellpads, pipelines, and associated activities (access roads, flow lines, etc.) over 5 acres in Oklahoma must obtain a storm water discharge permit from EPA, but activities under 5 acres do not require a storm water permit. In Oklahoma, EPA is the NPDES permitting authority for storm water discharges from construction activities associated with oil and gas exploration, drilling operations, and pipelines. The NPDES General Permit is issued by EPA to regulate the discharge of storm water from construction sites, in accordance with the requirements of the Clean Water Act (CWA). Region 6 of the EPA recognizes that its duty under section 7(a)(2) of the ESA applies to the issuance of the NPDES General Permit. On a national level, EPA and the Service have consulted on the processes by which an applicant qualifies for coverage under the General Permit to ensure federally-listed species are not jeopardized and designated critical habitat is not destroyed nor adversely modified.

This process requires applicants implementing oil and gas exploration, drilling, and pipeline construction activities, as specified in Standard Industrial Code Groups 13 and 46, and Standard Industrial Code 462 and 5171, that will disturb 5 acres or more to obtain a storm water discharge permit from EPA. Applicants may apply for coverage under EPA's General Permit or an individual permit. The General Permit application process requires the applicant to submit a Notice of Intent (NOI) to the EPA. The NOI serves to notify the EPA of a request for coverage under the General Permit for storm water discharge in compliance with the CWA. To qualify for coverage under the General Permit, applicants must certify on their application that their construction activities will not result in take of federally-listed threatened and endangered species or destroy or adversely modify federally-designated critical habitat

General Permit applicants unable to certify that their associated activities will not jeopardize or result in take of federally-listed threatened and endangered species nor will destroy or adversely modify federally-designated critical habitat may obtain coverage only by submitting an individual permit application to EPA. Subsequently, this triggers individual consultation with the Service on each application. Due to the numerous oil and gas construction activities that are likely to adversely affect the ABB in over 33 Oklahoma counties, the Service, EPA, and the oil and gas industry in Oklahoma have agreed to formally consult on these adverse affects programmatically rather than on an individual applicant basis.

Of the 33 Oklahoma counties addressed in this PBO, all are either within the reported historic range (U.S. Fish and Wildlife Service 1991) or within the documented current range of the ABB. Twenty-two of the 33 counties have known recent ABB occurrences. The remaining 11 counties, although lacking recent survey records, are either within the historical range of the ABB; or contain suitable habitat and are bounded by counties with confirmed recent ABB sightings (Figures 1, 1a). Two of these 11 counties have unconfirmed sightings. Unconfirmed sightings are defined as relatively reliable reports for which the Service or a knowledgeable entomologist has been unable to confirm due to lack of photographs, specimens, or other evidence.

For the remainder of this document the terms "construction project/activity" and "oil and gas project/activity" refer to oil and gas pipeline and wellpad construction projects (and associated activities as described in the project description) requiring a General Permit from EPA and that adhere to the project description set forth in this PBO. While the projects covered by this PBO are explicitly described in this document, projects that are not consistent, but similar to this PBO's project description or coverage area may be appended to this PBO, as the Service deems appropriate. For example, the Service may elect to treat under this PBO a project that differs somewhat from the design criteria, but is similar in nature and scope to the described design criteria and effects to ABBs.

This PBO estimates the amount of disturbance reasonably certain to occur per county, annually for the next 5 years. However, the project location within each county and the season of project implementation are unknown at this time. Consequently, the federal agency or their designated representative must submit written individual project documentation to the Service prior to project implementation. In addition, submittal of summary reports of comprehensive activities and impacts to the Service at regular intervals is required. Tracking at the individual project level and the entire project area will allow the Service to monitor and minimize cumulative effects to ABBs.

Individual project notification to the Service prior to project implementation will be in the form of the NOI submitted to EPA by the operator requesting NPDES General Permit coverage for storm water discharges associated with oil and gas construction activities. The applicant must submit a copy of the NOI to the Service no later than when submitted to EPA. The Service intends to utilize the 7 day delay, between EPA's receipt of the NOI and effective coverage under the General Permit, as its opportunity to ensure compliance with the PBO. If after 7 days from the receipt of the NOI by the Service or the EPA, which ever is latest date, the applicant has not been contacted by EPA or the Service, coverage is granted in accordance with the General Permit and the applicable requirements of the PBO. The programmatic consultation will subsequently be appended by the Service to include the activities described in the NOI with no response to the applicant by the Service.

However, should the Service or EPA determine that the NOI does not comply with the PBO, the applicant is ineligible for coverage under the General Permit and must wait for a response from EPA regarding eligibility. The applicant may be directed to submit an individual permit application to EPA to obtain NPDES discharge permit coverage. That individual permit application will be subject to a separate section 7 consultation and the project activities will not be appended to the PBO and will be treated as a separate section 7 consultation.

This PBO provides a mechanism for oil and gas operators to ascertain which of their oil and gas projects requiring coverage under EPA's General Permit are or are not considered in this PBO and will therefore either need further, separate consultation under the ESA. It is the responsibility of the federal agency (EPA) or their designated representative to determine if their projects adhere to the PBO.

The PBO prescribes the conditions that a General Permit applicant must comply with to meet the eligibility requirements of the General Permit as they pertain to the ESA. When filing an NOI for coverage under the General Permit where permit-related activities may adversely affect the ABB in any of the 33 identified counties, the operator is required to certify section 7 consultation, include the PBO conditions in their Storm Water Pollution Prevention Plan (SWMPP), and implement the PBO terms and conditions during permit activities for an operator to be covered by the General Permit. Failure to comply with the conditions of the PBO, after certifying eligibility based on this ABB PBO consultation, will constitute permit noncompliance. Any permit noncompliance constitutes a violation of the CWA and is grounds for enforcement action; for permit termination, revocation and re-issuance, or modification; or for denial of a permit renewal application.

Consultation History

On December 3, 2002, the Service met with CenterPoint Pipeline Company (CenterPoint) after they had requested a meeting with the Service to discuss the options available under section 7 of the ESA to avoid or minimize adverse impacts to the ABB, address take of the ABB, and facilitate consultation. During this meeting the Service provided a summary of the section 7 process and options, a summary of the life history and ecology of the ABB, and the information we would need to proceed with formal consultation. A description of pipeline installation and replacement methodology, including equipment used, method in which equipment is used, project implementation, and restoration were provided to the Service by CenterPoint on October 31, 2002.

In January of 2003 various oil and gas industry representatives formed a Coalition. This Coalition constitutes various representatives from the oil and gas industry that came together and agreed to develop a Memorandum of Understanding (MOU) and a PBO, as well as resolve other issues relating to oil and gas, and the ABB.

On January 8, 2003, the Service met with representatives from the Coalition; various other oil and gas companies; Mid-Continent Oil and Gas Association (MOGA); Oklahoma Independent Petroleum Association (OIPA); Oklahoma Farm Bureau; Oklahoma Gas Processors Association; and Enercon. This meeting was at the request of various oil and gas companies to discuss conservation of the ABB with respect to oil and gas activities. During this meeting the Service provided a summary of the section 7 consultation process, a summary of the life history and ecology of the ABB, and the basic information needed to complete project level section 7 consultations. The Service explained our concerns regarding impacts from projects like oil and gas activities to ABBs. In addition, we discussed the flexibility allowed under section 7 of the ESA to avoid or minimize adverse impacts to the ABB, address incidental take of the ABB, and facilitate consultation.

On February 19, 2003, the Service attended the quarterly Working Group Meeting between Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Tribes, Oklahoma Corporation Commission (OCC), MOGA, and OIPA discussing oil and gas issues. Some of the attendees included: Service; MOGA; BP America Production Company; OIPA; BLM; Enogex/OGE; Chesapeake Energy Corporation; and Enercon. This was another forum in which the Service provided information on section 7 consultation and the ecology of the ABB to oil and gas companies and other agencies that are involved with oil and gas activities.

On March 11-12, 2003, the Service, in conjunction with the University of Oklahoma, hosted an ABB Conference in Norman, Oklahoma. In attendance were various oil and gas companies and their representatives, species experts, Service biologists, consultants, academicians, researchers, state game and fish biologists, zoological associates, and representatives of several industries.

On March 14, 2003, the Service presented to the OCC a synopsis of the section 7 consultation process, the role of the oil and gas industry in the consultation process, the life history of the ABB, the flexibility afforded under section 7, and avenues the Service is pursuing to facilitate the consultation process regarding the ABB and the oil and gas industry. Numerous oil and gas companies and various other interested parties were in attendance.

On March 28, 2003, at Enercon's Oklahoma City Office, the Service met with Enercon, the Coalition, OIPA, and other oil and gas industry representatives. The objective of this meeting was to discuss the feasibility and mechanism for establishing a blanket agreement or a MOU between the Service and oil and gas companies implementing nonfederal nexus projects. In addition, we discussed methods to streamline consultation on federal nexus projects in the form of an NPDES General Permit from EPA. All parties agreed that formal programmatic consultation was the most feasible and prudent option to address federal nexus projects involving General Permits from the EPA. Subsequently, EPA was contacted, provided all the information generated to date, and encouraged to provide any comments or questions.

On April 3, 2003, the Service met with Coalition members from Williams Pipeline Company to address their questions and concerns regarding their projects and the ABB. On September 4, 2003, the Service met Coalition members from Enogex regarding the status of the PBO and the expected completion date.

On September 29, 2003, the Service received EPA's September 22, 2003, letter requesting initiation of formal programmatic consultation with the Service and their BE addressing future pipeline installations and replacements, and new well site construction that occur in 29 counties of eastern Oklahoma where the ABB is reasonably likely to occur. The BE provided a description of pipeline installation and replacement methodology and well site construction, including equipment used, method in which equipment is used, project implementation, and restoration. The number of counties where the ABB occurs was later updated to 33 counties based on new information. On April 28, 2004, ABB occurrence records from 1999 from The Nature Conservancy's TNC Tall Grass Prairie Preserve in Osage County were provided to the Service. This information expanded the ABB's range in Oklahoma. The Service provided this information to the Coalition via Enercon and recommended they include Osage County in the PBO.

On October 31, 2003, the Service met with the Coalition to discuss the preliminary draft of the PBO. The Service outlined the main points of the document. All comments or questions directed at the Service that could be addressed were done so at the meeting. Those comments or questions that required further research or discussion were noted by the Service with the agreement that answers would be provided to the Coalition members via Enercon as available.

On November 21, 2003, the Service met with Enercon at the Oklahoma Field Office. The objective of this meeting was to discuss the comments and questions that were not addressed at the October 31, 2003, meeting, address any additional questions or comments the Coalition or Enercon presented, and provide any other needed clarification.

On January 6, 2004, Jonathan Tolman, representing the Committee of Environment and Public Works, submitted (via electronic mail) comments on the preliminary draft. On January 7, 2004, representatives from the Service's Regional Office and Oklahoma Field Office met with Jonathon Tolman, Enercon, and various oil and gas representatives in Oklahoma City, Oklahoma. Numerous topics relating to the ABB were discussed. During the meeting, the Service agreed to attempt to develop a population estimate of the ABB in Oklahoma for incorporation into the PBO, and to explore ways to allow oil and gas activities to continue through the remainder of the current inactive season with no delays.

On February 23, 2004, the Service's Regional Office met with Enercon, and various oil and gas representatives in Albuquerque, New Mexico at the Service's Regional Office. The Oklahoma Field Office participated in this meeting via telephone conference. The Service agreed to 1) reconsider requiring individual project consultation under the PBO, 2) complete the population estimate, 3) modify language regarding reinitiation thresholds, 4) review take criteria, 5) simplify Reasonable and Prudent Measures, 6) issue only one PBO, and 7) to make the MOU and PBO more consistent where feasible. The oil and gas representatives agreed to revise project acreage estimates in light of extending the PBO to all oil and gas construction activities and to provide a list of concerns to the Service regarding dormant season Best Management Practices (BMPs).

On April 13, 2004, the Service attended the quarterly oil and gas Working Group Meeting involving BIA, BLM, Tribes, OCC, MOGA, and OIPA regarding oil and gas issues. The Service provided an update on the status of the PBO and answered questions regarding the PBO. The oil and gas representatives expressed their concern with the timeframe necessary to conduct a population estimate and did not understand the need for a population estimate in order to finalize the PBO. They further explained they did not want to wait on a population estimate to be completed before the PBO was finalized.

On April 28, 2004, positive ABB capture records from the summer of 1999 at The Nature Conservancy's Tall Grass Prairie Preserve in Osage County were brought to the attention of the Service. Shortly thereafter the Service provided this new information to Enercon and suggested that this county be included within the PBO. On May 7, 2004, the Service received data regarding certain oil and gas construction activities for Osage County from Enercon.

In response to this new information the Service re-evaluated the historic range of the ABB in Oklahoma. Prior to the Osage County record, the western most ABB records in Oklahoma were from southeast Tulsa County, eastern Okfuskee County, and northcentral Johnston County. At that time, ABBs were found further west in the southern portion of the state than in the northern part of the state. However, the Osage County occurrence expands the range of the ABB further west in the northern portion of Oklahoma. The occurrences in Osage and Johnston counties roughly occur along the same north-south continuum across the state. Based on this new occurrence data, and the fact that Creek, Seminole, and Pawnee counties also contain suitable ABB habitat and occur adjacent to counties with ABB occurrence records, the Service believes the historic range of the ABB likely included these counties and that ABBs are likely to occur in these 3 counties.

On May 12, 2004, the OIPA submitted a letter to the Service expressing their concerns with moving forward with the PBO, concerns of delays in project implementation due to consultation with the Service regarding the ABB, questioning the Services requirements on industry, and requested that a population estimate be conducted. On June 4, 2004, the Service provided a written response to OIPA addressing their issues and comments. The Service explained that a PBO would eliminate the delay in project implementation as a result of the consultation process. The Service further explained that we are developing this PBO at the request of EPA and those oil and gas companies that typically require a NPDES permit from EPA and would therefore benefit from the PBO. The Service also explained that due to a review of the ABB's status, currently published literature, known impacts from projects, the number of construction projects implemented, and the ABB's range indicated that a change in the Service's conservation approach towards the ABB was warranted.

On June 10, 2004, the Service conducted a conference call with Tim Basham with Enercon, Denise Hamilton with EPA, and David Brown with BP to discuss: 1) including Creek, Seminole, and Pawnee counties in the BE and consequently the PBO; 2) survey monitoring; 3) project level consultation; 4) amending the BE to include an updated project description reflecting the new counties; 5) the status of updated pipeline data from all counties to be submitted by Enercon to the Service; and 6) the length of time survey results are valid. The Service explained the reasons for including Creek, Pawnee, and Seminole counties in the historic range of the ABB and the benefits to the oil and gas industry from including these counties in the PBO. Enercon agreed to provide an updated project description and construction project quantities in the newly added ABB counties via a letter of amendment to the BE. No final decisions were made regarding the project level consultations, monitoring surveys, or the time surveys are valid.

On June 16, 2004, the Service's Oklahoma Field Office and Regional Office met via conference call to discuss project level consultations. Both agreed that this PBO is an appended programmatic consultation. Consequently, the Regional Office determined that individual project consultations will need to be submitted to the Service and appended to the PBO. However, it is not necessary that the Service respond to these individual consultations. Therefore, individual oil and gas projects can commence without waiting for a response from the Service. This will allow the Service to monitor compliance with the PBO, and oil and gas companies to proceed with projects in a timely manner.

On June 17, 2004, the Service requested literature citations for information provided in the BE and clarification on the discrepancy in wellpad acreage between the text and Figure 1 in the BE.

On June 18, 2004, the Service received a draft letter of amendment to the BE from Enercon on behalf of the Coalition. Per Enercon, EPA had reviewed this draft and did not foresee any major concerns but would review and make any edits, then submit the final draft to the Service. The amendment expands the BE to include project quantities for Osage, Pawnee, Creek, and Seminole counties. This amendment further provided Best Management Practices oil and gas companies are currently implementing and are willing to implement in the future.

On July 28, 2004, the Service provided a draft version of the PBO to EPA for their review and comment. We requested a response within 14 days.

On September 3, 2004, Stuart Leon of the Service submitted a copy of the PBO to Wren Stenger with EPA.

On September 20, 2004, EPA via telephone verbally requested a draft version of the PBO be provided to the oil and gas Coalition per Coalition's request. A draft version of the PBO was provided to the oil and gas coalition via David Brown of BP on September 22, 2004.

On September 23, 2004, Sarah Rinkevich and Hayley Dikeman with the Service received EPA's comments from Denise Hamilton on the July 28, 2004 draft PBO provided to the EPA by the Service. EPA provided supplemental policy language regarding their responsibilities involving the Proposed Action; and language changes to Reasonable and Prudent Measures 1, 2, and 3; and the supporting Terms and Conditions. After the Service had reviewed EPA's comments, Sarah Rinkevich and Hayley Dikeman contacted Denise Hamilton with EPA via telephone the same day to discuss EPA's comments.

On September 28, 2004, Stuart Leon, Sarah Rinkevich, and Hayley Dikeman with the Service met with Daivd Brown of BP and Tim Basham with Enercon via conference call. The Service discussed the comments EPA had submitted on September 23, 2004. In addition, the group discussed the edits the Service had made since a draft PBO was submitted to the coalition, via David Brown, on September 22, 2004. The following reasonable and prudent measures (RPMs) were agreed upon by the group:

1. Submit written individual project level consultation documentation, for oil and gas construction activities requiring coverage under the General Permit, to the Service prior to project implementation.
2. Surveys, baiting away, and trapping and relocating efforts will adhere to Service guidelines.
3. EPA will monitor and report on compliance of individual projects.
4. Monitor impacts from the proposed project on the ABB.
5. Report any death or impairment of ABBs.

Although, the wording of RPM number 1 changed the context did not change from the previous draft PBO. The RPM number 2 was not in the previous version of the draft PBO provided to the Coalition. The Service explained that it was in the process of updating its survey protocol, and baiting away, and trapping and relocating procedures to reflect new information. Although the wording of RPM number 3 has changed somewhat, the context has not changed from the draft PBO previously provided to the Coalition, which states that EPA would be responsible for ensuring projects implemented by the oil and gas industry under this PBO are adhering to the project description, terms and conditions, and take level.

The RPM number 4 is somewhat different from that in the previous draft PBO provided to the Coalition. The Service explained that since take was being authorized, ABB levels needed to be monitored, but we wanted to work with the oil and gas industry to maximize the amount of data collected and the knowledge about the ABB that the data would provide. The group agreed that a representative number of ABB surveys should be conducted annually for ABB monitoring purposes. The amount of representative ABB surveys to be implemented will be based on the number of oil gas projects implemented per county per year. The group further agreed that the Service would be responsible for determining if an insufficient amount of surveys were being conducted. Based on the fact that a representative number of surveys would be conducted annually in counties of high oil and gas activity, the Service believes that a sufficient amount of surveys would be conducted to allow for a survey to be valid for 2 years rather than 1 year. The Service also agreed to provide an updated version of the PBO after meeting with EPA again.

On September 29, 2004, the Service provided EPA with an updated draft PBO which incorporated EPA's comments submitted to the Service on September 23, 2004 and the comments via telephone from Dave Brown of BP and Tim Basham from Enercon on September 28, 2004.

On November 2, 2004, the Service provided a copy of the completed population estimate for the ABB in Oklahoma to OIPA. The Service again explained in our population estimate report that the estimate is likely incorrect based on the limited data available regarding the ABB and the biology of the ABB which makes mark and recapture procedures unreliable.

On November 3, 2004, Hayley Dikeman with the Oklahoma Field Office, Sarah Rinkevich and Stuart Leon with the Service's Regional Office, Denise Hamilton with the EPA, Dave Brown of BP, and Tim Basham from Enercon met via telephone to discuss oil and gas industry comments. Project level consultation was discussed. Mr. Brown and Mr. Basham wanted the details that the Service would require from the oil and gas industry on project level consultations. The spreadsheet reporting form drafted by the Service, included as an appendix to the previous version of the PBO, was reviewed. All agreed that the information the Service wanted was too extensive and suggested that the majority of the information requested by the Service would be more appropriately reported in the semi-annual report. Mr. Basham suggested that the NOI be submitted to the Service to serve as the project level description. All agreed that this would be sufficient.

Surveys for the ABB were also discussed. The EPA would not agree to require a specific number of standard transects to be sampled annually to monitor effects of take. They believed this fell outside the scope of the PBO. The Service explained that the oil and gas industry wanted to conduct their surveys in a manner that not only monitored take but provided long-term data as well and the Service concurred with this. However, EPA insisted that this was a status monitoring effort and not a take monitoring effort as required with the issuance of an incidental take statement. Per the PBO take is to be monitored in acres not individual ABBs. Consequently, the monitoring effort required by the Service only needs to track acres, so standard surveys would not be inappropriate. Everyone concurred that surveys conducted outside the project description would be more appropriate under the Conservation Measures.

On November 4, 2004, Hayley Dikeman and Tim Basham discussed via telephone other minor comments that he and David Brown had but were not covered in the November 3, 2004, meeting. In addition, the Service brought up the issue of the potential that projects could now be implemented during the inactive season without delays and with less effort to protect the ABB. The Service was concerned that more projects will be implemented during the inactive season, thereby preventing baiting away or trapping and relocating and likely negating the effectiveness of the project description minimization measures. We also discussed the minimum number of surveys to be conducted to ensure enough data is collected to monitor the ABB. Mr. Basham indicated he would discuss these issues with Mr. Brown.

On November 22, 2005, the Oklahoma Field Office submitted the latest draft of the PBO to the RO. This draft reflected the changes agreed upon during the November 3, 2004 meeting with Tim Basham and David Brown. A follow-up telephone call informed the Regional Office that this draft had not been reviewed by the Coalition. The RO recommended that a draft copy of the PBO be made available to the Coalition for their review.

On January 25, 2005, EPA submitted their final comments on the PBO. Their comments pertained primarily to accurately describing the NPDES permitting process and legalities; and the Reasonable and Prudent Measures and Terms and Conditions.

Per the request of the RO, on February 6, 2005, the Service provided a draft copy of the PBO to Denise Hamilton with EPA, David Brown of BP, and Tim Basham with Enercon. The Service stipulated that anyone else outside the Coalition who wanted a copy should contact the Service because it is not the responsibility of Enercon or BP to disseminate copies.

In February, 2005, the Service attended the quarterly Working Group Meeting. The Service announced that the PBO was in the final stages of development and anyone who wanted information regarding the PBO should contact the Service. The OIPA inquired how to obtain a copy, the Service responded that the we should be contacted to discuss.

On March 3, 2005, the Oklahoma Field Office met via telephone with Angela Burckhalter with OIPA to discuss their request for a copy of the PBO. The Service agreed to provide OIPA with a copy and invited her to attend the upcoming meeting with the Coalition, EPA, and Enercon.

On March 17, 2005, the Service's Oklahoma Field Office and Regional Office met with Denise Hamilton with EPA, Tim Basham of Enercon, MOGA, and members of the Coalition (BP, Chesapeake, Devon, Enogex, Unit, and Williams) for a final review of the PBO. The Service outlined the main points of the PBO and discussed with attendees. Multiple discussions ensued relating to: semi-annual reporting requirements; clarification of activities included in the 5-acre construction area of pad sites; and baiting away and trapping and relocating efforts validity duration. The group agreed to the following: semi-annual reporting requirements will be the responsibility of EPA; the 5 acres estimated for typical pad size includes the flowline since the BE stated that flowlines are typically within the wellpad but does not include the access road or transportation pipelines; and due to the biology of the ABB, baiting away and trapping and relocating are only valid for the current active season.

On March 21, 2005, the Oklahoma Field Office submitted a final draft of the PBO to the Regional Office for finalization and surname signatures.

DESCRIPTION OF THE PROPOSED ACTION

On July 1, 2003, EPA reissued the General Permit that authorizes the discharge of pollutants in storm water discharges associated with construction activity relating to oil and gas exploration, drilling operations, and pipelines. This reissued General Permit covers storm water discharges associated with both small and large construction activity, in response to Phase I and Phase II Storm Water Regulations, respectively.

Phase I Storm Water Regulations promulgated on November 16, 1990, (55 FR 47990) established permitting requirements for storm water discharges from construction activities that disturb 5 acres or more. Small construction activity was added in response to the Phase II Storm Water Regulations promulgated on December 8, 1999 (64 FR 68722). Specifically, the Phase II regulations add permitting requirements for storm water discharges from construction activities that disturb from 1 to 5 acres.

Storm water associated with small construction activity, as defined in 40 CFR 122.26(b)(15), refers to the disturbance of 1 acre or more to less than 5 acres of land for construction; or the disturbance of less than 1 acre of total land area that is part of a larger common plan of development; or sale if the larger common plan will ultimately disturb equal to or greater than 1 and less than 5 acres. As used in the General Permit, storm water associated with large construction activity refers to the disturbance of 5 or more acres, as well as disturbance of less than 5 acres of total land area that is a part of a larger common plan of development; or sale if the larger common plan will ultimately disturb 5 acres or more (40 CFR 122.26(b)(14)(x)).

At this time, EPA has postponed until June 12, 2006, the portion of Phase II requiring oil and gas operators to obtain a General Permit for oil and gas activity that disturbs 1 to 5 acres of land (Federal Register 70(11): 2832-2836). Based on this postponement, projects disturbing less than 5 acres are not required to pursue NPDES permit coverage for storm water discharges associated with those activities. The Phase II General Permit does provide specific requirements that oil and gas operators must certify to be eligible for General Permit coverage. Coverage under the General Permit is available only if storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities, as defined in Appendix A of the permit, are not likely to jeopardize the continued existence of any species that are federally-listed as endangered or threatened ("listed") under the ESA or result in the adverse modification or destruction of habitat that is federally-designated as critical under the ESA ("critical habitat").

The permit does not provide coverage to discharges if the storm water discharges, allowable non-storm water discharges, or storm water discharge-related activities would cause a prohibited "take" of federally-listed endangered or threatened species (as defined under section 3 of the ESA and 50 CFR 17.3), unless such take is authorized under sections 7 or 10 of the ESA.

In order to meet eligibility requirements for the General Permit the applicant must meet one or more of the following six criteria (A-F) for the entire term of coverage under this permit:

Criterion A. No federally-listed threatened or endangered species or their designated critical habitat are in the project area as defined in Appendix C; or

Criterion B. Formal consultation with the Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has been concluded and that consultation:

i. Addressed the effects of the project's storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat, and

ii. The consultation resulted in either:
   a. Biological opinion finding no jeopardy to federally-listed species or destruction/adverse modification of federally-designated critical habitat, or
   b. written concurrence from the Service(s) with a finding that the storm water discharges, allowable non-storm water discharges, and storm water discharge related activities are not likely to adversely affect federally-listed species or federally-designated critical habitat; or

Criterion C. Informal consultation with the Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has been concluded and that consultation:

i. Addressed the effects of the project's storm water discharges, allowable non-stormwater discharges, and storm water discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat, and

ii. the consultation resulted in either:
   a. biological opinion finding no jeopardy to federally-listed species or destruction/adverse modification of federally-designated critical habitat, or
   b. written concurrence from the Service(s) with a finding that the storm water discharges, allowable non-storm water discharges, and storm water discharge related activities are not likely to adversely affect federally-listed species or federally-designated critical habitat; or

Criterion D. The construction activities are authorized through the issuance of a permit under section 10 of the ESA, and that authorization addresses the effects of the storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities on federally-listed species and federally-designated critical habitat; or

Criterion E. Storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities are not likely to adversely affect any federally-listed species or result in the adverse modification or destruction of habitat that is federally-designated as critical under the ESA ("critical habitat"). Coverage under this permit is available only if your storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities, as defined in Appendix A, are not likely to jeopardize the continued existence of any species that are federally-listed as endangered or threatened ("listed") under the ESA or result in the adverse modification or destruction of habitat that is federally-designated as critical under the ESA ("critical habitat").

Compliance with the terms and conditions of this PBO allows for the applicant to certify compliance under Criterion B, above, that their activity has been covered by formal consultation regarding the likely adverse effects on the ABB. Multiple boxes may be selected if other listed species are being addressed. Should an applicant be unwilling or unable to meet the specific requirements in the PBO, permit coverage is available only by individual application. Discharge of storm water from construction activities without permit coverage is a violation of the CWA. Harm to federally-listed species without permission from the Service for "take" is a violation of the ESA.

Construction Activities
The amount of oil and gas construction activity generally varies between counties and years (Appendix 1). The Service evaluated affects to the ABB based on the average amount of new wells installed over a period of ten years for each county. The Coalition provided the annual average number of wells constructed per county from 1994 to 2003.

Well Pad Construction
The wellpad includes all structures and equipment necessary for recovering crude oil or natural gas from wells. This includes the primary facilities, such as the pad, drilling rig, pump or well head, and reserve pits for the containment of drilling muds and cuttings. The wellpad also includes ancillary facilities such as storage tanks for produced water and crude oil, fuel tanks, water tank, mist pump, mud pump, flow lines, and electrical equipment. The pad also houses structures such as the cellar, the rat and mouse holes, trenches, and sumps.

Typical wellpad construction activities involve clearing vegetation; grading to level the site; constructing storm water diversionary and erosion control structures; laying shale, gravel, and/or rock over the wellpad; and constructing reserve/cutting pits, trenches, sumps, a cellar, and the rat and mouse holes. Land clearing and grading of the construction area, as well as construction of the other measures stated above, are conducted with a bulldozer or other heavy equipment. During a routine wellpad installation, soil is excavated to a depth of approximately 6 inches. Topsoil is scraped from the construction area and is stored in the construction site for use during the restoration process. Vegetation debris piles are stored along the edges of the construction site and typically will be either buried in the reserve pit, burned, or left for landowner use after drilling operations are completed. Disposal method of the debris pile is dependent on the landowner's request.

If necessary, additional offsite shale, gravel, and/or rock is delivered to the construction site via dump trucks to aid in leveling the site and raising the pad above grade. In most cases, two reserve pits are excavated using a bulldozer. The pits are approximately 75 by 75 feet each and are a minimum of 8 feet deep. Additional soil or fill may be hauled in with dump trucks for pit construction and/or clay may be hauled to the site to line the reserve pits. Once completed, gravel or rock is hauled in and at a minimum covers the vehicular traffic areas and trailer areas associated with drilling operations. Once constructed, the majority of the pad site is a permanent installation. However, reserve pits and cut slope are restored with topsoil and revegetated upon completion of the well. An illustration of a typical pad construction area is presented in Figure 2.

The Coalition estimated that a typical wellpad is approximately 5 acres in size, not including the flow line and access road. The Oklahoma Corporation Commission (OCC) tracks the number and location of wells constructed in Oklahoma. However, it is difficult to determine which new wells will be included in an NPDES permit action, consequently the Coalition included all newly constructed well pads in the EPA's BE for this project. From the OCC's data on well construction during 1994 to 2003, the Coalition estimated the total number of wells constructed annually on average in eastern Oklahoma to be approximately 584. Therefore, the Coalition estimated that a total of 2,925 acres are disturbed annually in eastern Oklahoma by new well pads. This estimate is likely to be high since the sum of 584 wells includes all well projects, not only those with a federal nexus due to EPA's NPDES permit coverage.

Pipeline construction includes the installation of a flow pipeline or sales pipeline once the well is ready for production. Flowlines transport recovered oil and gas products from the well site to existing transportation pipelines. Flowline pipelines are installed similarly to gathering and transporting pipelines. The oil and gas Coalition's BE estimated that 0.25 miles of flowline pipeline is installed for each new producing well pad. The BE estimates that flowlines typically have a rights-of-way (ROW) averaging 50 feet. While the location of the flowline route is not always known or provided at the time of wellpad construction and some flow lines may be installed parallel to the access road but not always, flow pipelines and sales pipelines are typically located within the boundaries of the wellpad. Consequently, the Service assumes flowlines are included in BEs calculations for the average wellpad size, which is 5 acres.

Lease Road Construction

Pre-existing access roads are typically used; however, in some instances access roads may be built. The lease road is a permanent installation that will remain at least as long as the well itself, with periodic maintenance as required to correct washouts or other deterioration. The lease road area is first cleared with a bulldozer, than leveled with a road grader. Shale/rock/gravel is used to stabilize the length of the road. Where necessary, culverts and ditches are installed to facilitate drainage away from the road

Lease roads typically involve a 20-foot wide graded surface with sloped edges adding another 10 feet to the width of the disturbance, averaging about 30 feet wide. The average length of lease road per wellpad is 1,320 feet long. This constitutes a disturbance area of about 0.91 acres per access road per well site. The total area disturbed annually by lease road construction for all new wells is about 532 acres.

Pipeline Construction

Pipeline construction can include the installation of a flow pipeline, sales pipeline, and/or transport pipeline once the well is ready for production. Flow pipelines and sales pipelines are typically located within the boundaries of the wellpad, while transport pipelines can extend well beyond those boundaries. Pipeline construction involves land clearing activity similar to wellpads and lease roads. The pipeline construction of ROWs are generally divided into four areas of activity: trenching, spoil piles, pipeline assembly, and vehicle traffic. Clearing and installation of the pipeline requires the use of heavy equipment during construction. The types of equipment used during construction include trackhoes, bulldozers, sidebooms, bending machines, ditching machines, boring machines, and in some cases hydraulic directional drilling rigs (HDD). Pipe haul trucks and welding trucks as well as miscellaneous smaller vehicles also are used on most projects. Pipeline widths are determined by the amount of product flow that will be needed as well as terrain and site conditions. The width of the trench is determined by the diameter of the pipeline plus 6-inches to 12-inches clearance between the pipe and the trench wall. Pipeline construction ROWs are typically 50 feet wide, but can be as wide as 100 foot depending on the size of pipe.

Trenching is accomplished with back-hoes, track-hoes, or similar other ditching equipment. Excavated soil is placed to one side of the trench in a spoil pile. After the trench is excavated, the pipe is then laid in the open trench by a side boom bulldozer. The excavated trench is backfilled with the previously removed soil. Once the pipe has been connected, a hydrostatic test is conducted by funneling pressurized water through the pipes to ensure leaks do not occur at the proposed operating pressure. The fill material in the trench is then compacted back to original conditions by "walking" the equipment over the trench line returning the area to pre-existing contours.

For the majority of the pipelines, the above traditional land-lay pipeline construction techniques will be implemented. Surface disturbance in the pipeline ROW is mostly temporary. The entire ROW is revegetated once pipeline installation is completed. However, the permanent ROW is kept permanently clear of trees and brush to allow future maintenance and inspections of the pipeline. An illustration of typical pipeline construction is presented in Figure 3.

Contractor yards will generally be located in previously disturbed areas. Best Management Practices for erosion control are employed during project implementation until final stabilization of the disturbed area. The disturbed areas along the ROW will be revegetated as soon as practicable after final cleanup has been completed.

The amount of pipeline installed each year is not tracked by the OCC. The Coalition has provided an estimate based on historical data available. In the BE an estimate of 750 miles of pipeline were installed each year. However, no data was provided justifying this quantity. Consequently the Service requested further details on this amount. Tim Basham of Enercon provided some clarification (personal communication via electronic mail): oil and gas companies whose work involves primarily installation of pipelines, estimated an annual average of 142 miles of pipeline constructed each year. However, Mr. Basham indicated that very few companies provided annual pipeline installation data. Information obtained by the Service from another oil and gas company estimated the annual installation of approximately 35 miles of gathering natural gas pipeline and 20 miles of transmission natural gas pipeline for a total of 55 miles of pipeline annually.

Since no firm numbers are available from neither the OCC nor a large base of oil and gas companies, the Service estimated the annual pipeline installation using the oil and gas companies in eastern Oklahoma whose work consists primarily of transmission pipelines and who based on the Service's consultation records, previously consulted with the Service. From the data provided by the oil and gas industry for EPA's BE, the Service assumed the high estimate of 142 miles of pipeline installed annually per company accurately reflects the amount of new pipeline installed annually. Approximately four companies have regularly consulted on multiple projects over the last 5 years. With an annual amount of new transmission pipeline estimated to be 142 per company and four companies that deal primarily with transmission pipeline, a total of 560 miles of pipeline are estimated to be installed annually by these four companies. Based on Service consultation data from companies in this category, approximately 30 miles of pipeline are installed annually, for a total estimate of 180 miles annually. The Service also has consultation records from eight oil and gas companies that only occasionally submit consultation request. The Service assumes the minimal consultation requests result in a minimal annual average of new pipeline installation of about 5 miles, totaling 40 miles annually.

Based this information, approximately 780 miles of new pipeline are installed each year in eastern Oklahoma. With a typical ROW width of 50 feet this equals 4,727 acres of pipeline installed annually. This estimate is likely excessive because, whenever possible, existing pipelines are used rather than constructing new ones.

Project Quantity Summary
From OCC's 2001 records, the mean number of wells installed in the 33 eastern Oklahoma counties annually from 1994 to 2003 was 584. The BE states that each well site is typically 5 acres in size including flowlines but not including access roads. Consequently, with the construction of 584 new wells annually approximately 2,925 acres will be disturbed annually.

Based on the average annual number of new wells installed each year (584) and the average length (1,320 feet) of new access roads constructed per new well, the average annual amount of new access roads constructed is 146 miles. The average width of lease access roads is 30 feet. This results in approximately 532 acres disturbed annually from access roads. These estimates are likely to be high since, as explained above, the sum of 584 wells includes all projects not only those with the federal nexus of EPA's General Permit

Approximately 780 miles of new pipeline are installed annually in eastern Oklahoma. With a typical ROW width of 50 feet this equals 4,727 acres of disturbance from new pipelines. Including new wells, lease roads, and new pipelines, approximately 8,184 acres of land will be disturbed annually. The breakdown of acres per activity type per year is below in Table 1.

Table 1. Summation of project type acreages.

Average Annual Pipeline	**Typical Pipeline Width**	**Acres**
780 miles	50 ft ROW Width	4,727
Average Annual Lease Road	**Typical Access Road Size**	**Acres**
584 lease roads	1,320 ft/road length x 30ft width =0.91 Acres	532
Average Annual Well Sites	**Typical Well Pad Size**	**Acres**
584 wells	5 Acres/well	2,925
Total Acres		8,184

Action Area Description
The Action Area is defined in the regulations implementing section 7 of the Act as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." All action area descriptions provided in EPA's BE are derived from Duck and Fletcher (1943) and Ricketts *et al.* (1999).

Northeastern Oklahoma
The northeastern portion of Oklahoma is generally characterized by oak-hickory forest, including the highlands referred to as the Ozark Mountains. This region encompasses approximately 3,713 square miles of land and incorporates Adair and Cherokee counties; and parts of Delaware, Sequoyah, Muskogee, Craig, Mayes, Wagoner, and Ottawa counties.

Typical dominant oak-hickory forest vegetation includes blackjack oak (*Quercus marilandica)*, post oak (*Quercus stellata)*, red oak (*Quercus rubra)*, pin oak (*Quercus palustris)*, black hickory (*Carya texana)*, scaly bark hickory (*Carya laciniosa)*, pignut hickory (*Carya glabra)*, and winged elm (*Ulmus alata)*. Typical ground cover is composed of a mixture of huckleberry *Vacinium pallidum*, coral berry (*Symphoricarpos orbiculatus)*, sassafras (*Sassafras albidum)*, big bluestem (*Andropogon gerardii)*, spice bush (*Lindera benzoin)*, bladdernut (*Staphylea trifolia)*, hazelnut (*Corylus Americana)*, and grape (*Vitis* sp*)*.

Climatic conditions in this region are characterized as humid, mesothermal with between 190 and 200 days in the growing season. The Grand and Illinois Rivers and their tributaries, which are characteristically clear and cool, drain the area. In general the soils of the oak-hickory forest are fine textured, light colored calcareous loams. The rugged topography has maximum elevations in Adair County, with ridgetops at 1,500 feet and valleys at 600 feet above mean sea level. The area also contains a wide distribution of limestone bluffs, which influence habitats and microclimates.

Due to the rugged terrain, only 30 percent of this region has been cleared for agricultural production, while 70 percent stands as woodland. Field and timber margins provide habitat for small herbivores such as northern bobwhite (*Colinus virginianus)* and eastern cottontail rabbit (*Sylvilagus floridanus)*. The more rugged mountainous country provides habitat for species desiring undisturbed habitat. This area has relatively large tracts of undisturbed forests and small areas of agricultural fields.

North Central Oklahoma
Tallgrass prairies characterize the northwestern portion of the area included in this PBO, occupying a belt from north to south lying just east of the Post Oak-Blackjack ecological area. The Cherokee prairie covers a sizeable portion of this area, encompassing Nowata and Craig counties; and parts of Osage, Washington, and Rogers counties.

The natural vegetation in this region is a mixture of big bluestem, little bluestem (*Schizachyrium scoparium)*, Indian grass (*Sorghastrum nutans)*, switch grass (*Panicum virgatum)*, and silver beard grass (*Bothriochloa saccharoides)* in the eastern portions, with an increase of buffalo grass (*Buchloe dactyloides)*, blue grama (*Bouteloua gracilis)* and side oats grama (*Bouteloua curtipendula)* to the west.

The tallgrass prairies are partially represented in all three of the major climatic provinces of the state, but occur primarily in areas characterized as subhumid, mesothermal, and moisture deficient at all seasons. The average precipitation for this area ranges from 28 to 38 inches annually. The growing season is from 190 days (in the north) to 230 days (in the south). The soils of the tallgrass prairie have their origin from shales and clays of the Permian Red Beds and range from light sandy loams to heavier silt loams and clays. In north central Oklahoma the soil type is supported mostly by residual soils formed from weathering limestones, fine-grained sandstones, and shales.

The topography in the western portion of this region is flat to gently rolling, with more rugged terrain and a more complex network of drainages to the east towards the Ozark Mountains. This region is approximately 80 percent cultivated with wheat and corn representing the major crops. The grasslands located in Osage County are primarily utilized for pasture.

East Central Oklahoma

The east central portion of the state is characterized by post oak-blackjack vegetation and forest-grassland transition. This ecological region separates the eastern deciduous forests from the tallgrass and mixed grass prairies. This region encompasses Haskell, McIntosh and parts of Adair, Sequoyah, Muskogee, Pittsburg Latimer, Leflore, and Wagoner counties.

The overstory is dominated by post oak, blackjack oak, and black hickory. The understory is made up of little bluestem, big bluestem, and other herbaceous and woody species depending on the site. Climatic conditions in this region are characterized as subhumid, mesothermal with average precipitation ranging from 32 to 42 inches annually. Topography is generally rolling to rough. Typically soils in this area are coarse textured, relatively nutrient poor and developed from residual sandstones and weathered shales. Soils are leached and acidic. This region is well known for some of the most extensive sheet and gully erosion in the country. Productivity of the land for game or for agriculture is low. Principal species are the northern bobwhite, eastern fox squirrel (*Sciurus niger)*, and eastern cottontail rabbit.

Southeastern Oklahoma

This ecological region is located in the Ouachita Mountain province. Oak-pine forest and a small area of the loblolly pine-hardwood forest characterize the southeastern portion of the state. The loblolly pine-hardwood forest encompasses approximately 120 square miles in southeastern McCurtain County. Included within the oak-pine ecological designation are major portions of McCurtain, LeFlore, Latimer, Pushmataha, Atoka, Pittsburg, and Haskell counties.

Predominate vegetation of this area includes short leaf pine (*Pinus echinata)*, loblolly pine (*Pinus taeda)*, white oak (*Quercus alba)*, blackjack oak, post oak, shumard oak (*Quercus shumardii)*, willow oak (*Quercus phellos)*, black locust (*Robinia pseudoacacia)*, black hickory, basswood (*Tilia americana*), and sugar maple (*Acer saccharum)*. Common herbs and shrubs include huckleberry, mock orange (*Philadelphus pubescen)*, pink azalea (*Rhododendron prinophyllum)*, gooseberry (*Ribes* sp.*)*, bladdernut (*Staphylea trifolia)*, and spice bush. Big bluestem is common over the entire area, particularly in drier portions.

The climate in this region is characterized as humid, mesothermal with annual precipitation ranging from 42 to 56 inches per year. The growing season in the northern section is around 200 days and in the southern portion varies from 210 to 230 days. The principal drainages are the Kiamichi, Little, Glover, and Mountain Fork Rivers. These streams are clear and the smaller tributaries are often spring fed.

Soils are typically thin, well drained, and derived from sandstones and shales. Although the slopes are littered with boulders, the valley soils are fine textured. Topography in this region is rugged with relatively high topographic relief. The principal mountain chains in this region are known as Kiamichi and Winding Stair Mountains. The highest mountain is 1,850 feet above the valley floor.

Due to the presence of infertile soils and rugged topography, only 15 percent of this area is utilized for agricultural production, while the remainder is largely in woodland. The primary land use activities are lumbering, coal mining, ranching, and farming. Coal mining is confined almost entirely to the northern part of Latimer and LeFlore counties with scattered mining occurring in Pittsburg County.

Conservation Measures

The Service and various oil and gas companies have worked closely in evaluating impacts to the ABB from oil and gas activities, developing measures oil and gas companies could implement to minimize or avoid adverse impacts to the ABB, streamlining consultation, and facilitating project implementation. As a result of these efforts, project implementation guidelines have been developed by the Service and the oil and gas companies for projects requiring a General Permit. Because agreement was achieved on these guidelines, multiple oil and gas companies have already altered their project implementation methods to incorporate these guidelines even though this PBO was not yet completed.

On June 18, 2004, Enercon on behalf of the Coalition submitted a letter of amendment to the BE. This amendment addressed conservation measures oil and gas companies have been implementing prior to the finalization of this PBO and are going to implement for the duration of this PBO. Below are the steps that the oil and gas companies have incorporated into their project implementation methods to minimize adverse impacts to the ABB.

Project Site Evaluation

1. General Permit applicants evaluate the likelihood of ABBs in the project area by reviewing the Service's county lists of threatened and endangered species at: http://ifw2es.fws.gov/Oklahoma/ctylist.htm
2. If the project site is in a county where the ABB *is not documented*, the applicant may proceed without further precautions with regard to the ABB.
3. If the project site is in a county where the ABB *is documented,* the applicant will, when feasible, select sites already disturbed or unsuitable for the ABB as outlined below. Projects implemented in these areas are not likely to be occupied by the ABB and the permittee may proceed without further precautions with regard to the ABB.
    - Land that has already been developed and no longer exhibits surficial topsoil and leaf litter.
    - Land that is tilled on at least an annual basis.
    - Land that is established and maintained with $\geq$ 80% Bermuda (or similar non-native) monoculture.

4. When previously disturbed areas are not available the applicant evaluates the proposed project site for suitable ABB habitat. If the project site is confined to one or more of the following unsuitable habitats, the applicant will proceed without further precautions with regard to the ABB.
   - Soil that is greater than 70% sand.
   - Soil that is greater than 70% clay.
   - Land where greater than 80% of the soil surface is comprised of rock.
   - Land where greater than 80% of the subsurface soil structure within the top 4 inches is comprised of rock.
   - Land that meets the U.S. Army Corps of Engineers (Corps) definition of wetland. (However, projects developed in this type of habitat will need to ensure compliance with the CWA.)
5. When no such characteristics are present at a project site, an evaluation of the ABBs presence or absence is made using the following steps.

ABB Presence/Absence Evaluation

6. Review of the Service's ABB surveys database at: http://ifw2es.fws.gov/oklahoma/beetle1.htm. Operators will check this database at the first of every month during the ABBs active season. If the ABB survey database on our website has not been updated by the Service after the first of the month then the existing database on our website is to be used. Once projects have been evaluated for the ABB as outlined in this PBO and an NOI has been submitted to EPA, any updated version of the ABB survey database during the same active season will not be applicable. However, if a project which has evaluated the ABB and submitted an NOI is postponed until the following active season, the ABB database must be checked prior to project implementation and the proper actions taken to protect the ABB as outlined in this PBO.
7. If a nearby (within a five-mile radius of the proposed construction site) and recent (within 2 years of the project commencement) ABB survey has occurred, the applicant will apply the survey results to the project site. If both positive and negative surveys are found to be applicable, positive surveys will always be applied over negative surveys.
8. If applicable survey results are *negative* for ABB occurrences, the applicant will proceed with the project without further precautions with regard to the ABB.
9. If applicable survey results are *positive* for the ABB **OR** *no existing surveys* are applicable, the applicant will follow the ABB Protection Measure and Project Planning steps described below.

ABB Protection Measures

10. Implement the Service's current Baiting Away or Trapping and Relocating protocols, whichever is determined by the applicant to be more appropriate, then the Project Planning steps described below will be followed.

OR

11. Conduct an ABB survey within the project area using the Service recommended survey protocol available at http://ifw2es.fws.gov/oklahoma/beetle1.htm. If ABB surveys are *negative*, the project may proceed without further precautions with regard to the ABB. If ABB surveys are *positive*, then

implement the Service's current Baiting Away or Trapping and Relocating protocol whichever is determined by the applicant to be more appropriate then follow the Project Planning steps described below.

<u>Project Planning</u>

12. Whenever possible, the applicant will postpone construction until the active season of the ABB (between May 20 and September 20, when nighttime temperatures average above 60°F) in order to implement the above described ABB Protection Measures.
13. If construction must begin during the inactive season of the ABB (*i.e.* between September 20 and May 20, when nighttime temperature average below 60°F), then Inactive Season Construction Precautions will be implemented. (See below)

<u>Inactive Season Construction Precautions</u>

BMPs for construction of pipelines

1. Decrease the construction right-of-way by 10 feet from that which would normally be used for the project where safely possible.
2. Designate one side of the trench for use as an area for stockpiling excavated soil and use the other side of the trench as the access lane for equipment and vehicles.
3. Avoid disturbing stockpiled excavated soil until replaced into trench.

BMPs for construction of wells

1. Avoid disturbing stockpiled excavated soil until replaced.
2. Minimize size of pad, lease road, and ROW to extent possible.
3. Use a closed drilling system for new wells when practicable.
4. Consider use of alternatives to earthen pits.
5. Use offsite material (from non-ABB site) to level pad sites and reduce scrape areas to the extent possible.

Additional BMPs applicable to both wells and pipelines

1. During clearing the right-of-way of woody vegetation, leave as many stumps in the ground as safely and feasibly allowable.
2. Avoid construction of a new staging area/workpad or access road; rather, use an existing staging area and road, or use an area already cleared of trees and shrubs where such areas are available.
3. If using an area for the staging area or road previously cleared of woody vegetation, but still has a herbaceous vegetation layer and native soil (not paved, graveled, or *etc*.), avoid grading or dozing the area unless necessary for safety.
4. Compact soil only to the extent necessary for safety.
5. Replace excavated soils and revegetate completed portions of the project area as soon as feasible.
6. Avoid or minimize the use of fertilizers, herbicides, and/or pesticides during the revegetation

process.

7. Limit vehicle and equipment use on non-road areas to only that which is necessary.
8. Use the lightest equipment practical when possible to minimize unnecessary soil compaction.
9. Minimize soil disturbance to the greatest extent possible.
10. Minimize area of permanent disturbance to the extent possible.
11. Restore areas of temporary disturbance to the maximum extent possible and as soon as possible.
12. Avoid or minimize contamination of the soil from fluids such as fuel, oil, or other chemicals.

The Service believes that these conservation measures will benefit the ABB. In summary, these conservation measures provide minimization measures such as constructing in areas already disturbed and within the inactive period and recommend ABB surveys. When previously disturbed areas are not available, an attempt will be made to place the project site outside of suitable ABB habitat (based on soil types). Surveys and baiting away are also recommended. The information above represents the best available data known about the beetle. Thus, these best management practices are necessary for the conservation of the ABB.

STATUS OF THE SPECIES

The ABB was proposed for federal-listing in October of 1988 (53 FR 39617) and was designated as a federally-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.

The ABB is an annual species that typically only reproduces once in their lifetime. They are dependent on carrion for food and reproduction. They must compete with other invertebrate species, as well as vertebrate species, for carrion. Even though ABBs are considered feeding habitat generalists they have still disappeared from over 90 percent of their historic range. Habitat loss, alteration, and degradation have been attributed to the decline of the ABB. The U.S. Fish and Wildlife Service (1991) concluded that the best explanation for the decline of ABBs involved habitat fragmentation which created edge habitat, which led to a reduced carrion prey base and an increase in vertebrate scavengers.

Description

The ABB is a member of the beetle family Silphidae (208 species worldwide; Ratcliffe 1996) and is in the subfamily Nicrophorinae. Silphids are scavengers of carrion and play an important role in breaking down decaying matter and recycling it back into the ecosystem. The genus *Nicrophorus* presently contains 85 species distributed in Europe, Asia, and North and South America (Ratcliffe 1996), 15 of which occur in the U. S. (U.S. Fish and Wildlife Service 1991). *Nicrophorus* species are known to bury vertebrate carcasses for reproductive purposes and exhibit parental care of young. Care involving both parents consists of food provisioning, protection, and direct feeding of larvae during the entire larval stage, demonstrating the highest level of sociality in the beetle order Coleoptera (Ratcliffe 1996).

The ABB is the largest species of its genus in North America, measuring 0.98-1.4 inches in length (U.S. Fish and Wildlife Service 1991). The body of the ABB is shiny black and has hardened protective wings (elytra) that meet in a straight line down the back. The elytra are smooth, shiny black, and each elytron has two scalloped shaped orange-red markings. The pronotum, or shield 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 (U.S. Fish and Wildlife Service 1991). The ABB also has orange-red frons (a mustache-like feature) and a single orange-red marking on the top of the head (triangular in females and rectangular in males). Antennae are large, with notable orange clubs at the tips (Figure 4). The aposematic coloration patterns of *Nicrophorus* appear to deter predation by insectivorous birds, although crows are known to eat the ABB and other *Nicrophorus* species (Ratcliff 1996).

Distribution

Historically, the geographic range of the ABB encompassed over 150 counties in 35 states, covering most of temperate eastern North America and part of Canada (U.S. Fish and Wildlife Service 1991, Peck and Kaulbars 1987; Figure 5). During this century, the ABB has disappeared from over 90 percent of its historical range (Ratcliffe 1995). Historic records are known from Texas in the south, north to Montana (single record in 1913) and the southern fringes of Ontario, Quebec, and as far east as Nova Scotia and Florida (U.S. Fish and Wildlife Service 1991). However, historic documentation is not uniform throughout this broad historical range. More historic records exist from the Midwest into Canada and in the northeastern United States than from the southern Atlantic and Gulf of Mexico region (U.S. Fish and Wildlife Service 1991). The last ABB specimens along the mainland of the Atlantic seaboard, from New England to Florida, were collected in the 1940's (U.S. Fish and Wildlife Service 1991). Since 1970, the U.S. Fish and Wildlife Service (1991) documented the ABB from: Rhode Island, Oklahoma, Arkansas, Nebraska, Kentucky, Missouri, South Dakota, Massachusetts, and Kansas, with additional single records from Texas, Ontario, and Montana. At the time of listing, in July 1989, known populations were limited to Block Island, Rhode Island; and eastern Oklahoma.

Currently, the ABB is known from only 8 states: on Block Island off the coast of Rhode Island; Nantucket and Peninskee Island off the coast of Massachusetts; eastern Oklahoma; western Arkansas; Sand Hills in north-central Nebraska; Chautauqua Hills region of southeastern Kansas (Sikes and Raithel 2002); northeastern Texas (Godwin 2003), and in South Dakota (Ratcliff 1996, Bedick *et al.* 1993). Seeming differences in abundance throughout the ABB's range, may however largely be a function of survey intensity. Most extant populations are located on private land than on public lands. Populations known to exist on public land include: Camp Gruber, Oklahoma; Fort Chaffee, Arkansas; Sequoyah National Wildlife Refuge, Oklahoma; Block Island National Wildlife Refuge, Rhode Island; and Valentine National Wildlife Refuge, Nebraska (U.S. Fish and Wildlife Service 1991).

There are currently three captive populations of ABBs. One is at the Roger Williams Park Zoo in Providence, Rhode Island. The second captive population is at the Entomology Department at Ohio State University in Columbus, Ohio. The third is at the St. Louis Zoo, in St. Louis, Missouri.

Habitat

Active Period

Peck and Kaulbars (1997) broadly characterized the distributions of 32 species of nearctic carrion beetles including the ABB in the category "eastern deciduous forest region". In Oklahoma, ABBs are found within a mosaic of vegetation types, from oak-hickory and coniferous forests on lowlands, slopes, and ridgetops to deciduous riparian corridors and pasturelands in the valleys (U.S. Fish and Wildlife Service 1991, Creighton *et al*. 1993). Historical records for ABBs in Nebraska indicate that the species occurred along water courses where riparian deciduous forests or scrub forests were predominant habitat (Jameson and Ratcliffe 1989). The Block Island, Rhode Island population occurs on glacial marine deposits, vegetated with post-agricultural maritime scrub plants including bayberry (*Myrica sp.*), shadbush (*Amelanchier sp.*), goldenrod (*Solidago sp.*), and numerous exotic plants (U.S. Fish and Wildlife Service 1991). Vegetative structure of Rhode Island habitats varies from shrub thickets to large mowed and grazed fields.

Soils in the vicinity of ABB captures in Oklahoma include well-drained, 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 (U.S. Fish and Wildlife Service 1991). Soil conditions where the species occurs must be conducive to excavation by ABBs (Anderson 1982, Lomolino and Creighton 1996). Certain situations and soil types are clearly not suitable for carcass burial (very xeric, saturated, or loose sandy soils, for example). Carrion availability in a given area is suspected to be more important to ABB occurrences than vegetation or soil structure *per se* (U.S. Fish and Wildlife Service 1991).

Comparisons of surveys conducted at Camp Gruber by Schnell and Hiott (1997-2002) inside and outside the installations perimeter revealed more ABBs were collected during surveys conducted inside the installation than outside. Also, Schnell and Hiott (1997-2002) conducted surveys at Weyerhaeuser lands in southeast Oklahoma. Here they reported that fewer ABBs were found along roads than in the interior of tree plots. This could suggest that ABBs prefer large, relatively unfragmented landscapes.

Klein (1989) observed several trends in carrion and dung beetles from the South American forest which may be applicable to carrion beetles in North America:

- forest fragments had more rare species;
- little movement across clear cuts;
- were not attracted into clear-cuts or into second growth clear cuts;
- forest edge had lower species diversity than interior forest;
- rarely moved from intact forest to fragments;
- found more in forested areas than in clear cuts;
- forest fragments had lower species richness, sparser populations, and smaller beetles than intact forest areas; and
- a lower rate of dung decomposition was detected in fragments.

Inactive Period

American burying beetles bury themselves beneath the soil surface during their inactive period. This makes it difficult to conduct research evaluating habitat preferences during these periods. The ABB is assumed to prefer overwintering in soils suitable for excavation and therefore, are similar to those used during reproduction in its active season. Soil depths preferred by ABBs for overwintering are unclear and any changes in their metabolic state are currently unknown. However, Anderson (1982) reported burial depths of 7.87 inches. However, there is likely some bias in his lab experiment because 7.87 inches was the depth of the rearing container used. Lomolino and Creighton (1994) reported burial depths ranging from 1.81 to 7.68 inches. This study was conducted in the field but some bias is still potential because a male/female pair of ABBs were placed on the carcass by the researcher and then covered with a 10.2 x 7.87 x 5.9 inches tub. Like other species, it is assumed that ABBs expend the minimal amount of energy necessary to ensure overwinter survival. The ABB would likely bury itself as shallow as physiologically possible, but the precise depths are unclear at this time.

Reproductive Period

During their reproductive period, ABBs also bury themselves in the soil. Again, it is unclear at what specific depth burial occurs. The ABB is thought to be a feeding habitat generalist but likely requires more specific breeding habitat. Larger species tend to have narrow niches (Diamond 1984, Martin and Klein 1984, Vrba 1984, Owen-Smith 1988, Stevens 1992). Multiple authors, such as Holloway and Schnell (1997), have stated that ABBs are not likely as general in breeding habitat selection as they are in feeding habitat selection. Creighton and Schnell (1998) concluded that ABBs are feeding habitat generalists, but their research does not describe habitats used by the ABB to successfully produce and raise young. They expect that the ABB will not be able to reproduce successfully in as broad a range of habitats as used for feeding.

Lomolino and Creighton (1996) found evidence that ABBs preferred mature forest over clear-cuts and had greater breeding success in forests relative to grasslands. They attributed this difference to the difficulty in ABBs burying carcasses in grasslands. Once buried, grassland carcasses produced similar larval complements as carcasses buried in forested landscapes. For breeding, some habitat preference studies in Oklahoma indicate ABBs select undisturbed, mature oak-hickory forests having substantial litter layers and deep, loose soils over grasslands or bottomland forests (Lomolino and Creighton 1996, Creighton *et al*. 1993). In 1996, more than 300 ABB specimens were captured in Nebraska in habitats consisting of grassland prairie, forest edge, and scrubland (Ratcliff 1996). This investigation had found certain soil types, such as very xeric, saturated, or loose sandy soils, to be unsuitable for carcass burial and thus unlikely breeding habitat. Lomolino and Creighton (1995) found the reproductive success to be higher in forested sites than grassland sites. Carcasses tended to be buried deeper in the soil at grassland sites, whereas carcasses in forested sites were buried closer to the surface typically, just below the litter layer. Lomolino and Creighton (1995) found that in grasslands, about 56% of ABBs buried carcasses successfully and reared young. In contrast, 95% of ABB pairs in the forested site were successful. The mean number of young raised on carcasses in the grassland site was only 9.79, whereas it was 14.77 in the forested site.

Life History

The ABB is presumed to be an annual species (U.S. Fish and Wildlife Service 1991), typically only reproduces once in their lifetime, fully nocturnal, and active when nighttime temperatures consistently (*i.e.*, 5 consecutive nights) exceed 60°F. In Oklahoma ABB are typically active from May 20 to September 20 (Oklahoma Climatological Survey 1993-2002). For the remainder of its life cycle, September 20 to May 20, (in Oklahoma) the ABB remains in an inactive condition buried in the soil at depths from 1.81 inches (Lomolino and Creighton 1994) to 7.87 inches (Anderson 1982). They are dependent on carrion for food and reproduction, utilizing a wide variety of carrion. They use keen antennal chemoreceptors to detect the presence of carrion. They must compete with other invertebrate species, as well as vertebrate species, for carrion.

American burying beetles, along with other (*Nicrophorus* species), carry swarms of orange-colored, phoretic mites (*Poecilochirus vitzhum)*. Wilson and Knollenberg (1978) reported that 14 species of mites from four families disperse phoretically on *Nicrophorus* in Michigan. While the significance of the relationship between mites and carrion beetles is not entirely clear, it is believed to be mutually beneficial: the beetle provides mites' mobility and access to food, and the mites help keep the beetle and carcass clean by consuming microbes and fly eggs (Wilson 1983, Trumbo 1990).

Even though ABBs are considered feeding habitat generalists they have still disappeared from over 90 percent of their historic range. Habitat loss, alteration, and degradation have been attributed to the decline of the ABB. The U.S. Fish and Wildlife Service (1991) concluded that the best explanation for the decline of ABBs involved habitat fragmentation which creates edge habitat, leading to a reduced carrion prey base and an increase in vertebrate scavengers, all of this works against the ABB.

Food Habitats

American burying beetles are considered feeding habitat generalists and have been found in several different habitat types, including undisturbed grasslands, grazed pasture, riparian zones, and oak-hickory forest, as well as various soil types (Creighton *et al.* 1993; Lomolino and Creighton 1996; Lomolino *et al.* 1995; NatureServe Explorer 2001; U.S. Fish and Wildlife Service 1991). Ecosystems supporting ABBs include primary forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (U.S. Fish and Wildlife Service 1991, Ratcliffe 1996).

Adult ABB food sources include an array of available vertebrate carrion, as well as capturing and consuming live insects (U.S. Fish and Wildlife Service 1991). The extremely sensitive antennal chemoreceptors of *Nicrophorus* species are capable of detecting a carcass between 1 and 48 hours after death at a distance of up to 2 miles (Ratcliff 1996). Success in finding carrion depends upon many factors including availability of optimal habitats for small vertebrates (Lomolino & Creighton 1996); abundance of competing beetle and vertebrate scavengers; individual searching ability; reproductive condition; and temperature (Ratcliff 1996).

Individual ABBs have been recorded traveling as much as 2 miles during one night (Creighton *et al.* 1993). Schnell and Hiott (1997-2003) determined the average nightly movements of the ABB, using marked individuals, annually for a nine-year period at Camp Gruber to be 0.62 miles, with a minimum distance of 0.01 mile in one night to a maximum distance 6.2 miles over a 6 night period.

Of the movements Creighton and Schnell (1998) recorded, 71 percent were to a habitat different from that of the initial site of capture. They concluded that ABBs move relatively long distances over short periods of time in their search for carrion. This included movements between open grassland and woodland and between bottomland and upland woodland. No evidence for sex- or age-related differences was detected in movement patterns of ABBs (Creighton and Schnell 1998).

By moving relatively long distances among different habitat types, ABBs increase the chance of encountering appropriate-sized carcasses, but also increase the exposure to a diverse suite of natural and unnatural mortality factors including predation, insecticides, commercially available insect traps, and nocturnal light pollution. The probability of individual ABBs being subjected to these types of hazards also increases as areas become more developed (Lomolino and Creighton 1996).

Populations Dynamics

From the long-term data collected at Camp Gruber by Schnell and Hiott (1997-2002) and from the relative abundance maps produced, the year to year behavior of the ABB can be interpreted. Numbers of ABBs within a general area (like Camp Gruber and Fort Chaffee) appear to fluctuate every year or every other year (Table 2). Further, locations of ABB high relative concentrations vary through the years. Consequently, repeated annual survey efforts at the same site annually may not consistently capture. We suspect ABB captures from other sites in Oklahoma likely fluctuate annually, but such conclusive data is not available.

Table 2. Annual number of ABBs captured at Camp Gruber and Weyerhaeuser in Oklahoma.

	Number of ABBs Captured	
Year	**Camp Gruber**	**Weyerhaeuser**
1992	215	-
1993	222	-
1994	283	-
1995	153	-
1996	322	-
1997	158	106
1998	377	64
1999	81	26
2000	118	41
2001	291	16
2002	128	25
2003	207	85

Surveys conducted by numerous parties over the recent past have consistently established the occurrence of the ABB within specific areas during the active season in Oklahoma. Considering ABBs may move up to 6.2 miles over 6 nights, an ABB could move as much as 104 miles during the active period. While unlikely a single ABB would disperse this distance over the active period, positive ABB captures within a specific area provides a reasonable certainty that the species occurs within that general area and in a broader area around a specific site. Thus, the species is likely to be present in both areas lacking recent surveys and in areas which have not ever been surveyed but contain suitable habitat and are either within the historic range or adjacent to counties with current ABB occurrence. Consequently, it is likely that the species may be present in areas lacking recent surveys or lacking any surveys.

Szalanski *et al.*, (2000) compared the genetic variation between ABB concentrations in South Dakota, Nebraska, Oklahoma, Arkansas, and Rhode Island. They found little evidence that these 5 concentrations have maintained unique genetic variation, indicating that these concentrations should not be necessarily treated as separate, independent objects of conservation. The amount of genetic variation one would expect to see would depend on a number of factors, most importantly the amount of time which has elapsed since the populations were isolated from each other. Considering there is no historical genetic information, we can only assume the populations were not genetically distinct in the past.

The standard survey technique for ABBs is baited pitfall traps. This technique has been described by Creighton *et al.*, (1993). This method has proven to be a successful tool for surveying ABBs and numerous surveys have been conducted throughout eastern Oklahoma. However, false negatives are possible and this type of survey technique only documents presence or absence of the species, not density or total numbers. While mark and recapture surveys have been conducted using baited pitfall traps, this method has not proven successful in allowing for an accurate population estimate (Kozol 1990c). Because the ABB violates two primary assumptions of mark and recapture methodology: all individuals have an equal probability of being captured and that individuals remain in the trapping area. Instead, catch per unit effort is typically used to measure relative abundance and trends at areas with long-term monitoring data. This type of data eliminates the need for these assumptions and allows for comparability between surveys and sites. Schnell and Hiott (1997-2002) report their survey results as catch per unit of trapping effort at each site and compare the abundance of ABBs at each site with the abundance of ABBs calculated from other sites. The Service did attempt to estimate the overall abundance of the ABB in eastern Oklahoma and have provided this information in a subsequent section of this document.

ABB Populations in Eastern U. S. Compared to Central U. S.

The apparent generalist nature of ABBs on Block Island, Rhode Island may be an artifact of this insular environment (Crowell 1983). Amaral *et al.* (1997) noted that there are unusually large populations of ground-nesting birds and there are few mammal predators or scavengers on Block Island. The U.S. Fish and Wildlife Service (1991) demonstrated that Block Island has a greater proportion of potential carrion producers than the adjacent mainland. Because of the low diversity of predators and competitors on islands, insular populations often exhibit ecological release, occurring in a broad variety of habitats considered atypical for populations on the mainland (Crowell 1962, Grant 1971, Cox and Ricklefs 1977, Lomolino 1984). Considering that Block Island is in fact an island, it is not an appropriate comparison to the Midwest. Further, the unique characteristics of Block Island, it is not likely to be appropriately compared with Midwestern populations. In addition, Amaral (2002 unpublished report) reported that on Block Island, 64 ABBs were artificially provisioned with carrion in 2001 prior to monitoring. Also in 2001, 66 ABB broods were artificially provisioned with carrion (the most ever) on Block Island for reproduction enhancement. This same type of artificial supplementation is not provided in Oklahoma. This issue only further emphasizes the unsuitability of comparing the Midwestern populations to that of Block Island.

Reproduction

American burying beetles are generally considered to be univoltine (one generation per year) (Kozol 1990a). Reproductive activity occurs between mid-May and mid-August in Oklahoma and commences once an appropriate carcass on which to feed and lay eggs is found (Eggert and Müller 1989, Bartlett 1987). In comparison to smaller species, ABBs tend to breed on larger carcasses, which are more unpredictable in space and time (U.S. Fish and Wildlife Service 1991, Creighton and Schnell 1998). Preferred ABB carrion sources are dead birds and mammals weighing from 1.7-10.5 ounces, with an optimum weight of 3.5-7.05 ounces (U.S. Fish and Wildlife Service 1991), whereas all other *Nicrophorus* species can breed abundantly on much smaller carcasses of 0.11 to 0.18 ounces (Trumbo 1992). Therefore, it is likely that ABBs must search over a larger area and greater diversity of habitats to find suitable carcasses than its smaller congeners. Wilson and Fudge (1984) suggest that smaller *Nicrophorus* species have higher reproductive rates than the larger species. On this basis, it is suspected that ABBs have a lower reproductive rate than most congeners.

Both parents often participate in the rearing of young, with care by at least one parent, usually the female, being critical for larval survival (Ratcliff 1996). This is a rare and highly developed behavior in insects, known only among bees, ants, wasps, termites, and a few species of scarab beetle species. The advantage of male attendance appears to be the added defense of the carcass and brood from *Nicrophorus* competitors and other intruders, as suitable carcasses are believed to be scarce relative to the number of potential breeders (Ratcliff 1995).

Typically, a male broadcasts a sex pheromone to attract potential mates to the site of his fresh carcass (Eggert and Müller 1989, Bartlett 1987). However, males have been known to emit pheromones both when they have found a carcass and when they have not (Ratcliff 1996). A female responding to a male without a carcass may benefit from obtaining a sperm supply for later use if she finds a carcass on which no mate is present (Eggert and Müller 1992). For females, ovarian response to reproduce is triggered by the behavior of assessing, preparing, and burying a carcass, not by male presence, male pheromones, or the mere presence of a usable carcass (Ratcliff 1996).

At night during the reproductive phase, male and female ABBs may compete among themselves and with congeneric competitors for a suitable carcass. This struggle continues until one pair remains on the carcass, with greater body size being the prime determinant of the outcome (Ratcliff 1996). Intrusions and takeovers of a carcass by *Nicrophorus* species are a regular feature of this genus's breeding system (Ratcliff 1996). The victorious pair buries the carcass, usually before dawn of the first morning. However, individuals of both sexes are capable of burying carrion alone (Ratcliff 1996). The pair will bury carrion of approximately 3.5-7.0 ounces, within a brood chamber constructed around the carcass. Prior to carcass burial, ABBs may move the carrion laterally as much as 3.2 feet (U.S. Fish and Wildlife Service 1991). Laboratory analysis of soil preference by *Nicrophorus* species suggest ABBs do discriminate, choosing substrates for a brood chamber with higher bulk or litter content (Ratcliffe 1996).

Immediate, nocturnal burial is important for North American *Nicrophorus* species because Calliphorid flies also are attracted to carrion as oviposition sites. The beetles must consume any fly larvae to prevent an infestation that would render the remains unsuitable for the adult beetles and their young. There may be a tradeoff between rapid burial in a less than optimum substrate in the midst of intense competition versus delayed burial where competition is low and optimum substrate occurs only a slight distance from the carcass (Ratcliff 1996). Once a burial site is located by a *Nicrophorus* species, a beetle displaces soil with its head starting beneath the carcass. As soil is moved to the sides, the carcass settles into the ground and then is buried by both parents to a depth of several inches. The carcass is cleaned of feathers or fur, formed into a ball, and coated with anal and oral secretions, which retard decay and contamination (U.S. Fish and Wildlife Service 1991).

Eggs are laid in the soil beside the carcass in an escape tunnel (U.S. Fish and Wildlife Service 1991). At least one parent, usually the female, remains with the eggs and subsequent larvae until larval development is complete. Eggs hatch within a few days and larvae move toward the carcass, eventually settling into an indentation at the top of the carcass formed by the attending parents. Adult *Nicrophorus* not only guard their offspring and continually clean the carcass, but also feed the begging larvae with regurgitations (U.S. Fish and Wildlife Service 1991). Larvae approach adults and press their mouth parts against the adult mouth parts which stimulate parental regurgitation (Ratcliff 1996). Studies have found that single females and males regurgitate to larvae more frequently than paired females and males, suggesting an increase in brood care by individual parents to compensate for loss of a mate (Fetherston *et al*. 1990). These observations may represent the first example of compensation for mate loss in an invertebrate (Ratcliff 1996).

Brood sizes vary between 3-31 individuals (U.S. Fish and Wildlife Service 1991) with a positive correlation between carrion weight and larvae weight (Kozol 1990b). However, as fecundity (larval numbers) increases, weight per larva decreases, particularly if the carcass is small (Ratcliff 1996). Kozol (1990) also observed a positive correlation between carrion weight and fecundity. Parents appear to selectively cull larvae if their assessments of the carcass resource reveal its size is less than the amount needed to sustain the parents and the brood. This unusual behavior of calculated infanticide, performed especially by the fathers, is the only known case among invertebrates (Ratcliff 1996).Although the male's presence reduces the chance of the carcass being taken over by an intruder and loss of the brood, continued male presence also may decrease total larval weight. Males consume an amount of food equivalent to one larva (Ratcliff 1996). On small carcasses offering limited food supply, females have been known to drive off males in an attempt to increase resources for the brood (Ratcliff 1996).

The larvae pupate and eclose (emerge as adults) in about 48-79 days. The U.S. Fish and Wildlife Service (1991) reported a timeframe of 48-60 days. In a laboratory setting Ratcliffe (1996) reported a timeframe of 60–79 days for development from larvae to emergence. Field research conducted in Nebraska by Bedick *et al.* (1999) supported Ratcliff's report. So, ABB emergence generally ranges from early July to mid-August. These teneral (newly hatched) adults overwinter to reproduce the following year. Occasionally the emerging generation of adults will succeed in producing another brood if summers are long and warm (U.S. Fish and Wildlife Service 1991).

Threats

At the time of listing there were perhaps fewer than 1,000 known individuals in the only remaining population known east of the Mississippi River and the only known Oklahoma populations were of undetermined size (U.S. Fish and Wildlife Service 1991). The Recovery Plan identified the following 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, and agricultural and grazing practices. These threats are discussed below.

None of these theories alone adequately explain why the ABB declined when congeneric species are still relatively common rangewide. The cause(s) of the species' decline is a complex and difficult question; however, an understanding of the possible factors involved in the decline is necessary in order to implement an effective recovery program, as well as to facilitate efforts to locate additional populations.

Since publication of the Recovery Plan, additional research has been conducted regarding threats to ABBs. Sikes and Raithel (2002) conducted an exhaustive search of the literature. They evaluated the following as threats to the ABB: DDT/pesticide use, artificial lighting, pathogen, habitat alteration, habitat fragmentation, vertebrate competition, loss of ideal carrion, and congener competition. These threats also are addressed below.

Disease/Pathogens

The ABB disappeared from its core range and persists only on the very periphery of its historic range. A pathogen hypothesis readily accounts for such a geographic pattern of decline. Any pathogen that could be transmitted among adult burying beetles, and was non-fatal to congeners of ABBs, would eliminate all contiguous ABB populations, leaving only peripheral isolates untouched. Raithel (1991) suggested this hypothesis but pointed out that no evidence of a disease or pathogen has been found, although no known rigid investigation has been conducted to test this hypothesis.

Further, Channel and Lomolino (2000) investigated the geographic pattern of decline in 245 endangered species. Their analysis showed that the remaining populations of many endangered species (98% of their sample), including birds, mammals, fish, mollusks, arthropods, and plants, are in the peripheries of their former range. Peck and Anderson (1985) determined that ABBs are phenotypical and presumably evolutionary distant from other *Nicrophorus* species in North America. Therefore, ABBs could be physiologically unique and vulnerable to a pathogen to which its congeners are immune. In addition symbiotic mites and nematodes of the ABB could also contribute to the spread of disease. Consequently, this hypothesis can not be eliminated as a possible reason of decline.

DDT and Pesticide Use

Kozol (1995) and U.S. Fish and Wildlife Service (1991) concluded that given the apparent timing and pattern of decline exhibited by ABBs, particularly in the Northeast, DDT could not have been responsible for most extirpations, since populations were largely gone a full 25 years before organochlorine compounds were broadly applied as pesticides. In addition, some populations persisted following DDT spraying in Oklahoma, Nebraska, and Missouri, while other unsprayed areas within the ABBs historical range no longer support the species. In the Midwest however, several ABB populations disappeared during or right after the general period from 1940 to 1972, when DDT was actively applied as a pesticide. However, Raithel (1991) pointed out that some ABB populations did disappear during the period that DDT was applied. Hoffman *et al*. (1949) showed, in a controlled study, that DDT spraying eliminated populations of three *Nicrophorus* species (*N. orbicollis, N. sayi,* and *N. defodiens*).

Although, this hypothesis is rejected as the primary explanation, it remains possible that some ABBs may have been extirpated by DDT use.

Direct Habitat Loss and Alteration

The very first hypothesis published to explain the decline of ABBs was that of Anderson (1982), who suggested that the species might be a specialist of old growth forest and require the deeper, looser soils of such habitats. Lomolino *et al.* (1995) tested and rejected Anderson's old growth hypothesis, concluding that ABBs are a vegetation generalist. At the time of listing in 1989, the prevailing theory regarding the ABBs' declines was habitat fragmentation (U.S. Fish and Wildlife Service 1991) which reduced the carrion prey base and increased the vertebrate scavenger competition for this prey. Kozol (1995), Ratcliffe (1996), Amaral *et al*. (1997), Bedick *et al*. (1999), and other authors have reiterated this theme.

Data show that species in the family Silphidae are generally widely distributed and occur in many habitat types (Peck and Kaulbars 1987). Sikes and Raithel (2002) concluded that, given the broad historical range of this species, ABBs are unlikely to have been vegetation specialists. There is information to indicate that ABBs tolerate and may even prefer, open habitats. However, most of the historical ABB collections, at least in the eastern portion of its range, occurred during the period when much of the landscape was highly agricultural and considerably altered from pre-settlement conditions. Given the historical distribution of the ABB across eastern and Midwestern North America, this species must certainly exhibit broad habitat tolerances (Schweitzer and Master 1987) at least from the standpoint of feeding preferences. Nonetheless, 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. Even though ABBs are considered feeding habitat generalist they have stilled disappeared over 90% of their historic range. In this regard, highways, coal mining, and construction of natural gas pipelines may constitute continuing threats to the ABB population (U.S. Fish and Wildlife Service 1991).

Increase in Competition for Prey, Fragmentation, and Edge Habitat

Fragmentation is the reduction in the total amount of habitat and the breakup of extensive habitats into small, isolated fragments and there is no limitation on the size of disturbed areas creating fragmentation. Initially, fragmentation may have minimal affects on vegetation, and species composition and abundance. However, as fragmentation gaps increase in size and quantity, they become the dominant habitat type in the landscape over the natural habitat. These small, isolated fragments of habitat are insufficient to maintain their native species stocks into the indefinite future. As the size of a fragmented area declines so does the number of native species it is able to support.

Natural patchy landscapes have less contrast between adjacent patches, whereas anthropogenic fragmentation creates intense, sudden contrast between patches. Edge habitat is where to different habitats meet, for example where grassland meets a mature forest. In the Midwest, windbreaks, hedgerows, park development, and urban planning have all provided new "edge" habitat. This edge habitat is a zone where the light, wind, microclimate, and moisture are altered. The affects from these changes may extend into different forest types at distances of 450, 656 to 1,640 feet.

Edge zones are usually drier and less shady than forest interiors, favoring shade- intolerant, xeric plants over typical mesic forest plants. In Wisconsin, forest edge zones of shade-intolerant vegetation may extend 32.8-98.4 ft into a forest. Climate edge effects may explain why dung and carrion beetle communities in 2.5 and 25 acre forest fragments in Brazil contain fewer species, sparser populations, and smaller beetles than do comparable areas within intact forest (Klein 1989). In heavily fragmented landscapes dominated by disturbed lands, edge effects may not be observed because the remaining patches of land lack a true interior or core habitat due to their small size. The drier conditions in small fragments, which are largely edge habitat, may lead to increased fatal desiccation of beetle larvae in the soil.

Fragmentation of habitats may increase species richness, but the species composition changes favoring species that thrive in areas disturbed by humans (Noss and Csuti 1997). There is evidence to support a direct correlation between edge, or fragment size, and vertebrate scavenger pressure, primarily on nesting bird populations ((Noss and Csuti 1997). The scavengers may extend hundreds of feet from edges into forest types of eastern North America. All these animals undoubtedly consume carrion that may be suitable for ABBs (Brett Rattcliff, University of Nebraska State Museum, in litt. 1991). When the amount of edge habitat increases there is likely to be a concomitant increase in the occurrence and density of vertebrate predators and scavengers such as the American crow *Corvus brachyrhynchos*, raccoon *Procyon lotor*, red fox *Vulpus fulva*, opossum *Didelphis marsupialis*, and striped skunk *Mephitis mephitis*. Accordingly, fragmented habitats not only support fewer or lower densities of indigenous species such as ABBs, but also facilitated increased competition for limited carrion resources among the "new" predator/scavenger community. Fragmentation of large expanses of natural habitat may have been a contributing factor in the decline of ABBs by changing the species composition and lowering the reproductive success through a reduction in prey species and quantities required for optimum reproduction.

Trumbo and Cloch (2000) found that *Nicrophorus* species had significantly greater success in larger woodland plots and attributed this in part to lower vertebrate scavenger success in those areas. Sikes (1996), working with *Nicrophorus nigrita*, found that most baited pitfall traps along transects laid more than 328 feet from a trail or road had 10% or fewer carcasses taken by vertebrates, whereas transects near trails or roads had an average of 85% of the carcasses taken by vertebrate scavengers.

When resources fluctuate seasonally or annually, species dependent on those resources fluctuate (Noss and Csuti 1997). Population variability predisposes species to extinction. The higher level of fluctuation, the greater the chance of extinction. Habitat fragmentation makes such species vulnerable in two ways: by reducing the number of sites that contain critical resources, and by isolating suitable sites and making them harder to find (Noss and Csuti 1997). Studies of butterfly species suggest that local extinction is frequent on the small patches of grassland to which the species is now restricted due to fragmentation of the once extensive native grassland.

Ecosystem functioning is more likely to be disrupted at finer scales of fragmentation, although the organisms affected are smaller and the overall process is less noticeable to human observers. Probably some of the strongest effects of fragmentation on ecological processes may turn out to involve the invertebrate community (Noss and Csuti 1997). Invertebrates are critically important in decomposition, nutrient cycling, disturbance regimes, and other natural processes in ecosystems, and they appear to be quite sensitive to disruption of microclimate and other effects of fragmentation.

Some animals, such as the ABB, roam over large areas in the course of their daily or seasonal movements. Even large fragments may not provide enough are for viable populations of these species (Noss and Csuti 1997). Species with either specialized habitat or resource requirements, like ABBs, often are vulnerable to extinction, especially when those resources are unpredictable in time and space (Karr 1982 and Pimm *et al.* 1988). In addition, several studies have shown that species with short life cycles are more extinction prone than longer-lived species in habitat fragments.

Dispersal is more likely to maintain metapopulations in naturally patchy landscapes than in formerly continuous landscapes fragmented by human activity (den Boer 1970). Human created structures and habitats – roads, urban areas, agricultural fields, clear-cuts – can greatly inhibit the movements of many kinds of animals. Studies have found that roads and railroads inhibited normal movement of prairie voles (*Microtus ochrogaster)* and cotton rats (*Sigmodon hispidus)* (Noss and Csuti 1997).

When an area is isolated by destruction of the surrounding natural habitat, population densities of mobile animal species may initially increase in the fragment as animals are displaced from their former homes (Noss and Csuti 1997). The initial increase in population densities in isolated fragments is followed by collapse in most cases. This type of effect is likely to occur in many cases over the long-term, but this has not been proven.

The ABB is largest carrion beetle in North America. In a fragmented ecosystem, larger species including the largest of a type of invertebrate such as the largest carrion beetle, have been shown to be negatively affected before smaller species, a phenomenon which has been well-documented with carrion and dung beetles in South America (Klein 1989). This is partly due to small areas failing to provide enough prey, but also these animals are more likely to be killed by humans or their vehicles when they attempt to travel through fragmented landscapes. Other species, for reason s not entirely understood, avoid settling in small tracts of seemingly suitable habitat.

Hiott and Schnell (1997-2003) found higher numbers and abundances of ABBs within Fort Chaffe and Camp Gruber boundaries which are large, continuous blocks of land than outside their boundaries where the habitat is more fragmented. Although, some mobile species can integrate into a number of habitat patches this does not appear to be the case with the ABB. Hiott and Schnell (1997-2003) found that ABBs avoided clear-cut areas in southeast Oklahoma. A clear-cut depending on its size and location can be compared to oil and gas activities such as pipelines, roads, rights-of-way; and well pad sites.

Peck and Kaulbars (1987) suggest that the eclectic occurrences of the Silphidae are probably due to carrion being a finite resource widely scattered in space and time. Data available for the ABB on Block 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 utilized by all other North American *Nicrophorus* species, and that the optimum-sized carrion resource base has been reduced throughout the species' range over time (Raithel 1991). ABBs are the largest species of *Nicrophorus* in the New World and require carcasses of 3.5 to 7.0 ounces (Kozol *et al*. 1988) to maximize its fecundity, whereas all other *Nicrophorus* species can breed abundantly on much smaller carcasses, with the smaller species using carcasses of 0.11 to 0.18 ounces (Trumbo 1992).

In Oklahoma, Holloway and Schnell (1997) found a significant correlation between the number of ABBs caught in traps and the biomass of mammals, the biomass of mammals plus birds, the number of mammal species, and the number of individual mammals, irrespective of the predominant vegetation. The ABB is likely to be a feeding habitat generalist but require more specific breeding habitat. The later has not been confirmed but multiple authors state that ABBs are not as general in breeding habitat selection as they are in feeding habitat selection.

Although much of the evidence suggesting the reduction of carrion resources as a primary mechanism of decline in ABBs is circumstantial, this hypothesis fits the temporal and geographical pattern of the disappearance of ABBs, and is sufficient to explain why ABBs declined while congeneric species did not.

Interspecific Competition and Congener Competition

Interspecific competition may affect ABB populations at the local level. Kozol (1989) demonstrated that *N. orbicollis* was about eight times more abundant than the ABBs on Block Island, Rhode Island while Walker (1957) collected 19 times more *N. orbicollis* than ABBs in the single trapping array where the ABB was encountered in Tennessee. These limited data, in conjunction with Latham's anecdotal statement, "ABB was always the most common genus here (Orient, NY)," may suggest that congeneric species with which ABBs compete for carrion resources (to some extent), might have increased (been "released) in those areas where ABBs disappeared (U.S. Fish and Wildlife Service 1991). However, Ratcliff (1996) reported that ABB being the larger species typically out-competed smaller congener species.

Loss of Genetic Diversity in Isolated Populations

Even for a winged and moderately mobile insect such as the ABB, movement to and from suitable habitat would be reduced when these habitats become isolated and fragmented. As ABB populations became isolated loss of genetic variation through drift could leave isolated populations inbred, and of low viability and/or fecundity, and thus potentially unable to adapt to further environmental changes (Schonewald-Cox *et al*. 1983, Templeton *et al.* 1990). However, study to date shows no significant differences between populations.

Agricultural and Grazing Practices

Agricultural and grazing practices within the range of ABBs, may compound the changes in vertebrate species composition and densities caused by habitat fragmentation. Phillips (1936) documented that some species, *e.g*. deer mouse (*Peromyscus maniculatus*), responded positively to cattle grazing in Oklahoma and were most abundant in moderately overgrazed pastures, whereas other species (*e.g.* hispid cotton rat) respond negatively to grazing and were most abundant in ungrazed areas. At 0.53 to 0.88 oz body weight, deer mice are below optimum size for ABB reproduction, while the hispid cotton rat, at 1.76 to 5.29 ounces, is of optimum size. More importantly, conversion of native plant communities to cropland, including frequent soil disturbance caused by regular tilling, also likely influence the distribution and abundance of the ABB.

Artificial Lighting

In the Northeast, ABBs consistently come to lights (Anderson and Peck 1985). However, ABBs are less frequently attracted to lights than to baited pitfall traps. Support for artificial lighting as a reason for decline in ABB populations could be derived from the fact that most extant populations of ABBs occur in relatively remote, lightless areas, and electric lighting was becoming widespread during the late 1800s (Bright 1949), concurrent with the beginning of ABBs disappearance from the Northeast. Conversely, the ABB population on Block Island has coexisted with artificial light for over 50 years. Considering artificial lighting is highly correlated with development and loss of habitat, lighting alone is not likely to bully explain the disappearance of the ABB rangewide.

Summary

The decline of the ABB can plausibly be attributed primarily to habitat loss and fragmentation, which lead to a reduction in optimum reproductive carrion resources and an increase in vertebrate competition for carrion. This loss probably has been exacerbated by changing land use patterns, including more intensive agricultural and grazing practices (U.S. Fish and Wildlife Service 1991). The fecundity and general population levels of avian species, several of which are ground nesting species, have declined due to habitat loss and fragmentation. The resulting decline in available carrion resources likely led to reduced abundances of ABBs. Similarly a vast increase in scavenging and predatory mammals reduced carrion availability by increasing predation on the eggs and young of ground nesting birds and by actively competing for available carrion resources.

ENVIRONMENTAL BASELINE

The environmental baseline is defined as the effects of past and ongoing human induced and natural factors leading to the current status of the species, its habitat, and ecosystem, within the project area. The environmental baseline is the snapshot of the status of the ABB at this time.

Species Status within Action Area

Presently, eastern Oklahoma contains two known, large concentrations of the ABB, one at Camp Gruber in Muskogee County and one in McCurtain County, on a large, privately owned commercial holding. The large numbers of ABBs captured from these areas provides insight into the numbers of ABBs in and around the area. Surveys for the ABB have been conducted at Camp Gruber annually since 1992. Likewise, Weyerhaeuser has conducted surveys since 1997.

In addition, numerous random surveys have been conducted throughout eastern Oklahoma. The number of trapnights varies between counties and years, ranging from 24 trap nights in Tulsa County to 17,388 in Muskogee County (including Camp Gruber). Although survey intensity differs between counties, survey information does provide at least a rough estimate of abundance based on ABBs captured per trap night. This information also provides a means to monitor ABB trends and distribution.

In Oklahoma, the ABB is currently known to occur or likely to occur in 33 counties. Of these 33 counties, all are either within the reported historic range (U.S. Fish and Wildlife Service 1991) or within the documented current range of the ABB. Twenty-two of the 33 counties have known recent ABB occurrences. The remaining 11 counties although lacking recent (within the last 10 years) survey records, are either within the historical range of the ABB; or contain suitable habitat and are bounded by counties with confirmed, recent ABB sightings (see Figure 1). Two of these 11 counties have unconfirmed sightings (see Figure 1). Unconfirmed sightings are defined as relatively reliable reports for which the Service or a knowledgeable entomologist has been unable to confirm due to lack of photographs, specimens, or other evidence.

Table 3. American burying beetle current and historic distribution in Oklahoma by County.

Historic	Likely to be Present	Documented		Unconfirmed (Historic)
Creek	Pawnee	Atoka	McCurtain	Adair
Mayes	Pontotoc	Bryan	McIntosh	Delaware
Nowata	Seminole	Cherokee	Muskogee	
Okmulgee		Choctaw	Okfuskee	
Ottawa		Coal	Osage	
Washington		Craig	Pittsburg	
		Haskell	Pushmataha	
		Hughes	Rogers	
		Johnston	Sequoyah	
		Latimer	Tulsa	
		Leflore	Wagoner	

Population Estimate

During discussions related to completion of this PBO, the Service agreed to estimate the population size of the ABB throughout its known range in eastern Oklahoma at the request of some members of the oil and gas industry. As stated above, conducting such an estimate is difficult for a number of reasons, the majority of which relate to a lack of specific life history information for the ABB (see Appendix 2; U.S. Fish and Wildlife Service 1991).

In spite of the lack of appropriate survey information, the Service herein provides an estimate of population size in Oklahoma using available presence/absence surveys. Estimating the ABB population size required the Service to make several assumptions, many of which are likely to be invalid. By utilizing these assumptions, we were able to make an estimate of population size. At best, we believe this estimate is likely to be unreliable and only marginally indicative of ABB population size in Oklahoma.

In wild organisms, counting all of the individuals in a given place and time is extremely difficult if not impossible. Consequently biologists must utilize techniques that estimate numbers from samples. Such estimates are approximations and are only as reliable as the representative sample from which the estimate was generated. Typically an estimate of population size may be inferred from an area sample, a complete count of a known part of the sampling area, or a time sample conducted by obtaining a partial count over the entire area of interest (Blower, *et al*. 1981).

Long-term ABB survey data from throughout eastern Oklahoma is lacking. Long-term, mark and recapture data is available for Camp Gruber in northeastern Oklahoma and from a pine plantation on Weyerhaeuser lands in southeastern Oklahoma. Long-term mark and recapture information also is available for Fort Chaffee in Arkansas. However, these mark and recapture surveys are considered unreliable at best. The applicability of the population estimates derived from these mark and recapture surveys is limited because ABBs violate the two basic assumptions of the population estimation methods.

Most standard techniques used to estimate population size assume that marked and unmarked individuals are equally likely to be captured and that a substantial number of the animals remain in the available population from one trapping period to the next. Creighton and Schnell (1998) discuss mark and recapture efforts for the ABB in eastern Oklahoma and western Arkansas. Absence of recaptures beyond 6 nights post capture was believed to be indicative of the rapid turnover in the trappable ABB population (Creighton and Schnell 1998). They suspected that factors such as mortality, dispersal, and burrowing activity influenced their ability to recapture beetles. As stated by Creighton and Schnell (1998), most standard methods of estimating population size from mark and recapture data assume that marked and unmarked individuals are equally likely to be captured and that most, if not all, of the organisms remain in the trappable population. They felt this assumption was not valid for ABB populations considering the high turnover rate they observed for the ABB (Creighton and Schnell 1998). Accordingly, conventional methods of estimating population size may not be applicable for the ABB and accurate measures of absolute densities are problematic (Creighton and Schnell 1998).

Kozol (1990) conducted a population estimate for Block Island, Rhode Island between 1986 and 1990, and indicated that the population was relatively stable at a level of approximately 375 animals with a confidence interval ranging from 316 to 450. Kozol's mark and recapture population estimate was based on trapping efforts spanning several weeks. Even with an intensive survey effort on a relatively confined population, Kozol cautioned using such figures as more than a guide because, as stated above, ABBs generally violate the two basic assumptions of population estimate methods.

Most animal population estimates, particularly for mobile organisms which may enter or leave a sampling area during the sampling interval, require not only the collection of the representative sample, but knowing what fraction of the total this sample comprises. Estimating this fraction of the total for mobile species generally requires repetitive sampling in the sampling area, typically at least 2 successive samples (Blower, *et al*. 1981). Because the ABB is an annual species (*i.e*., life span is about 1 year), repetitive sampling in subsequent years would not provide an estimate of the original population. Meaningful estimates could only be obtained with repetitive samples of the same population. Unfortunately, with the exception of studies at Camp Gruber, on Weyerhaeuser plantations, and at Fort Chaffee, Arkansas, none of the ABB surveys available to date for the area of interest include repetitive samples.

In estimating the overall population size for ABBs in Oklahoma, all previous positive survey records were used in conjunction with a crude estimate of the acreage of suitable ABB habitat. Only counties having documented ABB records, either voucher specimens or reported captures, were assumed to have existing populations. Our data revealed 20 counties met this criterion (Appendix 2). While several additional counties, at least 13, likely have ABB populations, based on the occurrence of suitable habitat and proximity to known populations, these counties were not included in the analysis.

Determining suitable habitat for the ABB is particularly difficult. The ABB is considered a feeding habitat generalist and will utilize carrion in a variety of habitat types (Creighton and Schnell 1998, Creighton, *et al*. 1993, Service 1991). However, the occurrence of carrion is highly unpredictable in both time and space. The Service also lacks definitive information on ABB preferred breeding and overwintering habitat. As stated previously ABBs are believed to be more selective in regards to choosing reproductive habitat. While such habitats are likely to be more limited in the landscape, and thus more crucial to determining the abundance of the ABB than is feeding habitat, lack of specific information on location and abundance of such habitats precluded us from refining our estimate. Consequently, we assumed those natural habitats, such as prairies and forests, which provide suitable foraging habitat also contained suitable breeding and overwintering habitat. In doing so, we likely have overestimated the abundance of the ABB throughout its known range in Oklahoma.

We also assumed that ABBs were uniformly dispersed throughout suitable habitat because we lack specific information on ABB dispersion patterns and cannot correlate this dispersion with available habitat. Studies for most species of wildlife indicate that animals tend to be dispersed across the landscape in a clumped pattern (Odum 1971). Purely random patterns are relatively rare and uniform dispersion patterns occur typically when competition for resources is severe or interactions between individuals promote even spacing. Considering ABBs are strongly influenced by carrion availability, and carcass dispersion likely occurs most commonly in a clumped pattern, the Service doubts ABBs occur uniformly across the landscape. However, Trumbo (1992) found that competition for carcasses among adult burying beetles can be intense and perhaps could cause ABB populations to be more uniformly dispersed throughout the landscape than we currently believe.

The Service determined the extent of suitable ABB habitat by subtracting the acreage of unsuitable ABB habitat from the total acreage for each county (Appendix 2). We were able to make certain assumptions, using known characteristics of suitable habitat that would allow us to more precisely determine unsuitable habitat. While these assumptions are not likely to be consistently valid, given the lack of precise information on ABB microhabitat preferences, we are confident that we can reasonably describe environments that are not likely to be preferred ABB habitat. Accordingly, we assumed that the ABB is absent or extremely rare in urban environments and other large areas having a predominance of asphalt, concrete and similar forms of soil disturbance. We also assumed that the ABB would not occur on roadways or railroads, primarily due to the extent of soil disturbance and compact nature of soils within road and highway ROW. While the ABB does occasionally occur along road and highway ROW, we assume such occurrence is due to the presence of carrion from road kills and not because the ABB actually prefers these types of habitats. Railroad beds typically have a gravel base that would not be conducive to use by the ABB.

The ABB is a terrestrial insect and is not associated with the aquatic environment, with the exception of the riparian zone. Consequently we assumed areas that are permanently flooded or frequently flooded are not suitable habitat. Unfortunately we lacked detailed information regarding the flooding regime for many small rivers and streams and could not readily exclude the smallest of these features from our analysis. We also excluded areas that undergo repeated soil disturbance, primarily areas such as cropland that are frequently tilled.

The extent of urban areas was determined using the Oklahoma Urban Areas data set available from U.S. Census Bureau TIGER (*i.e*., Topographically Integrated Geographic Encoding and Referencing system) files. The U.S. Census Bureau TIGER data sets also were used to determine the extent of surface water, roads, and railroads. The Service utilized the following assumptions regarding the width of roads and railroads in order to determine the real extent of each feature: 1 lane of railroad track has a width of 20 feet; 2 lane roads, such as vehicular trail, road as other thoroughfare, and road with special characteristics, have a total width of 24 feet; local, neighborhood, rural, secondary, and connecting roads had a total width, for 2 lanes, of 12 feet; and primary roads have a total width, for 4 lanes, of 56 feet. The current land base for each county meeting the above-defined criteria were determined using data obtained from the 2000 census (U.S. Census Bureau 2004). The acreage of unsuitable habitat for each county was then subtracted from the total land base of the county to provide an estimate of suitable habitat. Information on total acres per occupied county and acres of suitable habitat are provided in Appendix 2.

The abundance of the ABB in eastern Oklahoma, as explained below, was extrapolated from capture information reported to the Service in compliance with various permit or consultation reporting requirements or from scientific literature. As one would anticipate, survey efforts were not consistent between years or among the occupied counties. Surveys were conducted much more frequently in some counties as opposed to others. Bedick, *et al*. (2004) found that capture success even varies by month within the same active season. Accordingly, the number of ABBs reported within each county varied greatly and trapping effort undoubtedly influenced the number of ABB that were captured. Despite these potential biases, no other suitable data from which to make comparisons was available.

Lacking any accurate measures of density, we attempted to estimate density based on capture data and the extent of suitable habitat within each county of occurrence. The Service used all known positive survey records to determine the total number of ABBs captured and total transects deployed per county. In using this information, we assumed all captures were obtained using the methodology described by Creighton, *et al*. (1993) unless stated otherwise. Data that was not collected using Creighton *et. al.* (1993) methodology was excluded from the analysis.

The Service then estimated the area each transect would effectively trap. Creighton, *et al*. (1993) determined, based on known movements of ABBs, that transects do not need to be spaced any closer than 0.5 miles. Past and ongoing research demonstrates this trapping recommendation is still appropriate. Schnell and Hiott (1997-2003) determined the average nightly movements of the ABB, using marked individuals, annually for a nine-year period at Camp Gruber to be 0.62 miles. The smallest average nightly movement for any given active season over that same period was 0.52 miles. Consequently, we believe each transect effectively lures beetles from an area bounded by a 0.25 mile perimeter around a transect. As such, the effective trapping area (ETA) for one transect is about 153.5 acres. Using the ETA and number of ABBs collected, by county, we could estimate the mean ABB density (*i.e.,* the number of ABB per acre) for each county. The density was then used in conjunction with our estimate of suitable habitat to calculate the number of ABBs for each county with known populations.

Factors Affecting the Species within the Action Area
The action area defined in this PBO is the entire known range of the ABB in Oklahoma. Projects evaluated pursuant to this PBO will likely occur throughout the 33 counties encompassing the ABBs range in Oklahoma. Adequate evaluation of the proposed action addressed in this PBO must not only include the impacts from the proposed activities, but also must consider other, separate effects currently ongoing and likely to occur in the foreseeable future that also could have adverse impacts to the ABB. In accomplishing this evaluation, the Service considers other incidental take statements issued, incidental take permits issued, recovery permits issued, other section 7 consultations conducted, and cumulative impacts within the action area.

During the Service's 2003 fiscal year (October 1, 2002 to September 30, 2003) the Oklahoma Field Office consulted on approximately 1,562 proposed actions of which 785 (51 percent) were proposed to be implemented in the 33 counties in which the ABB likely occurs. Project types evaluated included construction of pipelines, roads, communication towers, residential housing development, bridges, mining, petroleum production, commercial development, recreational development, transmission lines, and water and waste water treatment facilities. Of the 785 projects the Service reviewed within the ABBs range, approximately 213 (28 percent) involved petroleum production and distribution, and other industry distribution pipelines.

During the Service's 2004 fiscal year (October 1, 2003 to September 30, 2004) the Oklahoma Field Office reviewed about 1,320 proposed actions. Of the 1,320 proposed actions, 591 (45 percent) were proposed within the 33 counties in Oklahoma where the ABB is likely to occur. Of these 591, about 157 (27 percent) involved petroleum production and distribution, and other industry distribution pipelines.

Currently 11 entities or individuals possess valid section 10 permits for the ABB in Oklahoma. Ten are section 10(a)(1)(A) scientific research permits to enhance the survival of the species and one is an incidental take permit issued in conjunction with a Habitat Conservation Plan (HCP). Although ten permits are enhancement of survival permits, some take of ABBs is authorized. The research conducted under these permits, even though take is allowed, must further conservation efforts for the species. The loss of some individual ABBs over the short-term from research is allowed as long as the survival of the ABB is not jeopardized. The Service requires that every available precaution be implemented to minimize and/or eliminate authorized take associated with research activities.

The HCP and related 10(a)(1)(B) incidental take permit was issued in 1996 to Weyerhaeuser Timber Company for ABBs on their lands in southeast Oklahoma and southwest Arkansas. Habitat Conservation Plans, with incidental take permits are available to private landowners, corporations, state or local governments, or other non-Federal entities who wish to conduct activities that might incidentally harm (or "take") a species listed as endangered or threatened. To obtain a permit, the applicant must develop an HCP, designed to minimize or mitigate any harmful effects the proposed activity might have on the species. The HCP process allows development to proceed while promoting listed species conservation.

The Weyerhaeuser HCP is valid for 35 years and does not estimate a number of ABBs that could potentially be taken. The HCP stipulates the following as foreseeable activities implemented by Weyerhaeuser over 35 years: 28,000 acres (average of 800 acres per year) of forest will potentially be harvested; 16 ponds constructed; 10 or fewer food plots planted; EPA approved application of pesticides for control of pales weevil damage to planted pine seedlings; ROW vegetation control; 2 miles of road constructed; 20 acres of mineral, oil, or gas exploration; and no more than 600 acres of cattle grazing. From 1997 to 2000 approximately 10,710 acres of Weyerhaeuser lands were surveyed for the ABB annually and from 2001 to 2003 approximately 14,382 acres were surveyed. Take is the form of acres has not been exceeded to our knowledge. From 1997 to 2003 the following number of ABBs were captured: 106, 64, 26, 41, 16, 25, and 85, respectively.

There are two ongoing formal consultations (i.e., biological opinions with incidental take statements) issued for the ABB in Oklahoma; one with the Department of Defense pertaining to Camp Gruber near Braggs, Oklahoma, and the other with the U.S. Forest Service regarding the Ouachita National Forest in southeastern Oklahoma. The biological opinion for Camp Gruber allows for the take of 35 ABBs per year. The biological opinion for the Ouachita National Forest covers forest lands in both Oklahoma and Arkansas, and allows for the take of 30 ABBs per year. The Service is also currently working with the Federal Highways Administration and other federal agencies to develop a programmatic consultation for their activities.

In addition, the Service may recommend that ABBs be trapped and relocated in certain instances. While these activities can have adverse impacts, the existing recovery permit provides for take which may occur. All accidental deaths are required to be reported to the Service. However, due to the loss of some of those records the Service is unable to determine the total amount of incidental take that has occurred.

EFFECTS OF THE ACTION

As stated in the Project Description, the General Permit authorizes the discharge of pollutants in storm water discharges associated with soil disturbing activities relating to oil and gas exploration, drilling operations, and pipeline construction While the discharge of water from these construction sites appears unlikely to adversely affect the ABB, the interrelated and interdependent soil disturbing activities associated with EPA’s action of issuing coverage under the General Permit for the discharge of storm water from oil and gas construction sites, have the potential to adversely effect the ABB. Adverse impacts to ABBs occur primarily from ground disturbance associated with drilling and associated construction and pipeline installation actions during the ABB’s inactive and active periods. Construction activities associated with oil and gas wells and pipelines may disturb soils in areas within the ABB’s range and have the potential to harm, harass, or kill individuals. Typical oil and gas construction activities are relatively short-term, usually completed in less than 30 days. However, maintenance and repair of the facilities and the associated ROW, can have recurring impacts over the life of the project. Routine operation of these facilities does not entail additional soil disturbance and therefore are not likely to result in direct effects to the ABB.

Direct Effects
Direct adverse impacts to ABBs during their inactive and active periods may occur as a result of impacts associated with clearing vegetation; heavy equipment operation; fuel and chemical contamination of the soil; grading; soil excavation and filling; and revegetation and reseeding of disturbed areas. American burying beetles can be crushed or displaced during these activities.

During routine wellpad installation, soil is excavated to a depth of approximately 6 inches. Soil excavation for pipeline installation is 3 feet or more in depth and about 5 feet wide. The overall permanent width of a pipeline ROW is usually 50 feet. Excavating soils, clearing vegetation; grading the ROW and the wellpad, constructing an access road, and installing a pipeline will entail displacement of soils that could uncover ABBs. Uncovered ABBs could be exposed to predation, adverse environmental conditions, or crushed by equipment. If construction occurs during the active season, ABB broods could be displaced during soil excavation, adults could be separated from larvae/eggs, and/or both could be crushed by equipment. Revegetation could result in additional disturbance similar to that described above.

Construction of a wellpad requires compaction of the soil to ensure rig stability. In addition, use of heavy construction equipment, such as bulldozers, excavators, track hoes, and back hoes during pipeline and wellpad construction could compact the soils in additional, unintended areas. Soil compaction could destroy ABB brood chambers, including attending adults and larvae; and prevent ABBs from burying carcasses if construction takes place during the reproductive season. Soil compaction during the active or inactive period could crush individuals ABBs and their broods and prohibit ABB re-emergence from the soil following reproduction or prevent emergence following the inactive season. The use of petroleum products and chemicals could contaminate the soil if spilled or is leaking during construction creating unsuitable habitat, directly killing individuals and/or broods; or displacing individuals to less suitable areas.

All of these activities could result in the direct mortality of individual ABBs or broods, or create conditions that reduce the chance of survival of individuals or broods. In summary, ground disturbance associated with oil and gas construction and operation activities could result in take of individual ABBs, eggs, or larvae in eastern Oklahoma.

Indirect Effects
Indirect effects are caused by, or result, from the proposed action but occur later in time. Maintenance activities usually occur, after construction is completed and when operators are no longer under the regulatory authority of EPA’s General Permit. Maintenance of the wellpad and pipeline areas typically will occur two to five years following completion of construction and revegetation of the site. The entire pipeline ROW usually is maintained by brush hogging or mowing every one to two years. The running surface of the lease road ROW and the associated borrow ditch will periodically require maintenance. Clearing and maintaining the ROW and wellpad could alter the habitat by precluding re-establishment of the natural vegetative community. This could potentially displace ABBs to other less suitable areas.

Future, maintenance activities and small construction activities (taps, meters, hydrologic testing, etc) within well pads, lease roads and/or pipeline ROW, while not unrelated to the current action, are difficult to accurately predict or schedule at the time of initial project construction. These activities may have adverse impacts to ABBs; however, they cannot be considered reasonably certain to occur within the immediate future and are not under the purview of the EPA's General Permit. Consequently, these actions are not considered in this PBO. If future activities of these types do require another General Permit then these activities would be covered under this PBO, or if these activities invoke another federal nexus, separate consultation may be required.

New pipeline, access road, and wellpad construction results in increased edge habitat and habitat fragmentation. Increased edge can often have a negative influence on a species because it decreases the interior conditions of habitat. As discussed above, the Service (1991), as well as multiple other species experts, have concluded that the best explanation for the decline of ABBs involve habitat fragmentation and creation of edge habitat, which reduces the carrion prey base and increases the vertebrate scavenger competition for prey. Construction of roads, pipelines, and wellpads has the potential to create new edge habitat. This type of habitat is likely to result in take of ABBs in the form of harm by lowering the availability of appropriate prey for ABBs, hindering reproduction, and increasing predation of ABBs.

Tracking

This section addresses the quantification of actual effects to ABBs from construction activities compared to those impacts projected and quantified in this PBO. Tracking includes monitoring and reporting both at the project and landscape level. These reports will allow the Service to monitor the effects of individual and cumulative project activities. Each year on the date of this PBO, the Service will re-evaluate the impacts and effectiveness of the programmatic process to determine if reinitiation is required. Project level reporting requirements and the semi-annual landscape reporting requirements are explained in the Reasonable and Prudent Measures.

Project Level Effects Monitoring and Reporting Within Action Area

Effects to the ABB must be evaluated at the project level to determine the following: (1) when a project is implemented, (2) exact location of the project, (3) what entity is implementing the project, (4) what type of project is being implemented, and (5) actual size of project area. In addition, the Service needs to review the project to review implementation of the typical construction methods, insure that the Reasonable and Prudent Measures as stated below of this PBO and their implementing Terms and Conditions are adhered to, and ensure that level of incidental take is not exceeded. Thus, prior to each construction project an individual project consultation in the form of an NOI must be submitted to the Oklahoma Field Office. When a NOI for oil and gas activities is submitted to the EPA a copy must be submitted to the Oklahoma Field Office. The applicant is reminded that the receipt of the NOI by the Service must occur prior to or concurrent with the receipt of the NOI by EPA.

Landscape Level Effects Monitoring and Reporting Within Action Area

This PBO defines the typical construction methods to be used, the minimization measures available (Reasonable and Prudent Measures), and how to implement these minimization measures (Term and Conditions). The Service needs to ensure that the guidelines described in this PBO are adhered to and that these guidelines adequately protect the ABB. Consequently, reports need to be submitted to the

Service twice annually. One report is due after the completion of the active season by October 31. The second report is due at the end of the inactive season by June 31.

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 PBO. 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 projects that do not require federal funding, permitting, or authorization and consequently do not require consultation with the Service. Therefore, the number of acres affected by these non-federal nexus projects is unknown. These most likely include, but are not limited, to road construction, residential development, agricultural land development, commercial development, rights-of-way, and mineral/rock extraction

As stated above, habitat fragmentation, loss, and alteration likely have adverse impacts on the ABB. Habitat fragmentation can reduce the carrion prey base and increase the vertebrate scavenger competition for the available carrion thus potentially contributing to the decline of the ABB. Cumulative pressure on existing populations of ABB can be caused by projects that contribute to habitat fragmentation, such as road construction, residential development, agricultural land development, and mineral extraction (U.S. Fish and Wildlife Service 1991). In the Midwest, windbreaks, hedgerows, park development, and urban planning have all provided new “edge” habitat for these scavengers, as well as domestic and feral animals such as dogs and cats. All these animals undoubtedly consume carrion that may be suitable for ABBs (Brett Rattcliff, University of Nebraska State Museum, in litt. 1991). Modification of small portions of forested habitats (*i.e*., 5 to 10 acres) may, in the long run, have the cumulative effect of lowering the reproductive success of the species.

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 the action, as proposed, is not likely to jeopardize the continued existence of the ABB across its entire range. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. We concluded that this action is not likely to jeopardize the continued existence of the species because of the conservation measures adopted by the oil and gas companies during their project implementation. As stated above, the Service believes that these conservation measures will benefit the ABB. These conservation measures provide minimization measures such as constructing in areas already disturbed and within the inactive period and recommend ABB surveys. When previously disturbed areas are not available, an attempt will be made to place the project site outside of suitable ABB habitat (based on soil types). Surveys and baiting away are also recommended.

Additional conservation measures that are part of the proposed action applicable to both wells and pipelines that will minimize loss of ABBs and its habitat are as follows:

- During clearing the right-of-way of woody vegetation, leave as many stumps in the ground as safely and feasibly allowable.
- Avoid construction of a new staging area/workpad or access road; rather, use an existing staging area and road, or use an area already cleared of trees and shrubs where such areas are available.
- If using an area for the staging area or road previously cleared of woody vegetation, but still has a herbaceous vegetation layer and native soil (not paved, graveled, or *etc*.), avoid grading or dozing the area unless necessary for safety.
- Compact soil only to the extent necessary for safety.
- Replace excavated soils and revegetate completed portions of the project area as soon as feasible.
- Avoid or minimize the use of fertilizers, herbicides, and/or pesticides during the revegetation process.
- Limit vehicle and equipment use on non-road areas to only that which is necessary.
- Use the lightest equipment practical when possible to minimize unnecessary soil compaction.
- Minimize soil disturbance to the greatest extent possible.
- Minimize area of permanent disturbance to the extent possible.
- Restore areas of temporary disturbance to the maximum extent possible and as soon as possible.
- Avoid or minimize contamination of the soil from fluids such as fuel, oil, or other chemicals.

The information above represents the best available data known about the beetle. Thus, because these measures are in place, the proposed action is not likely to jeopardize the continued existence of the ABB. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

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

The reasonable and prudent measures, with their implementing terms and conditions, described below are non-discretionary, and must be undertaken by EPA so that they become binding conditions of General Permits for those oil and gas industry applicants certifying eligibility for the General Permit under this consultation, as appropriate, for the exemption in section 7(o)(2) to apply. These measures are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, all work related to this PBO must cease immediately and this field office must be notified. Notification should be addressed to Field Supervisor, U.S. Fish and Wildlife Service, 222 South Houston, Suite A, Tulsa, Oklahoma, 74127. Such incidental take exceedance represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures. EPA must immediately provide an explanation of the causes of the excess taking and review with the Service the need for possible modification of the reasonable and prudent measures and terms and conditions.

Amount or Extent of Take Anticipated

The amount or extent of take anticipated is difficult to enumerate in the form of individual ABBs. This difficulty is due to multiple factors including a lack of a comprehensive survey effort due to the ABBs large distribution across eastern Oklahoma. Recent survey efforts that are available are limited in scope and geographical range. Some counties have not been surveyed at all recently. Further, as stated above, conducting an accurate population estimate is not feasible due to the biology of the ABB, as well as the lack of surveys or the incompatibilities of survey methods implemented. In addition, the ABB has a small body size making it hard to locate, which makes encountering dead or injured individuals unlikely. Further, ABB losses may be masked by annual fluctuations in numbers and high concentration movements. These complications result in difficulty enumerating or estimating the quantity of ABBs in Oklahoma in order to accurately estimate the amount or extent of take. Consequently, the Service believes using habitat as a surrogate for take is the best method to determine the amount of take that is likely to occur.

As stated previously, approximately 8,184 acres of land will be disturbed annually including new wells, lease roads, and new pipelines (see Table 1 above). Based on this total number of acres impacted by oil and gas related construction activities, the Service anticipates that take of ABB is reasonably certain to occur within 8,184 acres of ABB habitat annually within 33 counties of eastern Oklahoma. The level of take is based on the anticipated impacts to 8,184 acres of ABB habitat from oil and gas construction activities. Take may occur in the form of killing, harming, harassing, and/or wounding.

To proactively address not exceeding the level of incidental take, the Service and EPA have agreed to discuss reinitiation of the PBO when 80 percent of the level of incidental take is reached. This will prevent oil and gas companies from having to cease their operations and allow the Service to re-evaluate incidental take prior to take being exceeded.

Effect of the Take

In this PBO, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species because of reasons stated above. Although take will occur, the Service opines that the benefits from the above conservation measures will assist with conserving the species. No critical habitat has been designated for this species; therefore, none will be affected.

REASONABLE AND PRUDENT MEASURES

The Service believes the following non-discretionary reasonable and prudent measures are necessary and appropriate to minimize take of the ABB.

1. EPA will adherence to Service guidelines when performing surveys, baiting away, trapping and relocating efforts.

2. EPA will monitor and report compliance activities implemented to ensure take is minimized as set forth in the proposed action and terms and conditions below.

3. EPA will Report any death or injured ABBs to the Service.

TERMS AND CONDITIONS

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

The following terms and conditions implement reasonable and prudent measure 1 above:

1.1 All surveys and any trapping and relocation of ABBs must be conducted under the authority of an appropriate section 10(a)(1)(A) permit under the ESA from the Service.

1.2 Survey protocol must adhere to that recommended by the Service.

1.3 Trapping and relocating must adhere to the Service's guidelines. Any relocation site must be coordinated and approved by the Oklahoma Field Office prior to relocation.

1.4 Baiting away must adhere to the Services guidelines.

1.5 The Survey protocol, Baiting Away and Trapping and Relocating guidance, and a list of permittees can be downloaded from <http://ifw2es.fws.gov/oklahoma/beetle1.htm>.

1.6. Although a section 10(a)(1)(A) permit from the Service is not currently required to conduct baiting away activities, a permit for such activities could be required in the future.

1.7 For the purposes of this PBO, survey results are only valid for two years; and trapping and relocating and baiting away procedures are valid for the current active season only.

The following terms and conditions implement reasonable and prudent measure 2 above:

2.1 Submit project level notifications to the Service for oil and gas construction activities requiring coverage under the General Permit prior to project implementation.

2.2 Applicants must submit to the Service a copy of the NOI submitted to EPA to fulfill project level consultation. The Service should receive the NOI no later than when received by EPA. This allows the Service 7 days to comment to EPA any concerns it may has regarding the NOI. These NOIs will be appended to the PBO.

2.3 The NOI notification must be submitted to the Oklahoma Field Office by one of the following methods: via mail - 222 South Houston Ave, Suite A, Tulsa, Oklahoma 74127; via facsimile – (918)581-7458, or via electronic mail – abbcontact@fws.gov.

2.4 The discharge of storm water under the General Permit is not authorized until EPA provides notice to the applicant of eligibility.

2.5 EPA will monitor implementation of the best management practices above. This may include the following: (1) routine inspections of oil and gas construction activities covered by the General Permit in Oklahoma, and (2) reporting to the Oklahoma Ecological Field Services Office, Tulsa, Oklahoma.

2.6 EPA will submit monitoring reports to the Service twice annually describing any inspections conducted, the level of take incurred, and compliance with the PBO. One report is due after the completion of the active season by October 31. The second report is due at the end of the inactive season by June 31.

2.7 Any adverse effects to the ABB observed, but not addressed or considered in the PBO, must be reported to the Service. This report shall be submitted electronically to the Oklahoma Ecological Services Field Office; 222 South Houston, Suite A; Tulsa, OK. Electronic versions can be provided via compact disc or diskette.

2.8 EPA and the Service agree to meet and discuss reinitiation of this PBO when 80 percent of the level of incidental take is reached.

2.9 If take exceeds the level authorized by this opinion during the permit term, EPA will ensure that no further applicants will be eligible for General Permit coverage under this consultation and will inform those applicants covered by the permit and subject to the condition of this consultation at that time that no further take of the ABB is authorized.

The following terms and conditions implement reasonable and prudent measure 3 above:

3.1 If a dead or impaired ABB is found, care should be taken in its handling to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. The dead or impaired ABB should be photographed prior to disturbing it or the site. The Service is to be notified within three (3) calendar days upon locating a dead or injured ABB. Initial notification must be made to the nearest U. S. Fish and

Wildlife Service Law Enforcement Office, at (918) 581-7469, then the Oklahoma Ecological Services Field Office, at (918)581-7458. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Formal written notification also must be submitted (Appendix 3).

3.2 All dead or moribund adults should be salvaged by placing them on cotton in a small cardboard box as soon as possible after collection. The date and location of collection should be included with the container. Specimens should then be furnished to the Sam Noble Museum of Natural History at the University of Oklahoma in Norman for deposition in their collection of invertebrates, or to another suitable site approved by the Service.

CONSERVATION RECOMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. The conservation recommendations listed below are discretionary agency activities to minimize or avoid adverse impacts of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information needed to conserve the species.

1. Conduct research on the ABB to fill data gaps regarding the ecology and biology of the ABB. Data gaps involving the ABB include: suitable reproductive habitat, overwintering habitat, and diurnal active season habitat. The Service recommends coordinating research proposals with the Oklahoma Field Office.

2. Develop and implement educational outreach regarding the ABB, in concert with the Service, to be distributed to companies and agencies of the petroleum industry that conduct business in the ABB's current range in Oklahoma. Outreach efforts could include developing educational pamphlets, conducting survey training, promoting conservation efforts for the ABB, and other such efforts.

3. Conduct surveys for the ABB, in coordination with the Service, above and beyond those surveys required per this PBO.

4. During maintenance, avoid mowing or brush hogging ROWs from mid-May to late August.

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

REINITIATION NOTICE

This concludes formal programmatic consultation on the issuance by EPA of coverage under their General Permit for oil and gas activities greater than 5 acres. 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: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat designate not considered in this opinion; and (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 operations causing such take must cease pending reinitiation of consultation.

/s/ Joy E. Nicholopoulos — 3-21-05

Assistant Regional Director – Ecological Services — Date

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