

**Biological Opinion on Enbridge Pipelines (FSP) L.L.C.'s  
Flanagan South Pipeline Project**

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**Prepared by:  
U.S. Fish and Wildlife Service  
Midwest Regional Office  
Bloomington, Minnesota  
July 24, 2013**



## EXECUTIVE SUMMARY

The action evaluated in this consultation is the construction, maintenance, and operation of Enbridge Pipelines (FSP) L.L.C's (referred to as Enbridge) Flanagan South Pipeline (FS Pipeline). The FS Pipeline is a new 36 inch diameter pipeline that will traverse approximately 593 miles through portions of Illinois, Missouri, Kansas and Oklahoma. It will transport crude oil from the Western Canadian Sedimentary Basin and the Williston Basin in North Dakota to refineries in the Midwest and the U.S. Gulf Coast. The proposed route begins at the Flanagan Terminal located north of the City of Pontiac in Livingston County, Illinois, and terminates at the Cushing Terminal in Cushing, Oklahoma. Initial pipeline capacity will be 600,000 barrels per day.

The proposed FS Pipeline is co-locating Enbridge's existing crude oil Spearhead Pipeline. Mainline pipe construction will take place within the construction ROW, which consists of the permanently maintained 50 foot ROW and temporary workspaces required for construction. Enbridge will use a typical construction ROW limit that is 135 feet wide, which will be reduced to 110 feet wide in emergent wetlands and heavily forested uplands, and to 85 feet wide in scrub/shrub and forested wetlands. The Project will also include the construction of pump stations and valve sites, pipe storage yards, access roads, and contractor yards. All construction is anticipated to commence in August of 2013, with an in-service date of mid-2014. Operation and maintenance (O&M) activities are projected to occur over the next 50 years. More detailed information on construction and O&M activities is provided in the biological opinion.

The U.S. Army Corps of Engineers (Corps) and the Bureau of Indian Affairs (BIA) are proposing to issue permits and easements authorizing the construction of the FS Pipeline. The Corps requested formal consultation on this action for the threatened decurrent false aster (*Boltonia decurrens*) and the endangered Indiana bat (*Myotis sodalis*). The BIA requested formal consultation for the decurrent false aster, the Indiana bat, and the endangered American burying beetle (*Nicrophorus americanus*). No critical habitat will be affected. The agencies collectively evaluated 18 other federally protected species but determined that the construction, operation and maintenance of the FS Pipeline may affect, but are not likely to adversely affect these 18 species. The U.S. Fish and Wildlife Service (Service) concurred with the agency determinations based on the numerous mandatory conservation measures proposed by Enbridge, the Corps, and the BIA.

Detailed information about the current status of the decurrent false aster, American burying beetle, and Indiana bat is included in the biological opinion, along with detailed information about the impacts of the FS Pipeline on these species. The decurrent false aster may occur at one small area where the pipeline crosses the Illinois River. Our analysis indicates that the FS Pipeline would have a negative effect on the decurrent false aster; however, most direct and indirect effects will occur during construction and O&M vegetation management, and they are expected to be small, temporary, and recovery will be rapid.

The FS Pipeline will likely modify a total of 205.5 acres of American burying beetle (ABB) habitat: 115.5 acres of occupied ABB habitat will be disturbed during construction, and 90 acres of habitat in the ABB range will be disturbed during O&M construction activities over the next

50 years. Some ABBs may be disturbed or killed during FS Pipeline construction and related ground disturbance activities, but most of the effects are expected to be infrequent, of short duration, and reversible. Habitat loss will have a negative impact, but 113.4 acres of the total 115.5 acres will be revegetated after the pipeline is constructed, and we expect that ABBs will recolonize these areas. We also expect ABBs to recolonize the 90 acres that may be impacted during O&M activities. In addition, Enbridge has also committed to provide mitigation, which is expected to offset the impact. The ABB population within the action area is likely to be small and not representative of that which is considered most critical to ABB recovery. Therefore, our analysis indicates that the proposed project would have a negative effect on the ABB, but it will not appreciably reduce its survival and recovery.

The proposed action will likely modify 621 acres of Indiana bat habitat and potentially kill 19 non-reproductive or migratory individuals that may be roosting in felled trees during the active Indiana bat season. We also anticipate the loss of two active (i.e., occupied in the summer) maternity roost trees and/or their 100-ft buffer during the inactive season. This will result in harm and harassment of no more than 120 reproductive female Indiana bats. Our analysis, however, indicates that these impacts are not likely to cause maternity colony impacts. We anticipate that the 120 females that may be harmed and harassed will return to hibernacula in the fall, and the potential loss of 19 individuals is not likely to impact the hibernating populations. Because maternity colony and hibernaculum impacts are not anticipated, we do not expect that this Project will result in a loss of fitness at the population level or recovery unit level. In addition, Enbridge has also committed to mitigating the loss of all occupied and presumed occupied Indiana bat habitat. For these reasons, it is unlikely that the anticipated effects from this proposed action will affect the likelihood of achieving the recovery needs of the species, and therefore, is not likely to appreciably reduce the survival and recovery of the Indiana bat.

The Service has concluded that the proposed construction, operation, and maintenance of the FS Pipeline will not jeopardize the continued existence of the decurrent false aster, the American burying beetle, or the Indiana bat. However, the proposed action likely will result in incidental take of American burying beetles and Indiana bats.

The Incidental Take Statement (ITS) issued exempts the Corps, BIA, and Enbridge from the prohibitions of taking under Section 9 of the Endangered Species Act provided that such taking is in compliance with the terms and conditions of the ITS. The BIA is responsible for all Reasonable and Prudent Measures (RPMs) and terms and conditions for the ABB. The Corps is responsible for all RPMs and terms and conditions for the Indiana bat. The Services anticipates that the action will result in the following incidental take: 1) disturbance of 115.5 acres of occupied ABB habitat during pipeline construction; 2) disturbance of no more than 90 acres of ABB habitat throughout the ABB range in Oklahoma and Kansas during O&M activities; 3) the mortality, harm, and harassment of no more than 19 Indiana bats, and 4) the harm and harassment of an additional 120 female Indiana bats through the removal of two active maternity roost trees and/or the 100 ft buffer. The two mandatory RPMs for each species, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. Incidental take will be monitored, and if it is exceeded, the consultation will be reinitiated.

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### List of Acronyms

Act	Endangered Species Act
ABB	American burying beetle
BA	Biological Assessment
BIA	Bureau of Indian Affairs
BO	Biological Opinion
CECP	Construction and Environmental Control Plan
CFR	Code of Federal Regulations
CI	Craft Inspectors
cm	centimeter
CMFO	Columbia Missouri Field Office of the U.S. Fish and Wildlife Service
Corps	U.S. Army Corps of Engineers
CPA	Conservation Priority Areas
CWA	Clean Water Act
dbh	Diameter at breast height
Enbridge	Enbridge Pipelines FSP L.L.C.'s
EI	Environmental Inspectors
EMP	Environmental Mitigation Plan
EPA	Environmental Protection Agency
ETWS	Extra Temporary Work Space
FS Pipeline	Flanagan South Pipeline
ft	feet
GCP	General Conservation Plan
UHDD	Utility-type Horizontal Directional Drill
ITS	Incidental Take Statement
KFO	Kansas Field Office of the U.S. Fish and Wildlife Service
km	kilometer
mi	mile
MOU	Memorandum of Understanding
MP	Mile Post
NPDES	National Pollutant Discharge Elimination System
NLAA	Not Likely Adversely Affect
NLCD	National Land Cover Database
NRCS	Natural Resources Conservation Service
NWP	Nationwide Permit
O&M	Operation and Maintenance
OHWM	Ordinary High Water Mark
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIG	Pipeline Inspection Gauge
RIFO	Rock Island Illinois Field Office of the U.S. Fish and Wildlife Service
RO	Regional Office of the U.S. Fish and Wildlife Service
ROW	Right-of-Way
RPM	Reasonable and Prudent Measures
SCADA	Supervisory Control and Data Acquisition
Service	U.S. Fish and Wildlife Service

TOFO	Tulsa Oklahoma Field Office of the U.S. Fish and Wildlife Service
TWS	Temporary Work Space
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WNS	White Nose Syndrome



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July 24, 2013

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Dear Sirs:

This letter transmits the Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of Enbridge Pipelines FSP L.L.C.'s (Enbridge) proposed construction, operation, and maintenance of the Flanagan South Pipeline, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The Flanagan South Pipeline

(FS Pipeline) is a new crude petroleum pipeline in the States of Illinois, Missouri, Kansas, and Oklahoma. The U.S. Army Corps of Engineers (Corps) originally requested formal consultation on this action for the endangered Indiana bat (*Myotis sodalis*) and the threatened decurrent false aster (*Boltonia decurrens*) by three separate letters, one from each district. The Corps’ St. Louis district letter was dated June 14, 2013, the Kansas City district letter was dated June 17, 2013, and the Rock Island district letter was dated June 18, 2013. The Bureau of Indian Affairs (BIA) originally requested formal consultation on this action for the threatened decurrent false aster (*Boltonia decurrens*), the endangered American burying beetle (*Nicrophorus americanus*), and the endangered Indiana bat (*Myotis sodalis*) by letter dated April 30, 2013. Our BO is based on information provided in the biological assessments (BA), supplemental information from Enbridge, numerous conference calls and coordination meetings, Service investigations in the project area, and other sources of information. A complete administrative record of this consultation is on file at the Service’s Midwest Regional Office (RO), Bloomington, Minnesota.

This BO refers only to the potential effects of the construction, operation, and maintenance of the FS Pipeline on the decurrent false aster, American burying beetle, and the Indiana bat. No Indiana bat critical habitat will be affected by this project, and there is no designated critical habitat for the decurrent false aster or the American burying beetle. Table 1 identifies other federally listed species that may occur within the FS Pipeline Action Area. Enbridge, the Corps, and the BIA have committed to complete numerous conservation measures in the BAs (see summary in Section 1.4). Because these measures will be followed, the Service concurs with the Corps’ and/or BIA’s determinations that construction, operation, and maintenance of the FS Pipeline may affect, but are not likely to adversely affect (NLAA) the federally listed species or critical habitat listed in Table 1. These species will not be discussed further in this BO. No further consultation is necessary for these species unless the FS Pipeline is subsequently modified in a manner that causes an effect to listed species or designated critical habitat, or new information reveals the FS Pipeline may affect listed species or designated critical habitat in a manner or to an extent not previously considered.

**Table 1.** Other federally protected species evaluated for effects.

Species	Federal Status	Critical Habitat in Action Area	Corps’ Effects Determination <sup>1</sup>	BIA’s Effects Determination
Eastern prairie fringed orchid ( <i>Platanthera leucophaea</i> )	T <sup>2</sup>	No	NLAA	NLAA
Western prairie fringed orchid ( <i>Platanthera praeclara</i> )	T	No	NLAA	NLAA
Lakeside daisy ( <i>Tetranneuris herbacea</i> )	T	No	No Effect	NLAA
Mead’s milkweed ( <i>Asclepias meadii</i> )	T	No	NLAA	NLAA
Prairie bush clover ( <i>Lespedeza leptostachya</i> )	T	No	None provided	NLAA

<sup>1</sup> All three Corps districts determinations were combined.

<sup>2</sup> T = Threatened

<b>Species</b>	<b>Federal Status</b>	<b>Critical Habitat in Action Area</b>	<b>Corps' Effects Determination<sup>1</sup></b>	<b>BIA's Effects Determination</b>
Spectaclecase mussel ( <i>Cumberlandia monodonta</i> )	E <sup>3</sup>	No	NLAA	NLAA
Higgins eye pearlymussel ( <i>Lampsilis higginsii</i> )	E	No	NLAA	NLAA
Neosho mucket mussel ( <i>Lampsilis rafinesqueana</i> )	PE <sup>4</sup>	Proposed	NLAA	NLAA
Sheepnose mussel ( <i>Plethobasus cyphus</i> )	E	No	NLAA	NLAA
Fat pocketbook ( <i>Potamilus capax</i> )	E	No	NLAA	NLAA
Rabbitsfoot mussel ( <i>Quadrula cylindrica</i> )	PT <sup>5</sup>	No	NLAA	NLAA
Neosho madtom ( <i>Noturus placidus</i> )	T	No	NLAA	NLAA
Pallid sturgeon ( <i>Scaphirhynchus albus</i> )	E	No	NLAA	NLAA
Topeka shiner ( <i>Notropis topeka</i> )	E	No	NLAA	NLAA
Interior least tern ( <i>Sternula antillarum athalassos</i> )	E	No	NLAA	NLAA
Piping plover ( <i>Charadrius melodus melodus</i> )	T	No	NLAA	NLAA
Whooping crane ( <i>Grus americana</i> )	E	No	NLAA	NLAA
Gray bat ( <i>Myotis grisescens</i> )	E	No	NLAA	NLAA

<sup>3</sup> E = Endangered

<sup>4</sup> PE = Proposed Endangered

<sup>5</sup> PT = Proposed Threatened

## CONSULTATION HISTORY

The Midwest Regional Office Division of Ecological Services in Bloomington, Minnesota, was designated as the lead Service office to conduct the consultation. However, other Service Ecological Services field offices in the four states crossed by the proposed Project were actively involved in review of the Project in their respective states during informal consultation beginning in 2012, and provided input on draft consultation documents throughout the consultation.

- February 6, 2012 Enbridge sent a letter to the Service's Kansas Field Office (KFO) dated February 6, 2012, requesting preliminary review of the Kansas portion of the Flanagan South pipeline project, with particular emphasis on their list of federal status species.
- February 16, 2012 Enbridge sent a letter to the Service's Columbia Missouri Field Office (CMFO) requesting a species list.
- February 23, 2012 Four Corps districts, Enbridge, the Service's Rock Island Illinois Field Office (RIFO), and CMFO had a conference call regarding regulatory requirements and ESA responsibilities.
- February 28, 2012 The KFO sent letter to Enbridge clarifying their species list and providing a point of contact.
- March 8, 2012 The CMFO sent an email to URS informing them of potential Indiana bat presence and need to conduct habitat assessments.
- March 22, 2012 URS, the project consultant, emailed the KFO with questions regarding the need for species surveys. The KFO replied via email on that same date, providing the clarifying information.
- March 28, 2012 The RIFO provided email technical assistance to URS with specific comments regarding the Indiana bat and decurrent false aster.
- May 20, 2012 Service employees from the Tulsa Oklahoma Ecological Services Field Office (TOFO) met with representatives from Bureau of Indian Affairs, Sac & Fox Nation URS, Enbridge, Gomez and Sullivan, and McAfee and Taft (Counsel to Enbridge) to introduce the Flanagan South Pipeline Project.
- July 24, 2012 The TOFO met with Enbridge and URS to discuss American burying beetle ESA compliance relative to removal of avoidance mechanism.
- August 8, 2012 URS submitted draft alignment maps to CMFO.

- September 7, 2012 The Rock Island Corps sent an email to CMFO and RIFO with a list of potentially affected species and associated determination of May Affect - Not Likely to Adversely Affect for all species including the Indiana bat.
- September 24, 2012 The KFO sent a letter to URS summarizing review of the project maps for Kansas. Potential impacts to the American burying beetle were emphasized, as were Migratory Bird Treaty Act and invasive species issues.
- September 26, 2012 The TOFO, Enbridge, and URS had a conference call to discuss section 7 and section 10 timelines under the Act and the Habitat Conservation Plan for the Gulf Coast Segment of the Keystone Pipeline.
- September 27, 2012 The CMFO sent an email to Rock Island Corps indicating non-concurrence with NLAA determination for Indiana bats and that further review of other species was necessary.
- October 3, 2012 RIFO sent an email to Rock Island Corps indicating support for CMFO's non-concurrence with NLAA determination for Indiana bats and the need for further review of other species.
- October 23, 2012 The CMFO, Enbridge, and URS had a conference call to discuss non-concurrence with NLAA determination for Indiana Bats.
- October 25, 2012 There was a meeting/conference call between Regional Office (RO) staff from Region 2-RO, Region 3-RO, and Region 6-RO of the Service, the TOFO, Enbridge, and URS to discuss project overview, Corps permits, BMPs, and American burying beetle surveys. There was also another conference call between CMFO and URS to discuss basic project information.
- November 1, 2012 The CMFO and URS had a conference call to discuss pump stations and ROW.
- November 5, 2012 BEACON Environmental Assistance Corporation provided the KFO with results of its American burying beetle survey along the Kansas portion of the alignment, including their data sheets. URS provided the TOFO with results of its American Burying Beetle survey along the Oklahoma portion of the alignment, including their data sheets. There was also an email from URS to CMFO transmitting shapefiles for pump stations for Service review relative to impacts to Indiana bat. URS gave notice that habitat assessments for the Indiana bat would be started soon.
- November 8, 2012 The CMFO and URS exchanged emails regarding the Indiana Bat Habitat Assessment Form.

- November 30, 2012 URS sent the KFO its Species of Concern Report on the project. There was also a conference call between CMFO and URS regarding potential Indiana bat impacts, and URS transmitted three volumes of Species of Concern reports to CMFO via email.
- December 4, 2012 The CMFO sent an email to URS regarding forested stands designated as potential Indiana bat habitat. CMFO made recommendations for additional forested stands that should be reviewed for potential Indiana bat habitat.
- December 6, 2012 The Region 3-RO met with Enbridge and URS to introduce project and discuss Indiana Bat and American burying beetle.
- December 11, 2012 Enbridge sent a letter to four Corps districts, with cc: to Service Region 3 RO, updating Corps on project status and ongoing review of potential impacts to Indiana bats.
- December 12, 2012 The KFO replied on to the URS Species of Concern Report with minor amendments and with a report that the KDWPT had successfully located the American burying beetle along the proposed alignment. The KFO also sent a letter to BEACON, questioning their negative survey results for the American burying beetle, and pointing out the surveys were conducted outside of Service survey parameters. BEACON provided responses and clarification regarding weather parameters.
- December 13, 2012 The TOFO provided response to the 2012 American burying beetle surveys that many were not valid surveys due to weather temperatures being too low and the end of the active season. BEACON provided a response to weather temperature parameters.
- December 18, 2012 The Region 3-RO met with Enbridge and URS to provide technical assistance on the Biological Assessment (BA) development.
- December 20, 2012 Four Corps districts, Region 3-RO, and Enbridge had a conference call to discuss the ongoing section 7 consultation.
- January 9, 2013 The Region 3-RO, Enbridge, and URS had a conference call for technical assistance on BA development and impacts analysis.
- January 11, 2013 The Region 3-RO, Enbridge, and URS had a conference call for technical assistance on BA development and impacts analysis.
- January 16 -17, 2013 There was a meeting/conference call at URS St. Louis office, Region 3-RO, RIFO, CMFO, Enbridge, and URS to introduce project and obtain technical assistance on BA preparation.

- January 22, 2013 The Region 3-RO and Enbridge had a conference call to discuss conservation measures and consultation.
- January – July, 2013 There were regular weekly conference calls with the Service, Enbridge, and URS to coordinate on the Project, BA, and consultation.
- January – June, 2013 Many emails were exchanged between Enbridge, URS, and the Service with technical assistance questions for the BA, route revisions, species data and analysis, conservation measures, and information to be used in the Service’s Habitat Equivalency Analysis (HEA) to inform mitigation estimates.
- February 6, 2013 Enbridge emailed the Service a draft BA and appendices for early review and comment. There was also a meeting with Region 3-RO and Enbridge to discuss the permit areas for the Corps, Indiana bat conservation measures, and Indiana bat habitat assessments.
- February 14, 2013 The Region 3-RO and the Corps had a conference call to discuss the consultation process and timeline.
- February 22, 2013 The Service emailed Enbridge with comments on the draft BA.
- March 5, 2013 Enbridge emailed the Service a document intended to clarify the Service’s comments on the Indiana bat section of the BA.
- March 6, 2013 The Service emailed Enbridge additional comments on the BA.
- March 11, 2013 The Region 3-RO, CMFO, RIFO, Enbridge, and URS had a conference call to discuss Indiana bat conservation measures.
- March 15, 2013 The Region 3-RO, TOFO, and BIA had a conference call to discuss the consultation process and timeline.
- April 12, 2013 Enbridge emailed the Service a draft Indiana bat survey plan.
- April 30, 2013 The BIA submitted the Biological Assessment and request for concurrence with the BA’s effect determinations and initiation of formal consultation for the decurrent false aster, American burying beetle, and Indiana bat.
- May-July, 2013 There were multiple email exchanges between the Service, Enbridge, URS, and West (Enbridge’s Indiana bat surveyor) with species survey updates.
- May 15, 2013 The Service emailed recommendations for Indiana bat conservation measures to Enbridge.

- May 16, 2013 The Service, Corps, Enbridge, and URS had a conference call/webinar to discuss the Indiana bat analysis for the Project.
- May 20, 2013 Enbridge sent the Service an email with supplemental information on utility-type horizontal directional drill (UHDD) for the BA and questions and clarifications for the Service's recommended conservation measures for Indiana bats.
- May 22, 2013 The Service sent Enbridge an email with a written response to Enbridge's questions about the Service's recommended Indiana bat conservation measures.
- May 23, 2013 The Region 3-RO met with Enbridge to discuss the HEA and recommended mitigation for the Project.
- May 28, 2013 Enbridge sent the Service an email with the final Indiana bat conservation measures.
- June 3, 2013 The Service emailed Enbridge the full list of conservation measures as written in the draft biological opinion for review.
- June 4, 2013 Enbridge sent the Service an email with two memos from URS as response to the Service's HEA and proposed mitigation ratios.
- June 6, 2013 There was a meeting and conference call between the Region 3-RO, Enbridge, and URS to discuss the HEA and the Service's recommended mitigation ratios.
- June 12, 2013 Enbridge sent the Service an email confirming the Conservation Measures in Section 1.4 below are correct.
- June 13, 2013 The Service sent BIA a letter acknowledging initiation of formal consultation and providing a timeline.
- June 14-21, 2013 The Service sent an email to Enbridge with the draft MOU for the mitigation agreement for the Project. Multiple emails followed between Enbridge and the Service with edits on the draft MOU.
- June 18, 2013 The Corps (Kansas City) emailed the Service and attached three letters requesting initiation of formal consultation for the Project from the Corps' Kansas City District, the St. Louis District, and the Rock Island District. ESA crossing spreadsheets were also attached. Hard copies of the letters and spreadsheets were sent to the Region 3-RO, CMFO, KFO, TOFO, and RIFO along with a BA and a BA supplement.

July 20, 2013

Enbridge provided a final Indiana bat impact acreage table via email to the Region 3-RO.

## **BIOLOGICAL OPINION**

### **1 DESCRIPTION OF PROPOSED ACTION**

The Federal actions evaluated in this biological opinion (BO) are the issuance of permits and easements by the U.S. Army Corps of Engineers (Corps) and the Bureau of Indian Affairs (BIA) to authorize the construction of Enbridge Pipelines (FSP) L.L.C's (referred to as Enbridge) Flanagan South Pipeline (FS Pipeline) (see Section 1.1). The new pipeline will traverse approximately 593 miles through portions of Illinois, Missouri, Kansas and Oklahoma (Figure 1). It will transport crude oil from the Western Canadian Sedimentary Basin and the Williston Basin in North Dakota to refineries in the Midwest and the U.S. Gulf Coast, (via interconnections at Cushing, OK).

The Service is issuing this BO pursuant to Section 7 of the Endangered Species Act of 1973. Direct and indirect effects of Federal actions and their interrelated or interdependent activities are analyzed to ensure they are not likely to jeopardize the continued existence of federally listed or proposed endangered or threatened species. Indirect effects of the Federal actions include, "...effects that are caused by or result from the action, are later in time but are reasonably certain to occur..." Interdependent actions have no independent utility apart from the proposed action, and interrelated actions are part of a larger action and depend on the larger action for their justification (50 CFR §402.02). The Federal actions will result in the construction, operation, and maintenance of the FS Pipeline. Therefore, the focus of this BO is the effects of the FS Pipeline (Project), including all preconstruction, construction, operation, and maintenance activities associated therewith, regardless of permit jurisdiction or land ownership.

#### **1.1 Federal Actions**

##### **1.1.1 U.S. Army Corps of Engineers' Actions**

The Corps is responsible for issuance of permits to discharge dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the Clean Water Act (CWA) (33 USC § 1344; 33 CFR 320-332). Enbridge has applied for 404 permits for the construction of the FS Pipeline at wetland and waterbody crossings throughout the pipeline from Illinois to Oklahoma. As described in the letters initiating consultation from the Corps' St. Louis, Kansas City, and Rock Island districts, the accompanying biological assessment (BA), and ESA crossings documents (USACE 2013), the Corps proposes to verify approximately 1,950 Nationwide Permits (NWP) under NWP 12, Utility Line Activities. These permits will also cover the Corps' permit authorities pursuant to Section 10 of the Rivers and Harbors Act of 1899, for work in or affecting navigable waters of the U.S. (33 USC § 403; 33 CFR 320-332). In addition to the NWPs, the Corps, under Army Regulation 405-80 (Management of Title and Granting Use of Real Property), requires real estate instruments, 30-year leases, easements for permanent right-of-way, and temporary construction easements for construction access where the project crosses government fee property. The Corps proposes to issue Enbridge easements where the FS Pipeline crosses the Corps' lands on the Mississippi River, IL/MO and the Arkansas River, OK. The Corps' permit areas will include the jurisdictional waters of the United States where pipeline route and access road crossing construction require permits. The permit area extends from these

**Figure 1.** Location of Enbridge’s Flanagan South pipeline from Pontiac, Illinois to Cushing, Oklahoma.



jurisdictional waters in either direction from the crossing to a point at which alternative alignments leading to reasonable alternative locations for the crossing can be considered and evaluated. The Corps provided the permit areas within the Rock Island, St. Louis, and Kansas City Districts with their letters requesting initiation of formal consultation. Permitted areas within the Tulsa District were not provided, but additional NWP’s will be issued within the Tulsa District. The Corps has stated that their statutory authority is limited to the permit areas of nationwide permit actions and the easements.

### 1.1.2 Bureau of Indian Affairs’ Actions

The BIA is responsible for granting right-of-way over Indian land. The proposed FS Pipeline route crosses 34 trust or restricted tracts of land under BIA’s jurisdiction (“BIA Managed Tracts”), comprising approximately 13.6 miles of the FS Pipeline corridor. These tracts are

located within a three-county area comprised of Osage, Pawnee, and Payne Counties in Oklahoma. Thirty-one of the BIA Managed Tracts are within the territorial jurisdiction of the Osage Nation, and the remaining three are within the territorial jurisdiction of the Sac and Fox Nation. The BIA proposes to grant temporary and permanent easements for the proposed pipeline through these 34 tracts listed in Table 1-1 of the BA (BIA 2013).

## **1.2 Action Area**

Service regulations define “Action Area” as all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR §402.02). Because there may be indirect effects from the Federal actions included in the consultation that occur outside of the geographic area of the proposed action as described by the action agency, the Action Area of the biological opinion may not be the same as the actual geographic area of the proposed action.

As described above, the Federal actions will result in the construction, operation, and maintenance of the FS Pipeline. Although the Corps and BIA each have their own permit and easement areas (described above), the construction, maintenance, and operation of the pipeline will result in direct effects and indirect effects throughout the entire pipeline. Therefore, the Action Area for this consultation is the entire 593 mile length of the FS Pipeline, including the permanent right-of-way (ROW), temporary ROW, extra temporary work spaces, access roads, pipe yards, aboveground facilities (e.g. mainline valves and pump stations), contractor yards, and a buffer distance of 3,280 feet (ft) [1 kilometer (km)] around all of these areas. The 3,280-ft buffer distance is used to incorporate all potential effects of the project to Indiana bats as described in Section 4.2.2.

In general, the planned FS Pipeline route starts at the Flanagan Terminal located north of the City of Pontiac in Livingston County, Illinois, crosses portions of Illinois, Missouri, Kansas, and Oklahoma, and terminates at the Cushing Terminal in Cushing, Oklahoma (Figure 1). The majority of the FS Pipeline will occur on private land, but it will cross approximately 18 miles of federal land and approximately 5 miles of state-owned land. The FS Pipeline route is mostly rural with agriculture as the primary land use; residential development is limited. Land use was classified using both the U.S. Geological Service’s (USGS) National Land Cover Database (NLCD) and field surveys. The proposed FS Pipeline will cross 396.6 miles of agricultural land (67%), 85.2 miles of forested lands (14%), 67.7 miles of grassland/herbaceous areas (11%), 27.7 miles of developed land (5%), 10.1 miles of wetlands (2%), and the remaining 1% will cross open water, shrub/scrub land, and barren land. Overall, agricultural land is the primary category in all states followed by forested land in Illinois, Missouri, and Kansas (15.0, 26.2, and 14.4 miles, respectively), and grasslands in Oklahoma (47.1 miles). Oklahoma portions also cross about 29.6 miles of forested habitat, and Kansas portions cross about 13 miles of grassland habitat.

## **1.3 Description of the Flanagan South Pipeline**

The FS Pipeline is a new 36 inch diameter pipeline that will increase the crude petroleum transportation capacity for the growing crude oil supply from the Western Canadian Sedimentary

Basin and the Williston Basin in North Dakota to refineries in the Midwest and the U.S. Gulf Coast (via existing interconnections at the Cushing, OK terminal). Initial capacity will be 600,000 barrels per day. The Project is co-locating Enbridge's existing crude oil Spearhead Pipeline (completed in the early 1950s), running parallel to and, where possible, using the existing ROW of the Spearhead Pipeline. Co-location of the FS Pipeline with the existing Spearhead Pipeline and other utility ROWs was not possible in all areas, which will result in habitat fragmentation in some new areas (approximately 15 percent of the pipeline route). Mainline pipe construction will take place within the construction ROW, which consists of the permanently maintained ROW and temporary workspaces required for construction. In addition to mainline pipe construction, the Project will also include seven pump stations and valve sites, pipe storage yards, access roads, and contractor yards. All construction is anticipated to commence in August of 2013, with an in-service date of mid-2014.

### **1.3.1 Construction Activities**

Construction activities are further detailed in both BAs (USACE 2013; BIA 2013) and are incorporated by reference. Enbridge follows standard pipeline construction activities detailed in Appendix D of the BAs and their Construction and Environmental Control Plan (CECP) detailed in Appendix C of the BAs, which includes an Enbridge's project specific Environmental Mitigation Plan (EMP).

Pipeline construction generally proceeds as a moving assembly line and includes survey and staking of the ROW, clearing and grading, pipe stringing, bending, trenching, welding, lowering in, backfilling, hydrostatic testing, and cleanup. In addition to these standard construction methods, special construction techniques like utility-type horizontal directional drilling (UHDD) would be used where selected by site-specific conditions, such as larger surface water features and associated wetlands, and paved roads, highways, and railroads.

Construction activities include those that require grading, excavation, or other forms of earth disturbing activities in order to construct, replace, inspect, and maintain facilities. These activities include: 1) general pipeline construction, 2) general appurtenance and cathodic protection construction, 3) pump-related facility construction, 4) communication facility construction, and 5) access road construction. Construction activities include the following sub-activities:

1. Vehicle Operation and Foot Traffic;
2. Clearing - herbaceous vegetation and ground cover, trees and shrubs, tree side trimming by bucket truck or helicopter;
3. Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking, brush pile burning;
4. Grading - topsoil stripping, installing erosion control devices;
5. Trenching - digging, blasting, dewatering;
6. Pipe Stringing and backfilling - bending, welding, coating, padding and backfilling;
7. Hydrostatic Testing -water withdrawal and discharge;
8. Regrading and Stabilization - restoration of corridor;
9. Pump Station Facility;

10. Communication Facility;
11. Access Roads - upgrading existing roads, new roads temporary and permanent - grading, graveling, culvert installation;
12. Stream Crossings - wet ditch, dry ditch, steel dam and flumed crossing, dam and pump, UHDD;
13. Stream Equipment Crossing Structures; and
14. Crossings, wetlands and other (non-riparian) water bodies - UHDD and Horizontal bore.

Enbridge currently plans to construct the entire pipeline Project in four construction spreads between Mileposts (MPs) as follows: (Spread 1 MP 0-171, Spread 2 MP 171-292, Spread 3 MP 292-391, and Spread 4 MP 391-593). Spread clearing is planned to begin August 7, 2013, and it is anticipated that approximately 6,300 ft of ROW will be cleared per day. Normal construction activities will be conducted during daylight hours with the following exceptions: 1) critical tie-ins on the ROW, 2) UHDD operations where work may occur continuously, and 3) other unanticipated activities due to weather conditions, safety, or other project requirements.

### Rights-of-Way

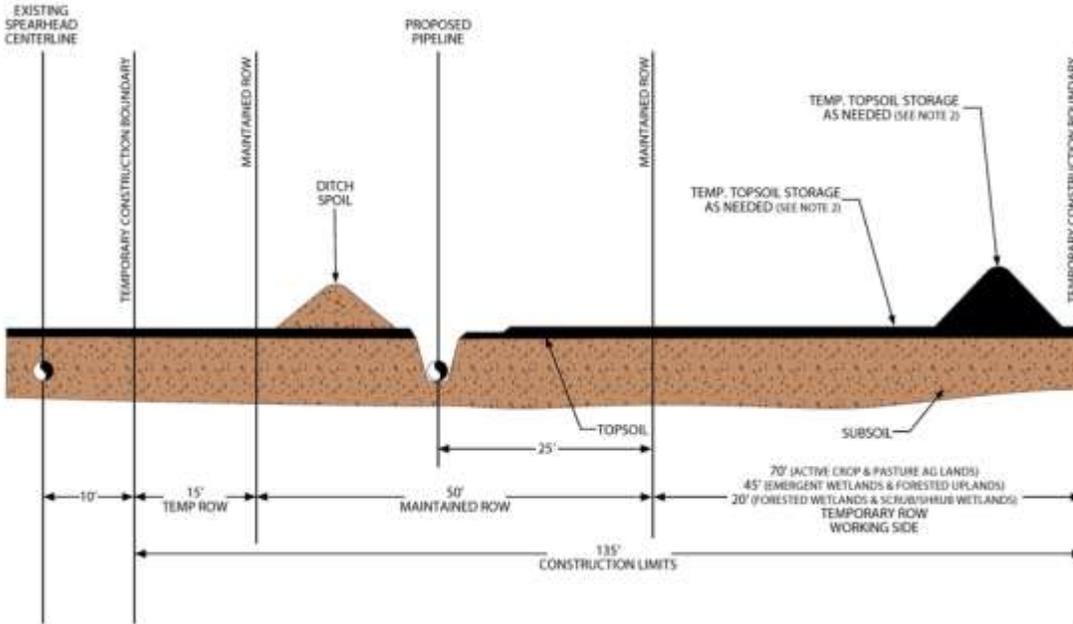
The construction ROW is comprised of the permanently-maintained ROW, temporary workspace (TWS) and extra temporary workspace (ETWS). Enbridge will use a typical construction ROW limit that is 135 feet wide, typically including 85 feet of TWS (Figure 2). The typical construction limit will be reduced to 110 feet wide in emergent wetlands and heavily forested uplands, and to 85 feet wide in scrub/shrub and forested wetlands. TWS will be limited to 85 feet wide in non-forested uplands, 60 feet wide in emergent wetlands and heavily forested uplands, and 35 feet wide in scrub/shrub and forested wetlands. The permanently-maintained ROW is required for pipeline inspection, operation and maintenance (O&M); it will be 50 ft in width centered over the pipeline. Temporary and permanent easements will be acquired for all of these areas.

In general, the entire mainline ROW will undergo disturbance ranging from minor grading and construction trafficking to trench excavation. The TWS will experience temporary disturbance and the majority will be replanted with seed mixes developed in consultation with the Natural Resources Conservation Service (NRCS) and other agencies during the restoration process and allowed to naturally revegetate from existing seed bank sources, stumps, root, and advance sprouting of woody species<sup>6</sup>. The 50-ft permanent ROW will be established and maintained upon completion of construction and during operation. Woody vegetation along the pipeline permanently maintained ROW will be removed and brush and saplings periodically cleared. Herbicide application may be required and would be applied by hand or from a vehicle if needed. Enbridge will use mechanical mowing, cutting, or brush clearing for normal vegetation maintenance as needed (approximately every 3 to 5 years) to prevent trees from growing and ground cover from getting excessively high, which eventually makes the ROW undistinguishable and difficult to traverse. Where the FS Pipeline is co-located with the Spearhead Pipeline, the FS

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<sup>6</sup> Note: this is not the same as described in the BAs where it specifically states that “Most of the construction ROW will experience temporary disturbance and will be restored to the pre-construction conditions during the restoration process”. We later learned that Enbridge was not replanting trees in forested areas.

**Figure 2.** Typical ROW Cross Section.



PROFILE

NOTES:

1. CONSTRUCTION LIMIT WILL TYPICALLY BE 135' WIDE. THE CONSTRUCTION LIMIT WILL BE REDUCED TO 110' IN EMERGENT WETLANDS, AND 85' IN SCRUB/SHRUB AND FORESTED WETLANDS. TEMPORARY WORKSPACE WILL BE 85' IN UPLANDS, 60' IN EMERGENT WETLANDS AND FORESTED UPLANDS, AND 35' IN SCRUB/SHRUB AND FORESTED WETLANDS, CONFIGURED AS SHOWN.
2. THIS DRAWING REFLECTS DITCH ONLY TOPSOIL STRIPPING PROCEDURE WHICH WILL BE USED IN WETLANDS. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY COMPANY. OTHER TOPSOIL STRIPPING PROCEDURES WILL BE USED IN AREAS AS DESCRIBED IN THE EMP.

Pipeline will typically be offset 50 feet from the Spearhead Pipeline, resulting in an increase of the total permanently maintained ROW of 50 feet in width.

The entire construction ROW will be cleared of vegetation and obstacles, including areas above the UHDDs. In agricultural lands, full ROW topsoil stripping will be implemented, and in forested areas, ditch plus spoil topsoil stripping will be implemented. Temporary erosion control measures such as silt fence or straw bales will be installed prior to or immediately after vegetation removal along slopes leading to wetlands and riparian areas. Grading would be conducted where necessary to provide a reasonably level work surface. Where the ground is relatively flat and does not require grading, rootstock would be left in the ground. More extensive grading would be required in steep side slopes or vertical areas and where necessary to safely construct the pipe along ROW.

The majority of the pipeline will be placed into an excavated trench. Typically, the trench would be 8 to 12 feet deep and 8 to 10 feet wide in stable soils. The depth of cover for the pipeline

would be a minimum of 48 inches. The trench width after top soiling in stable soils where sloping is not required will typically be approximately 12 feet at the top of the trench.

Enbridge plans to use the UHDD method of construction for several stream/river crossings listed in the BAs (BIA 2013; USACE 2013). Installation of a pipeline by UHDD is generally accomplished in three stages. The first stage consists of directionally drilling a small diameter pilot hole along a designed path. The second stage involves enlarging the pilot hole to a diameter that will accommodate the pipeline through numerous “reaming” passes. The third stage involves pulling the pipeline through the enlarged hole. Throughout the process of drilling and enlarging the hole, bentonite slurry is utilized as a drilling mud and circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the hole open. Spoil from reaming will be stored away from the site, within the construction work area and/or ETWS. The spoil and bentonite mud from drilling activities will either be spread in upland areas within the permanent ROW or TWS, or will be disposed of in accordance with applicable environmental regulations.

Land use acreages (using field survey and 2006 NLCD data) that would be affected by FS Pipeline construction, operation, and maintenance provided in the BAs (BIA 2013; USACE 2013; Table 2.3.3.1-1). Temporary impacts of the proposed Project would affect 24.7 acres of open water, 195.6 acres of developed land, 0.8 acres of barren land, 623.3 acres of forest, 5.9 acres of shrub/scrub land, 664.2 acres of grassland/herbaceous areas, 3,928.8 acres of agricultural land, and 61.1 acres of wetlands for a total temporary disturbance of 5,504.4 acres. Permanent impacts of the proposed Project would affect 30.0 acres of open water, 163.8 acres of developed land, 0.5 acre of barren land, 477.9 acres of forest, 4.5 acres of shrub/scrub land, 432.1 acres of grassland/herbaceous areas, 2,406.6 acres of agricultural land, and 62.3 acres of wetlands for a total permanent disturbance of 3,577.8 acres.

#### Extra Temporary Workspace

The use of ETWS would be needed at various locations along the construction ROW to allow for construction equipment assembly, turnarounds, hydrostatic test water withdrawals and discharges, UHDD crossings, level workspaces in areas with steep slopes, and feature crossings such as roads, railroads, buried features, wetlands and waterbodies, and residential areas. The ETWS areas are generally located immediately adjacent to the construction ROW and consist of rectangles that vary in shape but typically range from 100 feet by 200 feet to 200 feet by 200 feet, depending on the space needed for the specific construction technique. The total acreage of ETWS will be approximately 1,409.2 acres. The proposed ETWS would be used only during construction of the FS Pipeline. The ETWS would be cleared similar to the construction ROW and UHDD workspaces described above. The majority of the ETWS will be replanted with seed mixes developed in consultation with the NRCS and other agencies during the restoration process and allowed to naturally revegetate from existing seed bank sources, stump, root, and advance sprouting of woody species<sup>7</sup>. Land uses (using field survey data and 2006 NLCD data) at ETWS locations are summarized by county in the BAs (BIA 2013; USACE 2013; Table

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<sup>7</sup> Note: this is not the same as described in the BAs where it specifically states that “Once complete, these areas would be returned to pre-Project conditions to the extent feasible”. We later learned that Enbridge was not replanting trees in forested areas.

2.3.3.2-1). Approximately 1,409.2 acres of land will be disturbed for ETWS, the majority of which is agricultural (843.4 acres).

#### Access Roads

The FS Pipeline would use public and existing private roads wherever possible to gain access to most of the construction ROW. Paved roads are not likely to require improvement or maintenance prior to or during construction. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Road improvements such as blading and filling would generally be restricted to the existing road footprint, and widening of roads may also be required in some areas. A total of 67.8 miles of access roads are anticipated for the FS Pipeline, 7.1 miles or 10.5 percent of that length would be newly constructed. The majority of new temporary access roads are planned to be located in non-forested areas, and no tree clearing is anticipated in these locations. Clearing of brush and tall grass from these areas will consist of mowing and/or brush hogging. Gravel will then be placed to create the temporary access road to the construction ROW. Land uses at newly constructed roads account for approximately 43.3 acres of disturbance, assuming a road width of 50 feet (see Table 2.3.3.3-1 in the BAs in the BAs; BIA 2013; USACE 2013). The majority of newly constructed access roads are located in agricultural areas (36.4 acres or 84 percent of the total disturbance). Following construction, these areas will be replanted with seed mixes developed in consultation with the NRCS and other agencies during the restoration process and allowed to naturally revegetate from existing seed bank sources, stump, root, and advance sprouting of woody species.

#### Pipe Storage Yards

Eleven pipe storage yards will be constructed. These are designed to hold or store sections of pipe and materials, located at somewhat regular intervals along the proposed pipeline to facilitate construction. At this time, Enbridge has identified three pipe storage yard locations in Illinois, four in Missouri, two in Kansas and two in Oklahoma. These yards are mainly located in agricultural fields adjacent to county or local roads, which contain no forested areas. Pipe storage yards are prepared by stripping the topsoil from newly created access roads used to access and maneuver within the pipe storage yard area. The stripped topsoil is used to create berms to hold the pipe until it is ready to be used in the FS Pipeline. Gravel is placed on the access roads within the storage yard. A culvert and gravel are installed for the access road coming into the storage yard. The pipe storage yards will be used only during the construction of the FS Pipeline. Once the pipeline is completed, the gravel and culvert would be removed, and the topsoil would be replaced. The vast majority of the 185.6 acres of land disturbance associated with the pipe storage yards is agricultural (179.9 acres or 97 percent) (see Table 2.3.3.4-1 in the BAs; BIA 2013; USACE 2013).

#### Aboveground Facilities

Aboveground facilities required for the FS Pipeline include seven pump stations and 57 mainline valves. Footprint areas associated with the pump stations and mainline valves in the BAs were approximate because site layouts were not complete at the time. These facilities require approximately 105.6 acres (approximately 103 acres for the pump station sites and

approximately 2.6 acres for the mainline valve sites), including access roads. Clearing of these areas is similar to construction ROW and UHDD workspaces described above.

Mainline valve installation involves a 50-foot by 50-foot area surrounded by chain-link fencing, and the area within covered with crushed stone. Infrastructure within the mainline valve fenced area includes the valve stem, actuation cabinet and control cabinet. Each of the mainline valves that would not be within the fence line of a proposed pump station site would be within the permanently maintained ROW. Pump station sites will include permanent components of the pipeline inspection gauge (pig) launcher and pig receiver facilities. The vast majority of the 105.6 acres of land disturbance associated with the aboveground facilities is agricultural (84.9 acres or 80 percent) (see Table 2.3.3.5-2, Table 2.3.3.5-3, and in the BAs; BIA 2013; USACE 2013).

### Contractor Yards and Field Offices

Ten to 11 contractor yards/field offices would be located along the pipeline route at somewhat regular intervals as needed for use during construction of the FS Pipeline. They would be designed and used to store contractor equipment, material and supplies for construction of the Project. All contractor yard locations are located in existing industrial or agricultural land use areas. No clearing of forested areas is anticipated for these areas. As needed, preparation of these areas will consist of placing gravel at the surface to create a working surface for staging of equipment, materials and supplies. The proposed contractor yards would be used only during the construction of the proposed FS Pipeline. Once the Project is completed, these areas would be returned to preconstruction conditions. The vast majority of the 213.1 acres of land disturbance associated with the Contractor Yards and Field Offices is agricultural (206.1 acres or 97 percent) (See the new table in the BAs; BIA 2013; USACE 2013).

### Hydrostatic Testing

Hydrostatic testing will be performed on the pipeline during construction to test the pipeline's integrity. The primary and alternate withdrawal and discharge locations proposed for the Project are included in the BAs (USACE 2013; BIA 2013). Hydrostatic testing involves filling the new pipeline segments with water acquired in accordance with applicable permits, raising the internal pressure level, and holding that pressure for a specific period of time per U.S. Department of Transportation (USDOT) specifications. Pre-built sections will also be hydrostatically tested prior to installation at streams requiring the UHDD crossing method.

### **1.3.2 Operation and Maintenance Activities**

Operation and maintenance (O&M) includes activities conducted daily or routinely to keep the system operating efficiently and safely. These are further detailed in both BAs (Corps 2013; BIA 2013) and are incorporated by reference. O&M activities consist of the physical operation and the required maintenance, monitoring, and inspection of the facilities, including vegetation maintenance, pipeline and appurtenant facility operation, maintenance, monitoring and inspection, access road O&M, cathodic protection O&M, and facility and inspection activities. These activities are limited to the FS Pipeline permanent ROW, appurtenant facilities, and access

roads. O&M activities do not include facilities abandonment because there are no plans to abandon the pipeline and facilities at this time. We assume the proposed FS Pipeline will be operated and maintained for the next 50 years.

The FS Pipeline's facilities would be maintained in accordance with 49 CFR 194, 49 CFR 195, Project-specific special conditions recommended by USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) and agreed to by Enbridge, and other applicable federal and state regulations. Operation and maintenance of the pipeline system would be accomplished by Enbridge personnel. Additionally, the pipeline would be monitored 24 hours a day, 365 days a year from the Enbridge oil control center (located in Calgary, Canada) using leak detection and supervisory control and data acquisition (SCADA) systems.

Operation and Maintenance activities include the following sub-activities and related impacts:

1. Facilities - vehicles, foot traffic, noise, communication facilities;
2. Inspection Activities - ground and aerial;
3. Vegetation Management - mowing, chainsaw use and tree clearing, use of herbicides by hand or vehicle mounted application, dragging, chipping, hauling, piling, stacking, tree side trimming by bucket truck or helicopter, brush pile burning;
4. ROW repair, regrading, revegetation - hand, mechanical, in-stream stabilization and/or fill;
5. Access Road Maintenance - grading, graveling, culvert replacement;
6. General Appurtenance and Cathodic Protection Construction - ROW Clearing, trenching, anode, bell hole within the permanent ROW.

To maintain accessibility of the permanently maintained ROW and to accommodate pipeline integrity surveys, vegetation management will be performed to ensure the ROW is distinguishable at ground level, the pipeline markers can be seen, and the ROW route and ground surface can be seen by aerial patrol pilots. Woody vegetation along the pipeline permanently maintained ROW will be removed and brush and saplings periodically cleared. Herbicide application may be required and would be applied by hand or from a vehicle (not aerially) if needed. Enbridge will use mechanical mowing, cutting (i.e., limb trimming), or brush clearing (i.e., brushing) along its permanent easement for normal vegetation maintenance as needed (approximately every 3-5 years for the next 50 years). Areas will periodically be mowed to prevent trees from growing and ground cover from getting excessively high, which eventually makes the ROW undistinguishable and difficult to traverse.

The pipeline inspection activities will consist of direct observation methods, including aerial patrols, and ground patrols. These surveillance activities would provide information on possible encroachments of nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline. In addition, personnel will drive to pump stations and mainline valves periodically to perform maintenance on these facilities.

Gravel roads and dirt roads may require maintenance to maintain access to the FS Pipeline. Road improvements such as blading and filling will generally be restricted to the existing road footprint, although widening of roads may also be required in some areas.

Enbridge will consult with the Service for pipeline replacement projects that have impacts outside of the permanent ROW.

#### **1.4 Conservation Measures**

Conservation measures are actions that benefit or promote the recovery of a listed species that a Federal agency includes as an integral part of its proposed action and that are intended to avoid, minimize or compensate for potential adverse effects of the action on the listed species. These measures are synthesized from the BAs. Enbridge has committed to follow all of these conservation measures as written below through early review of this biological opinion (confirmed via email sent from Enbridge's Adam Vehe to the Service's Karen Herrington on 6/12/13). As such, these measures are mandatory.

##### **1.4.1 General Conservation Measures**

1. Routing efforts avoided sensitive species and habitats where Enbridge determined this was possible. The route was sited primarily in agricultural lands to reduce impacts on sensitive species and habitat, including protected species.
2. The Project route was co-located with the Spearhead Pipeline ROW to parallel that pipeline route and thus minimize environmental disturbance and fragmentation.
3. Enbridge will reduce the typical ROW width from 135 feet to 110 feet in upland forest areas, emergent wetlands, and all waterways. The ROW will be reduced to 85 feet in scrub-shrub and forested wetlands and waterways with these adjacent wetland types. The permanently maintained ROW will be 50 feet in width. This neck down in wooded habitat areas should reduce potential impact to the protected species by preserving as much wooded habitat areas as possible.
4. Enbridge's CECP (Appendix C of the BAs) will be implemented during Project construction. The CECP outlines construction-related environmental policies, procedures, and mitigation measures developed based on Enbridge's experience implementing conservation measures during construction. The EMP, which is a component of the CECP, is intended to meet or exceed applicable federal, state, and local environmental protection specifications and practices. The EMP is designed to address typical circumstances and may be amended by Enbridge as necessary to address site-specific conditions. As applicable, measures within the EMP will minimize impacts on protected species.
5. Enbridge will employ Environmental Inspectors (EIs) and Craft Inspectors (CIs) during construction. The EIs and CIs will be responsible for observing construction activities to verify that work is proceeding in accordance with environmental permit requirements and to monitor the implementations of the CECP, EMP, and conservation measures specific to protected species.

6. Enbridge provides construction contractor orientation prior to construction. This orientation includes construction contractor training on Project environmental permit requirements and CECP documents. In accordance with Enbridge contract requirements, all contractors are required to follow all applicable permits, Project documents, and regulations. The contractors will receive copies of these documents prior to the start of construction or O&M activity.
7. As described in the Spill Prevention, Containment and Control Plan (in Appendix C, CECP), staging areas for equipment, fuel, materials, and personnel should be at least 100 feet from wetlands, streams and waterbodies (including drainage ditches), and water supply wells, if possible, to reduce the potential for sediment and hazardous spills entering these areas. If sufficient space is not available, a shorter distance can be used, with additional control measures (e.g., redundant spill containment structures, on-site staging of spill containment/clean-up equipment and materials).
8. Where UHDD methods will be used for the Project, the use of the UHDD methods and implementation of the Drilling Fluid Response, Containment and Notification Plan (in Appendix C, CECP) will help reduce surface disturbance potential and minimize impacts to protected species identified within the pipeline construction ROW.
9. Care will be taken to minimize tree removal. To the extent practicable, and in accordance with applicable permits, wind breaks and shelterbelts will be crossed by minimizing the width of the ROW. When clearing, trees will be felled onto the ROW to minimize damage to off-ROW vegetation. Shelterbelts within the ETWS will be replanted in accordance with applicable Project permits and/or landowner agreements. To the degree possible, clearing of ETWSs will be limited to decrease temporary habitat loss.
10. Post-construction mitigation efforts are focused on revegetation<sup>8</sup> of the construction and permanently maintained ROW. The goal of revegetation on the construction ROW is to restore the vegetation to a similar composition and condition as before construction as described in Enbridge's CECP. Following construction, permanent vegetation will be established in areas disturbed within the construction work area except in actively cultivated areas and standing-water wetlands.
11. Enbridge has agreed to mitigate for all temporary and permanent losses of grasslands and forested habitat throughout the project from Illinois to Oklahoma for both listed species and migratory birds. The mitigation and ratios were formalized through a Memorandum of Understanding (MOU) between Enbridge and the Service (Enbridge and USFWS 2013). The Conservation Fund has received the payment from Enbridge for known habitat impacts, and a letter of credit has been issued by Enbridge to cover the remaining potential impacts to listed species after surveys have been completed and verified.

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<sup>8</sup> It is important to note that Enbridge's definition of revegetation is to plant areas with mixed grasses. Forested habitat removed within the permanent ROW will be a permanent loss; habitat removed within the construction workspaces will be allowed to revegetate through natural succession if the landowner does not manage it. There is no guarantee that the vegetation will be restored to a similar composition and condition.

#### **1.4.2 Plant-Specific Conservation Measures**

12. Enbridge will require that construction equipment be cleaned before arriving on site to prevent the introduction and/or spread of invasive species along its ROW due to pipeline construction activities.
13. Enbridge will minimize the potential for the establishment of invasive species by minimizing the time duration between final grading and permanent seeding, and by using straw mulch and seed mix that are free of noxious weed seed to revegetate the ROW.
14. Enbridge will monitor and address all areas where stabilization techniques have been implemented in accordance with conditions identified in the applicable Project permits and /or license conditions.

#### **1.4.3 American Burying Beetle-Specific Conservation Measures**

15. Pre-construction survey by certified ABB surveyors will identify all locations with potential disturbance that may have ABB present. If presence is indicated, Enbridge will mitigate for all ABB habitat according to the Service's *Draft Conservation Strategy for the American Burying Beetle* (USFWS 2012b) at a ratio of no less than 1:1 for temporary impacts, 1.5:1 for permanent cover change impacts, and 2:1 for permanent impacts that occur outside of any ABB Conservation Priority Area (ABB CPA). The mitigation agreement has been formalized in the MOU between Enbridge and the Service (Enbridge and USFWS 2013). The Conservation Fund has received the payment from Enbridge for known habitat impacts, and a letter of credit has been issued by Enbridge to cover the remaining potential impacts to listed species after surveys have been completed and verified.
16. Enbridge will minimize construction requiring artificial lighting to the extent practicable. In situations where night construction work is necessary and/or mandated by permit to maintain schedules (e.g. open-cut stream crossings), all lights will be shielded to direct light to the work area and prevent light from projecting upwards, thus minimizing the potential to attract insects, including potential ABBs.
17. In areas where ABB have been determined to be present by valid survey, areas with shallow soils will have surface soils returned to the approximate pre-construction conditions, regardless of the underlying bedrock and land use status.
18. Prior to the topsoil replacement, the working side of the right-of-way will be ripped at least 18 inches deep in agricultural areas and at least 12 inches deep in pasture and woodland areas unless the presence of stumps and large quantities of roots within 12 inches preclude ripping. All ripping and disking will be done at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands adjacent to the areas to be ripped. This soil de-compaction treatment should be beneficial to the American burying beetle by reducing the extent of soil compaction within the prepared right-of-way for the pipeline.

19. Depending on landowner requests, Enbridge will restore areas in native range using approved native seed mixes developed for the applicable region. In addition, forested areas will also be seeded and maintained in native range species if the landowner agrees.
20. All O&M activities that involve vegetation management (i.e., clearing, brushing, mowing) within the ABB range will occur during the non-active season, periods when nighttime temperatures do not exceed 60 degrees Fahrenheit for 5 consecutive nights, which usually encompasses October to early May.
21. At O&M facilities that require night lighting in the ABB occupied range, all lights will be shielded such that light is projected downwards to minimize insect (including American burying beetles) attraction to light.

#### **1.4.4 Indiana Bat-Specific Conservation Measures**

Indiana bat-specific conservation measures are listed below. Enbridge committed to performing Indiana bat surveys to determine the areas where Indiana bats are present within the construction ROW (Conservation Measure #25), and to further reduce impacts using other conservation measures depending on survey results. We have included a flow chart (Figure 3) to aid in understanding the outcomes of surveys and implementation of Conservation Measures 27-30 below.

22. Enbridge completed construction workspace modifications after the Indiana bat habitat surveys to avoid maternity roost trees.
23. The Project design avoided impacts to streams and wetlands to the extent practicable. Where impacts could not be avoided, maintenance of a vegetated buffer between the stream or wetland and adjacent upland was typically specified in project plans.
24. As determined in Measures #27, 29, and 30 below, Enbridge will mitigate for all occupied and presumed occupied Indiana bat habitat at a ratio of no less than 1.8:1 for temporary impacts to non-maternity roosting habitat, 4.9:1 for temporary impacts to maternity roosting habitat, 2.2:1 for permanent impacts to non-maternity roosting habitat, and 5.4:1 for permanent impacts to maternity roosting habitat. The mitigation agreement has been formalized in the MOU between Enbridge and the Service (Enbridge and USFWS 2013). The Conservation Fund has received the payment from Enbridge for known habitat impacts, and a letter of credit has been issued by Enbridge to cover the remaining potential impacts to listed species after surveys have been completed and verified.
25. Following the 2013 Field Season Contingency Plan for Conducting Indiana Bat Summer Surveys, Enbridge will perform surveys in the areas recommended by the Service that have a high potential for maternity colony presence. Several locations along the pipeline in Illinois have recent surveys documenting Indiana bat presence. For these locations, which the Service provided, acoustic surveys are not required, and Enbridge will proceed

as if acoustic surveys resulted in a positive detection. If acoustic surveys at the remaining locations result in positive detection of high frequency calls or positive detections of Indiana bats, conduct mist-netting surveys and radio-tracking and emergence protocols to identify maternity roost trees. Conduct exit counts to determine whether occupied maternity roost trees contain a substantial portion of the maternity colony<sup>9</sup>. Prior to construction, Enbridge would complete all surveys and submit the findings to the Service for review and comment.

26. Within an Indiana bat home range (defined as within a 2.5 mile radius of a documented maternity roost tree or 5 miles of a mist-net capture of a female or juvenile), no more than 5% of suitable habitat (classified by Enbridge as foraging, non-maternity roosting habitat, and maternity roosting habitat) will be removed.
27. In the areas that were not recommended for surveys, the Service will assume Indiana bats are present, and mitigation will occur for suitable habitat (classified by Enbridge as foraging habitat, non-maternity roosting habitat, and maternity roosting habitat) as described in measure #24. Clearing can occur from August 7, 2013, to March 31, 2014.
28. For the 2013 survey areas where no Indiana bats are found during acoustic surveys, clearing can proceed between August 7, 2013 and March 31, 2014, without Indiana bat mitigation.
29. For the 2013 survey areas where mist netting either results in no captures or the capture of male Indiana bats, clearing can proceed between August 7, 2013, and March 31, 2014. Enbridge will mitigate for the loss of suitable habitat as described in measure #24.
30. For the 2013 survey areas where mist netting results in the capture of female or juvenile Indiana bats, maternity colony presence is confirmed in the survey area. Enbridge will mitigate for the loss of habitat at the maternity roosting habitat level regardless of the original classification as described in measure #24, and the following conditions apply:
  - a. If telemetry is inconclusive and no maternity roost trees are identified, the maternity colony may be using the survey area for roosting or foraging. Clearing will take place between October 31, 2013 (or October 1 from mile marker 0 to 164), and March 31, 2014, to avoid direct impacts to females and juvenile roosting bats.
  - b. If occupied roost trees are identified outside of the clearing zone, the following conditions apply:
    - i. If all occupied roost trees are > 3,280 ft (1 km) from the clearing zone, the maternity colony is likely roosting outside of the Action Area. Clearing will proceed between August 7, 2013, and March 31, 2014.
    - ii. If any occupied roost tree is < 3,280 ft (1 km) from the clearing zone, the maternity colony may be roosting in the Action Area. Clearing will take place between October 31, 2013 (or October 1 from mile marker 0 to 164), and March 31, 2014. The Spearhead maintained ROW (defined 30 feet each side of Spearhead) may be used for construction equipment travel within the 3,280 ft

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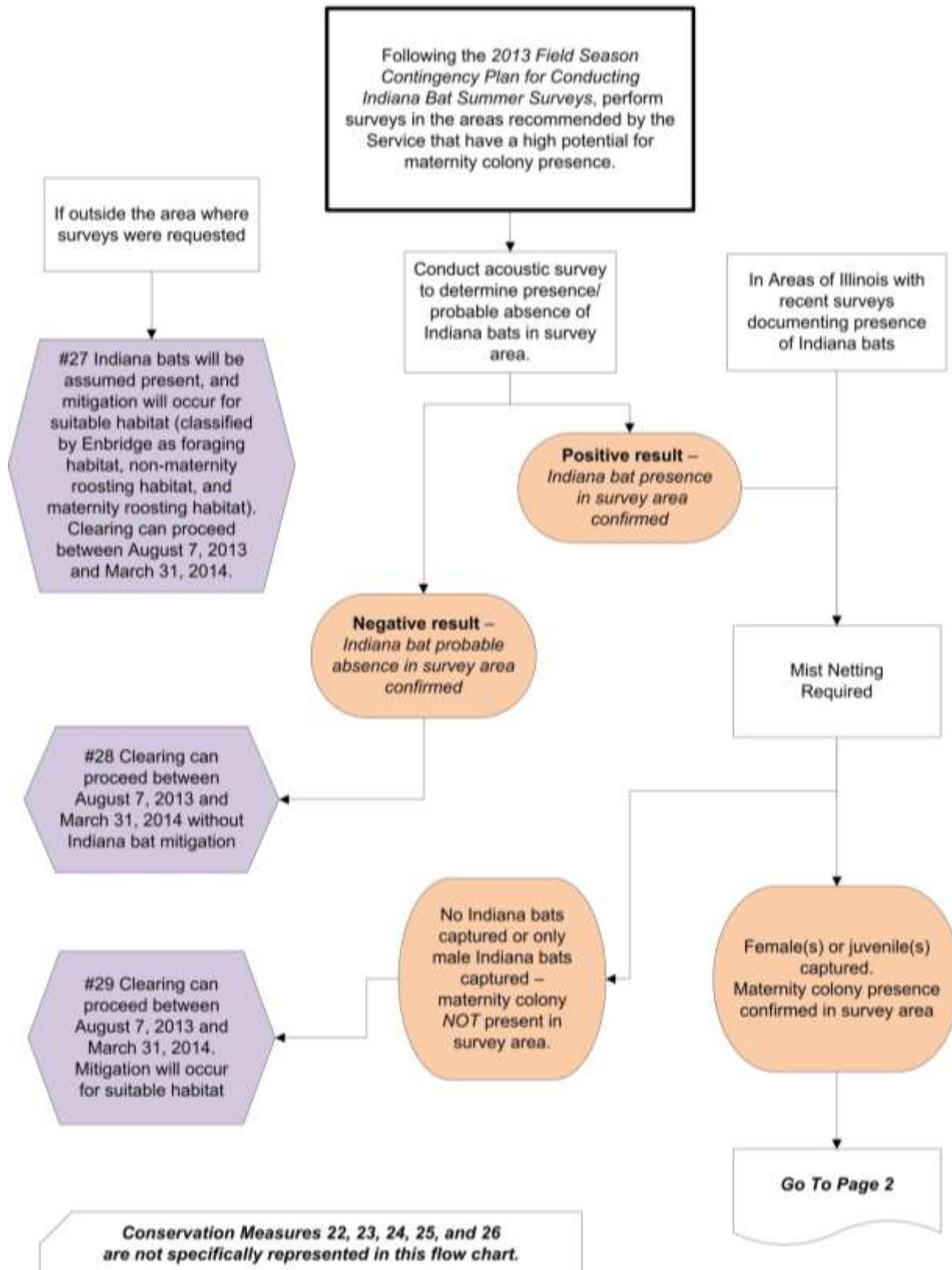
<sup>9</sup> A substantial portion of a maternity colony is 10% of the average Indiana bat maternity colony, which is 60 adult females.

buffer. O&M type brushing and limb trimming activities will be allowed within the Spearhead maintained ROW to facilitate equipment travel.

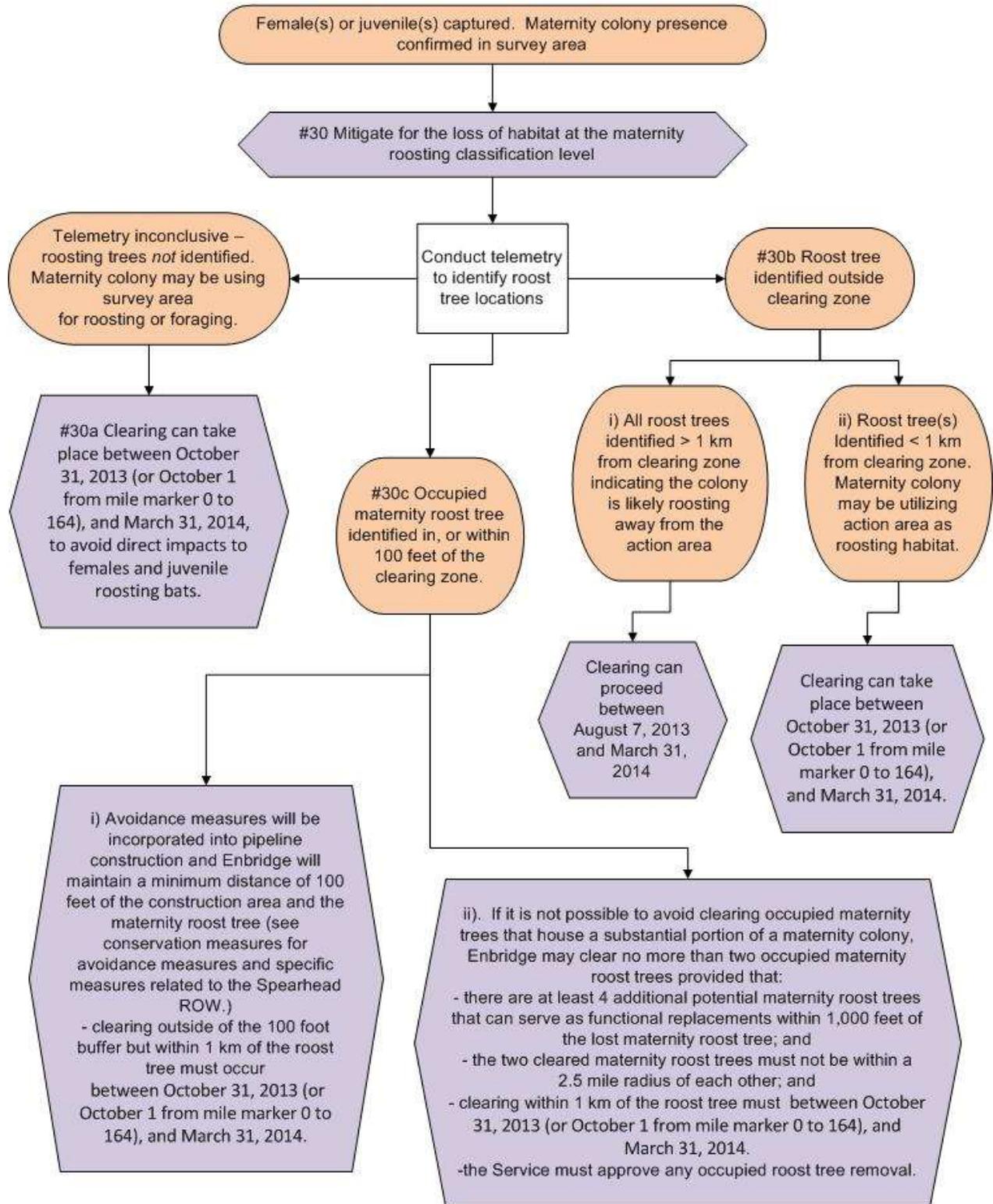
- c. Where occupied maternity roost trees are within 100-ft of the clearing zone, the following conditions apply:
  - i. For maternity roost trees that can be avoided, Enbridge will maintain a minimum distance of 100 feet between the construction area and the maternity roost tree. Enbridge will (a) erect fencing to delineate the boundary and prevent inadvertent encroachment into the area, and (b) erect signs stating “no trespassing” or “do not disturb – sensitive area”. The Spearhead maintained ROW (defined 30 feet each side of Spearhead) may be used for construction equipment travel and stovepiping activities within the 100 ft buffer. O&M type brushing and limb trimming activities will be allowed within the Spearhead maintained ROW to facilitate equipment travel and stovepiping activities. Enbridge will coordinate with the Service if an occupied roost tree or 100 ft buffer occurs within the Spearhead ROW prior to construction activities in these areas. Enbridge will determine the mechanism to avoid this area through any of the following options or others not identified here:
    1. Re-route the pipeline. If re-routes are selected as an option, Enbridge will ensure that no other identified maternity roost trees are cleared in the re-routed area. Surveys will be necessary as described if re-routes will occur in unsurveyed habitat.
    2. Install the pipeline using UHDD and do not clear the ROW above the UHDD installation. Use foot surveys for the Pipeline and Hazardous Material Safety Administration’s inspection requirements instead of aerial surveys. The ROW above the pipeline could be cleared to facilitate aerial inspection surveys after it has been documented that the maternity roost tree is no longer used during the active season, and provided that new roost trees are not within 100-ft of the right-of-way. To determine if the maternity roost tree is no longer used during the active season (for future clearing of the ROW above the pipeline UHDD), Enbridge will conduct exit counts for two consecutive nights between May 15 and July 15. If the tree is not occupied during the active season, Enbridge will conduct mist-netting surveys and radio-tracking to identify new maternity roost trees. Provided the new maternity roost tree does not occur within 100 ft of the area to be cleared, clearing will occur in the ROW during the inactive season. Enbridge will provide survey results to the Service and will not clear these areas until it has received written notification from Service to proceed.
    3. Install the pipeline by stovepiping in the existing Spearhead permanent right-of-way. This method entails welding together sections of pipe either in the ditch, or on the Spearhead ROW, lowering in, and immediately backfilling the ditch. Simultaneously, the pipeline ditch ahead is being excavated.
    4. Relocate extra temporary work space. If relocating extra temporary work space is selected as an option, Enbridge will ensure that no other identified roost trees are cleared in the re-routed area. Surveys will be necessary as described if relocations will occur in unsurveyed habitat.

- ii. If it is not possible to avoid an occupied maternity roost tree that houses a substantial portion of a maternity colony and the minimum 100-ft buffer, Enbridge may clear no more than two occupied maternity roost trees provided that:
  1. There are at least four additional potential maternity roost trees that can serve as functional replacements within 1,000 ft of the lost maternity tree ; and
  2. The two cleared maternity roost trees must not be within a 2.5 mile radius of each other.
  3. Clearing within 1 km of the occupied roost tree must occur between October 31, 2013 (or October 1 from mile marker 0 to 164), and March 31, 2014.
  4. The Service must approve of any occupied maternity roost tree removal.
31. During construction, trees, limbs, brush, and debris will not be burned in the right-of-way within 500 feet of occupied maternity roost trees.
32. Enbridge will not use aerial application of herbicides or insecticides for maintenance of the permanent right-of-way or adjacent forested areas from April 1 to November 1 to protect Indiana bats in summer habitat.
33. To minimize potential impacts on foraging Indiana bats during construction, Enbridge will limit clearing and heavy equipment operation activities within 300 feet of documented roost trees identified during the 2013 field surveys to one-half hour after dawn to one-half hour before dusk from April 1 to November 1. This timing restriction will allow time for bats to return to roost trees at dawn and time for bats to emerge from roosts at dusk. If this is not possible, the Service would review these on a case-by-case basis after consultation is completed to ensure adequate protection of occupied maternity roost trees.

**Figure 3.** Indiana Bat survey and conservation measure flow chart.



Indiana Bat Survey and Conservation Measures Flow Chart  
Continued - Page 2



#### **1.4.5 Additional Taxa-Specific Conservation Measures**

These measures apply to other species included in the BAs but not the biological opinion; however, they are included here as part of the action.

34. Conservation measures, including standard best management practices and environmental construction standards, as described in the Enbridge CECP will be utilized during work in and adjacent to the stream channel.
35. The construction ROW will consist of a 25 to 50 foot neck down beginning 50 feet from the Ordinary High Water Mark (OHWM) on the working side of the ROW.
36. The contractor will leave a 20 foot buffer from the OHWM of undisturbed herbaceous vegetation on all stream banks during initial clearing, except where grading is needed for bridge installation or where restricted by applicable regulations and/or permit conditions; this should reduce any potential erosion or sedimentation impact to mussel and fish species in these locations.
37. The banks alongside streams and rivers will be restored after backfilling is completed. These areas will be seeded with the appropriate seed mixture and covered with an erosion control blanket. Erosion controls including such items as straw bales, biologs, silt fence and similar materials will be installed as necessary at the individual bank stabilization site. This should prevent siltation from the sidebanks along streams and rivers.
38. Withdrawal and discharge of hydrostatic test waters will employ the following conservation measures: 1) water will not be withdrawn during periods of exceptionally low water; 2) water will be withdrawn in a manner that will not visibly lower the water level as indicated by water level height on the stream channel bank; 3) use appropriately sized screens, implement withdrawal rates, and maintain withdrawal point sufficiently above the substrate to minimize impacts; and 4) water will be discharged using additional sediment and water flow control devices to minimize effects to the waterbody.
39. The stream banks disturbed during installation of the pipeline will be stabilized with erosion control, materials including jute netting or equivalent and will be seeded as indicated by Enbridge using the recommended local endemic seed mixtures. This should minimize potential siltation to protected fish and mussel habitat.
40. Enbridge will avoid the use of fertilizers within 100 feet of known or presumed occupied habitat. Fertilizer will not be applied if weather (e.g., impending storm) or other conditions (e.g., faulty equipment) would compromise the ability of Enbridge or its contractors to apply the fertilizer without impacting presumed occupied mussel habitat. The CECP prepared for this activity will document relevant guidelines for application. This should minimize effects of these fertilizers to potential protected in-stream fish and mussel habitat areas.

41. The contractor will take all reasonable measures to control construction-related noise and dust near residential areas and other areas as directed by Enbridge. Control practices may include wetting the ROW and access roads, limiting work hours in residential areas reestablishment of vegetation and or additional measures as appropriate based on site-specific conditions. This should reduce short-term temporary impact to the bird species group.

## **2 STATUS OF THE SPECIES**

### **2.1 Decurrent False Aster**

#### **2.1.1 Species Description**

The decurrent false aster (*Boltonia decurrens*) was listed as a threatened species by the Service on November 14, 1988 (53 FR 45861). It is a floodplain species that is endemic to the Illinois Waterway and parts of the Upper Mississippi River near St. Louis, Missouri (Schwegman and Nyboer 1985; USFWS 1990). Herbarium records indicate that its historical range and habitat were the shores of lakes and streams in the Illinois River floodplain and the Mississippi River floodplain at its confluence with the Illinois River (Schwegman and Nyboer 1985).

#### **2.1.2 Life History**

The decurrent false aster is an early successional annual or biennial plant species that requires open areas for population establishment, and its natural habitat has been described as wet prairies, shallow marshes, and shores of open rivers, creeks, and lakes (Schwegman and Nyboer 1985). In the past, the annual flood/drought cycle of the Illinois River provided the natural disturbance required by this species. Annual spring flooding created the requisite open, bare-soil habitat and reduced competition by eliminating less-flood tolerant competitors. Field observations indicate that in areas without disturbance, the species is eliminated by competition within three to five years. While suitable habitat has been described as stated above, no critical habitat is currently designated for the species.

#### **2.1.3 Status and Distribution**

The decurrent false aster is currently known from 14 counties along the Illinois River and two counties on the Mississippi River. The Service's five year review has determined that the species population status was generally stable (USFWS 2010). The Recovery Plan states that the species will be considered recovered after 12 stable populations have been protected by purchase, easement, or cooperative management agreement (USFWS 1990). Recent surveys have identified as many as 26 populations (USFWS 2010), but numbers of individual plants within these populations have periodically decreased (Smith 2002). Given the ability of individual plants to produce large numbers of seeds and the known persistence of these seeds in the environment until conditions are favorable for their germination and growth (Baskin and Baskin 2002), it is expected that individual population numbers can naturally grow or decrease rapidly according to environmental factors.

Overall, the rangewide population of the species is believed to be stable to date. However, habitat destruction and modification continue to have detrimental effects on the species. Wet prairies and natural marshes have been eliminated within the species' range. Many natural lakes have been drained and converted to cropland as well. Shore habitats have been modified by heavy siltation and altered flooding regimes. Extensive row crop agriculture in the watershed and the numerous levee systems on the flood plain appear to be responsible for these problems (USFWS 1990). Climate change is also another developing threat that could result in seasonal changes in the timing of flood recession and growing seasons. These conditions can have a dramatic effect (both positive and negative depending on timing) on population size and fecundity (Smith et al. 2005); however, results of climate change are not predictable with any certainty since the changes in climate are unknown.

## **2.2 American Burying Beetle**

### **2.2.1 Species Description**

The American burying beetle (ABB) (*Nicrophorus americanus*) was designated as an endangered species on July 13, 1989 (54 FR 29652). Critical habitat has not been designated for the ABB. The final recovery plan was signed on September 27, 1991.

The ABB is the largest species of its genus in North America, measuring one to 1.4 inches long [approximately 2.5 to 3.6 centimeters (cm)]. The hardened elytra (i.e., modified, hardened forewings) are smooth, reflective black, and each elytron has two scallop shaped orange-red markings. The pronotum (hard back plate of the front portion of the thorax of insects) over the mid-section between the head and wings is circular in shape with flattened margins and a raised central portion. The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum, a feature shared with no other members of the genus in North America (USFWS 1991). The ABB also has orange-red frons 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 club-shaped tips.

### **2.2.2 Life History**

The ABB is a member of the genus *Nicrophorus*. Species in the genus are generally referred to as burying, sexton, or undertaker beetles because they share the unique behavior of burying carrion to provide a source of nutrition for developing young. It competes with other invertebrate species, as well as vertebrate species, for carrion. Although ABBs are considered feeding habitat generalists, they are believed to be more selective regarding breeding habitat. The ABB is a nocturnal species that lives only for one year. American burying beetles are active in the summer months and bury themselves in the soil during the winter.

#### Summer Active Period

The active season begins in early spring when overwintering adults emerge. In Oklahoma, ABBs are typically active at night from mid-May to late-September when nighttime ambient temperatures are consistently above 60°F. Nightly activity is most prevalent from two to four

hours after sunset (Walker and Hoback 2007). Weather events, such as rain and strong winds, result in reduced ABB activity. During the daytime ABBs are believed to bury under the vegetation litter. After the spring emergence in late May and early June, ABBs secure a mate and carcass for reproduction and proceed to bury the carcass underground. About 12 days afterward (once larvae enter pupae phase), adult ABBs emerge and search for food. Parent and teneral (period when the adult insect is newly emerged from the pupal case or nymphal skin) ABBs emerge in late summer.

### Winter Inactive Period

Only the teneral ABBs over-winter as adults, and comprise the breeding population the following summer (Kozol 1990). During the winter months, when the nighttime ambient temperature is consistently below 60°F, ABBs bury themselves into the soil and become inactive (USFWS 1991). In Oklahoma, this typically occurs in late September lasting until mid-May. Recent studies indicate that ABBs bury an average depth of 6 cm (2.4 inches) but can be found from 0 – 20 cm (Schnell et al. 2007). Habitat structure (i.e. woodland vs. grassland) does not appear to be an influencing factor.

Winter mortality has only recently begun to be investigated, but may range from 25 percent to about 70 percent depending on year, location, and availability of carrion in the fall (Schnell et al. 2007; Raithel unpubl. Data 1996-2006). Preliminary data suggest that overwintering results in significant mortality (Bedick et al. 1999).

### Feeding

When not involved with brood rearing, adult food sources include an array of available carrion, as well as capturing and consuming live insects. Primary carrion sources are small birds and mammals, but other appropriate-sized sources are used, such as snakes and fish. Success in finding carrion depends upon many factors, including availability of optimal habitats for small vertebrates (Lomolino and Creighton 1996), density of competing invertebrate and vertebrate scavengers, individual searching ability, reproductive condition, and temperature (Ratcliffe 1996).

An adult ABB in search of carrion moves an average distance of 0.7 miles per night with a mean movement distance from the site of original capture of 1.66 miles (Creighton and Schnell 1998). ABB can travel up to 3.72 miles in a single night (Bedick et al. 1999). By moving relatively long distances among different habitat types, the ABB increases their chance of encountering a proper sized carcass, but also increases their exposure to a diversity of natural and unnatural sources of potentially adverse impacts including predation, insecticides, commercially available insect traps, and nocturnal light pollution. These threats increase as areas become more developed (Lomolino and Creighton 1996).

### Habitat

ABBs are considered feeding habitat generalists and have been successfully live-trapped in several vegetation types, including undisturbed grasslands, grazed pasture, riparian zones, and

oak-hickory forest, as well as in various soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolino et al. 1995; NatureServe Explorer 2001; USFWS 1991). Rangeland, ecosystems supporting ABB populations are diverse and include primary forest, scrub forest, forest edge, prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; USFWS 1991). In Arkansas and Oklahoma, ABBs are found within a mixture of vegetation types from oak-hickory and coniferous forests on lowlands, slopes, and ridgetops to deciduous riparian corridors and pasturelands in the valleys (USFWS 1991; Creighton et al. 1993).

Soil conditions must be conducive to ABB excavation (Anderson 1982; Lomolino and Creighton 1996). Soils in the vicinity of captures are all well drained and include sandy loam and silt loam, with a clay component noted at most sites. Level topography and a well formed detritus layer at the ground surface are common (USFWS 1991).

At Camp Gruber, Oklahoma, Schnell and Hiott (2002a) reported more ABB captures within the installation than at the disturbed perimeters. Also, surveys conducted within Weyerhaeuser lands in southeast Oklahoma and southwest Arkansas reported fewer ABBs along roads than in the interior of tree plots (Schnell and Hiott 2002b). At Fort Chaffee, Arkansas, ABBs tended to avoid soils with less than 40 percent sand, greater than 50 percent silt, and greater than 20 percent clay (Schnell and Hiott 2005).

### Reproduction

Both parents often participate in the rearing of young with care by at least one parent, usually the female, which is critical for larval survival (Ratcliffe 1996). The pair buries appropriately-sized carrion, about 3.5-7.0 ounces in weight, within a brood chamber constructed around the carcass.

Eggs are laid in the soil beside the carcass. Brood sizes vary between 3-31 individuals (USFWS 1991), with a positive correlation between carrion weight and number of larvae (Kozol 1990). The larvae pupate and emerge as adults after 48-60 days. The newly hatched adults overwinter to reproduce in the following year. Generally, the ABB produces only one brood per year, but occasionally the emerging generation of adults succeeds in producing another brood if summers are long and warm (USFWS 1991).

In Oklahoma, ABBs select undisturbed, mature oak-hickory forests with substantial litter layers and deep, loose soils in grasslands or bottomland forests where the substrate is conducive to burial of carcass (Lomolino and Creighton 1996; Creighton et al. 1993). Surveys have found certain soil types, such as very xeric (dry), saturated, or loose sandy soils, to be unsuitable for carcass burial and thus are unlikely habitats (Ratcliffe 1996). Reproductive success was found to be higher in forested sites than grassland sites, but carcasses tended to be buried deeper in the soil at grassland sites, as compared to forested sites (Lomolino and Creighton 1996).

Reproductive activity occurs between mid-May and mid-August and commences once a suitable carcass is found on which to feed and lay eggs.

### 2.2.3 Status and Distribution

At the time of listing in 1989, the prevailing theory on the ABB's decline was habitat fragmentation, among others (USFWS 1991). Fragmentation of natural habitat that historically supported high densities of indigenous (native) species, an increased direct taking (ca. 1900) of birds of suitable reproductive size class, and the removal of top level carnivores such as the eastern cougar (*Puma concolor*) and wolf (*Canis lupis*) may have contributed to the decline of ABBs by changing the species composition and lowering the reproductive success of prey species required for ABB reproduction. Furthermore, increasing edge habitat and the reduction of top-level predators resulted in an increase in the occurrence and density of vertebrate predators and scavengers, such as the American crow (*Corvus brachyrhynchos*), raccoon (*Procyon lotor*), fox (*Vulpes* sp.), opossum (*Didelphis virginiana*), and skunk (*Mephitis* sp.), that compete with ABBs for available carrion.

In the Midwest, windbreaks, hedgerows, and park development have all provided new "edge" habitat for these scavengers, as well as for domestic and feral animals such as dogs and cats. All of these animals utilize carrion that would be suitable for ABBs (Ratcliffe 1996). In this way, fragmented habitats not only support fewer or lower densities of indigenous species that historically may have supported ABB populations, but there is more competition for those limited resources among the "new" predator/scavenger community.

Since the publication of the ABB recovery plan (USFWS 1991), additional research has been conducted. Sikes and Raithel (2002) examined the literature from the previous 20 years and evaluated several possible threats to the ABB identified in the ABB Recovery Plan: DDT/pesticide use, artificial lighting, pathogens, habitat alteration, habitat fragmentation, vertebrate competition, loss of ideal carrion, and congener competition. Fire ants (*Solenopsis invicta*) have also recently become competitors for carrion and a potential source of mortality for burying beetles where they co-occur (Warriner, 2004; Godwin and Minich, 2005). Fire ants now infest large areas within the ABB's range in Oklahoma, including Osage County, Oklahoma and Montgomery County in Kansas (USDA 2003).

Another emerging threat to the ABB is climate change. Weather extremes, such as droughts, wildfires, hurricanes, and ice storms, may reduce the carrying capacity and viability of existing populations (Amaral et al. 2005). Robust populations, such as those at Fort Chaffee and Camp Gruber and in central Nebraska are believed to be resilient to the effects of stochastic weather events. Climate change could also facilitate the northward movement of fire ants and exacerbate other factors such as habitat and disease.

The best explanation for the decline of ABBs involve habitat fragmentation, which reduces the carrion prey base and increases the vertebrate scavenger competition for this prey (Kozol 1990, USFWS 1991, Ratcliffe 1996, Amaral et al. 1997, and Bedick et al. 1993). The ABB is the largest species of *Nicrophorus* in the New World and requires carcasses of 3.5 to 7.0 ounces (Kozol et al. 1988) to maximize fecundity (productivity), whereas all other *Nicrophorus* species can breed on the more abundant smaller carcasses of 0.11 to 0.18 ounces (Trumbo 1992). Large populations today seem to be limited to relatively large blocks of land with low human

population densities, intact native plant communities, and high densities of small birds and mammals.

Historically the geographic range of the ABB encompassed over 150 counties in 35 states, covering most of temperate eastern North America (USFWS 1991; Peck and Kalbars 1987). Records are known from Texas (single record c. 1935) 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 (Appendix 2). 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 (USFWS 1991).

During the 20th century, the ABB disappeared from over 90 percent of its historical range (Ratcliffe 1995). The last ABB specimens along the mainland of the Atlantic seaboard, from New England to Florida, were collected in the 1940's (USFWS 1991). At the time of listing, known populations were limited to Block Island, Rhode Island, and a few counties in eastern Oklahoma. Currently, the ABB is known to occur in only eight states: on Block Island off the coast of Rhode Island, Nantucket Island off the coast of Massachusetts, eastern Oklahoma, western Arkansas, the Sand Hills and the Loess Hills regions in Nebraska, the Chautauqua Hills region of southeastern Kansas (Sikes and Raithel 2002), south central South Dakota (Ratcliffe 1996; Bedick et al. 1993), and northeast Texas (Godwin 2003).

Although they are found in more of their historic range than at the time of listing, extant ABB populations vary in level of protection, there is little understanding of population trends and biological limiting factors for most populations, and most if not all populations continue to be exposed to the factors that led to listing as well as additional threats.

## **2.3 Indiana Bat**

### **2.3.1 Species Description**

The Indiana bat was originally listed as an endangered species by the Service in 1967. Thirteen winter hibernacula (11 caves and two mines) in six states were designated as critical habitat for the Indiana bat in 1976 (USFWS 1976). No designated critical habitat is within range of the FS Pipeline.

The Indiana bat is an insectivorous, temperate, medium-sized bat that migrates annually from winter hibernacula to summer habitat in forested areas. The bat has a head and body length that ranges from 41 to 49 mm, with a forearm length of 35 to 41 mm. The fur is described as dull pinkish-brown on the back but somewhat lighter on the chest and belly, and the ears and wing membranes do not contrast with the fur (Barbour and Davis 1969). Although the bat resembles the little brown bat and the northern long-eared bat, it is distinguished by its distinctly keeled calcar and a long, pointed, symmetrical tragus.

### 2.3.2 Life History

The key stages in the annual cycle of Indiana bats are: hibernation, spring staging, pregnancy, lactation, volancy/weaning, migration and swarming. Figure 4 provides a depiction of the annual cycle. While there is variation based on weather and latitude, generally bats begin winter torpor in mid-September through late-October and begin emerging in April. Females depart shortly after emerging and are pregnant when they reach their summer area. Birth of young occurs between mid-June and early July and then nursing continues until weaning, which is shortly after young become volant (able to fly) in mid- to late-July. Migration back to the hibernaculum may begin in August and continue through September.

**Figure 4.** Indiana Bat Annual Chronology



#### Winter Hibernation

After the summer maternity period, Indiana bats migrate back to traditional winter hibernacula. Some male bats may begin to arrive at hibernacula as early as July. Females typically arrive later and by September the number of males and females are present in comparable numbers. Autumn “swarming” occurs prior to hibernation. During swarming, bats fly in and out of cave entrances from dusk to dawn and use trees and snags as day roosts (Cope and Humphrey 1977). Swarming continues for several weeks and mating occurs during the latter part of the period. Fat supplies are replenished as the bats forage prior to hibernation. By late September many females have entered hibernation, but males may continue swarming well into October in what is believed to be an attempt to breed with late arriving females.

Generally, Indiana bats hibernate from October through April (Hall 1962, LaVal and LaVal 1980), depending upon local weather conditions. Indiana bats hibernate in caves and mines with cold, stable microclimates. They form large, dense clusters, ranging from 300 bats per square foot to 484 bats per square foot (Clawson et al. 1980, Clawson, pers. observ. October 1996 in USFWS 2000). Clusters form in the same area in a cave each year, with more than one cluster possible in a particular cave (NatureServe 2007). It is generally accepted that Indiana bats, especially females, are philopatric, i.e., they return annually to the same hibernaculum. However, exceptions have been noted (USFWS 2007).

### Summer Roosting and Foraging

After hibernation ends in late March or early April, most Indiana bats migrate to summer roosts. Females emerge from hibernation ahead of males. Reproductively active females store sperm from autumn copulations through winter, and ovulation takes place after the bats emerge from hibernation. The period after hibernation and just before spring migration is typically referred to as “staging,” a time when bats forage and a limited amount of mating occurs (USFWS 2007).

Most winter populations leave hibernacula by late April or early May. In spring when fat reserves and food supplies are low and females are pregnant, migration is probably hazardous (Tuttle and Stevenson 1977). Consequently, mortality may be higher in the early spring, immediately following emergence. Once en route to their summer destination, females move quickly across the landscape. Radio-telemetry studies in New York documented females flying between 10 and 30 miles (mi) in one night after release from their hibernaculum, arriving at their maternity sites within one night. Indiana bats can migrate hundreds of miles from their hibernacula. Observed migration distances range from just 34.1 mi to 356.5 mi (USFWS 2007).

Females seek suitable habitat for maternity colonies, which is a requisite behavior for reproductive success. They exhibit strong site fidelity to summer roosting and foraging areas, generally returning to the same summer range annually to bear their young (Garner and Gardner 1992). Females arrive in their summer habitats as early as April 15 in Illinois (Gardner et al. 1991, Brack 1979), and usually start grouping into larger maternity colonies by mid-May. Humphrey et al. (1977) reported that Indiana bats first arrived at their maternity roost in early May in Indiana, with substantial numbers arriving in mid-May. During this early spring period, a number of roosts may be used temporarily, until a roost with larger numbers of bats is established.

In general, Indiana bats roost in large, often dead or partially dead trees with exfoliating bark and/or cavities and crevices (Callahan et al. 1997; Farmer et al. 2002; Kurta et al. 2002). Trees in excess of 16 inch diameter at breast height (dbh) with exfoliating bark are considered optimal for maternity colony roost sites, but trees in excess of 9 inch dbh appear to provide suitable maternity roosting habitat (Romme et al. 1995). Indiana bat maternity roosts can be described as primary or alternate based upon the proportion of bats in a colony consistently occupying the roost site. Maternity colonies typically use 10 to 20 trees each year, but only one to three of these are primary roosts used by the majority of bats for some or all of the summer (Gardner and Gardner 1992; Miller et al. 2002). Alternate roosts are used by individuals, or a small number of bats, and may be used intermittently throughout the summer or used on only one or a few days. Females frequently switch roosts to find optimal roosting conditions, switching roosts every few days on average, although the reproductive condition of the female, roost type, and time of year affect switching. When switching between day roosts, Indiana bats may travel as little as 23 feet (7 m) or as far as 3.6 miles (5.8 km) (Kurta et al. 1996; Kurta et al 2001; Kurta et al. 2002). In general, moves are relatively short and typically less than 0.6 mile (1 km) (USFWS 1997).

The range of maternity colony sizes observed for the Indiana bat is 20-100 adult females (Kurta 2004), and 60 females is the average of the overall variability in maternity colony size. Birth of young occurs in late June and early July (Easterla and Watkins 1969, Humphrey et al. 1977).

The young are able to fly between mid-July and early August (Mumford and Cope 1958, Cope et al. 1974, Humphrey et al. 1977, Clark et al. 1987, Gardner et al. 1991, Kurta et al. 1996).

The home range of a maternity colony is the area within a 2.5-mile radius (i.e., 12,560 acres) around documented roosts or within a 5-mile radius (i.e., 50,265 acres) around capture location of a reproductive female or juvenile Indiana bat or a positive identification of Indiana bat from properly deployed acoustic devices. Based on data provided in the Indiana bat draft revised recovery plan (USFWS 2007), a maternity colony needs at least 10% suitable habitat (i.e., forested habitat) to exist at a given point on the landscape.

Male Indiana bats may be found throughout the entire range of the species. Some males spend the summer near hibernacula, as has been observed in Missouri (LaVal and LaVal 1980) and West Virginia (Stihler, pers. observ. October 1996, in USFWS 2000). Males appear to roost singly or in small groups, except during brief summer visits to hibernacula. Males have been observed roosting in trees as small as 3 inches dbh, but the average roost diameter for male Indiana bats is 13 inches (USFWS 2007).

Indiana bats forage over a variety of habitat types but prefer to forage in and around the tree canopy of both upland and bottomland forest, along roads, or along the corridors of small streams. Bats forage at a height of approximately 2-30 meters under riparian and floodplain trees (Humphrey et al. 1977). They forage between dusk and dawn and feed exclusively on flying insects, primarily moths, beetles, and aquatic insects. Females in Illinois were found to forage most frequently in areas with canopy cover of greater than 80%, and typically utilize larger foraging ranges than males (Garner and Gardner 1992). Forested stream corridors and impounded bodies of water have been identified as preferred foraging habitats for pregnant and lactating Indiana bats (Gardner et al. 1991).

### **2.3.3 Population Dynamics**

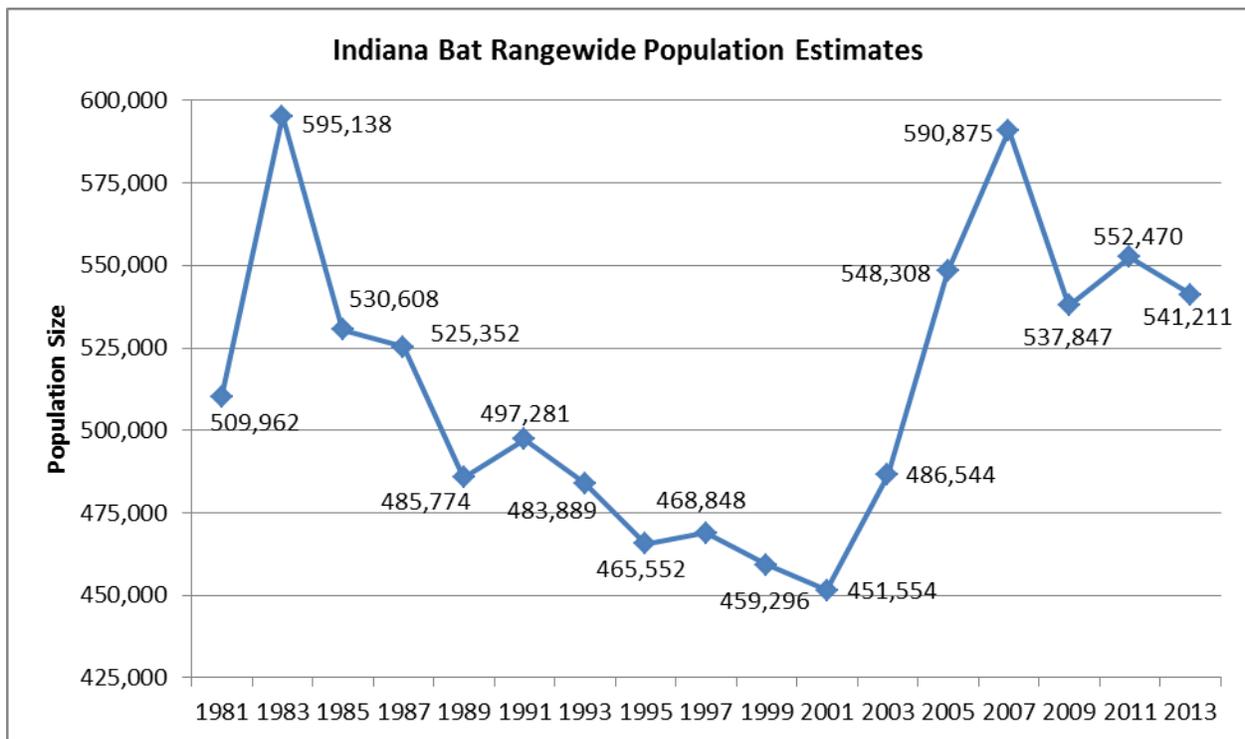
The population of the Indiana bat has decreased significantly from an estimated 808,000 in the 1950s (USFWS 2007). Based on censuses taken at all hibernacula, the current total known Indiana bat population in 2013 is estimated to number about 536,362 bats (Figure 5). Population trend data showed a steady increase from 2001 to 2007, a drop in 2009, an increase in 2011, and finally a drop in 2013 to a population estimate that approximates the 2011 estimate.

Missouri, Indiana, and Kentucky have historically had the highest estimated numbers of hibernating bats; all had estimates of greater than 10,000 bats in 1965. Over the period 1965 to 2005, estimated numbers of hibernating bats in Missouri and Kentucky clearly declined (USFWS 2007). Among the group of states in which aggregate hibernaculum surveys have never reached 100,000 bats, hibernaculum surveys in Arkansas, Tennessee, and Virginia consistently declined from 1965 to 2000. Hibernacula surveys in Illinois, New York, Ohio, and West Virginia were greater in 2000 than in 1965, but trends are not entirely consistent through the period. Thus, the southern tier of states in the species' range shows declines in counts at hibernacula, whereas some states in the upper Midwest show increasing counts (USFWS 2007).

### 2.3.4 Status and Distribution

The current species range includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The species has disappeared from, or greatly declined, in most of its former range in the northeastern United States. The current revised recovery plan (USFWS 2007) delineates recovery units based on population discreteness, differences in population trends, and broad level differences in land-use and macrohabitats. There are currently four recovery units for the Indiana bat: Ozark-Central, Midwest, Appalachian Mountains, and Northeast.

**Figure 5.** Indiana bat rangewide population estimates from 1981 – 2013 (www.fws.gov/midwest/Endangered/mammals/inba/pdf/2011inbaPopEstimate04Jan12.pdf; (USFWS 2013). (\* 2013 estimate does not include most recent survey data from all states in the range. Where the most recent data were lacking, 2011 data were substituted.)



Historically, the Indiana bat had a winter range restricted to areas of cavernous limestone in the karst regions of the east-central United States. Hibernacula are divided into priority groups that have been redefined in the Service’s Draft Recovery Plan (USFWS 2007): Priority 1 (P1) hibernacula typically have a current and/or historically observed winter population of greater than or equal to 10,000 Indiana bats; P2 have a current or observed historic population of 1,000 or greater, but fewer than 10,000; P3 have current or observed historic populations of 50 to 1,000 bats; and P4 have current or observed historic populations of fewer than 50 bats. Based on 2009 winter surveys, there were a total of 24 P1 hibernacula in seven states: Illinois (one); Indiana

(seven); Kentucky (five); Missouri (six); New York (three); Tennessee (one); and West Virginia (one). One additional P1 hibernaculum was discovered in Missouri in 2012. A total of 55 P2, 151 P3, and 229 P4 hibernacula are also known from the aforementioned states, as well as 15 additional states.

The historical summer range of the Indiana bat is thought to be similar to its modern range. However, the bat has been locally extirpated due to fragmentation and loss of summer habitat. The majority of known maternity sites have been located in forested tracts in agriculturally dominated landscapes such as Missouri, Iowa, Indiana, Illinois, southern Michigan, western Ohio, and western Kentucky, as well as the Northeast, with multiple recent spring emergence telemetry studies.

The reasons for listing the Indiana bat were summarized in the original Recovery Plan (USFWS 1983) including: declines in populations at major hibernacula despite efforts to implement cave protection measures, the threat of mine collapse and the potential loss of largest known hibernating population at Pilot Knob Mine, Missouri, and other hibernacula throughout the species range were not adequately protected. Although several known human-related factors have caused declines in the past, they may not solely be responsible for recent declines. Documented causes of Indiana bat population decline include: 1) human disturbance of hibernating bats; 2) improper cave gates and structures rendering them unavailable or unsuitable as hibernacula; and 3) natural hazards like cave flooding and freezing. Suspected causes of Indiana bat declines include: 1) changes in the microclimate of caves and mines; 2) dramatic changes in land use and forest composition; and 3) chemical contamination from pesticides and agricultural chemicals. Current threats from changes in land use and forest composition include forest clearing by private industry within the summer range, woodlot management and wetland drainage by landowners, and other private and municipal land management activities that affect the structure and abundance of forest resources.

Climate change is also an emerging threat to the Indiana bat, primarily because temperature is an essential feature of both hibernacula and maternity roosts. Potential impacts of climate change on temperatures within Indiana bat hibernacula were reviewed by V. Meretsky (pers. comm., 2006 in USFWS 2007). Climate change may be implicated in the disparity of population trends in southern versus northern hibernating populations of Indiana bats (Clawson 2002), but Meretsky noted that confounding factors are clearly involved. Humphries et al. (2002) used climate change models to predict a northern expansion of the hibernation range of the little brown bat; such modeling would likely result in predictions of range shifts for Indiana bats as well. Potential impacts of climate change on hibernacula can be compounded by mismatched phenology in food chains (e.g., changes in insect availability relative to peak energy demands of bats) (V. Meretsky, pers. comm., 2006 in USFWS 2007). Changes in maternity roost temperatures may also result from climate change, and such changes may have negative or positive effects on development of Indiana bats, depending on the location of the maternity colony. The effect of climate change on Indiana bat populations is a topic deserving additional consideration.

The greatest current threat to Indiana bats is white nose syndrome (WNS). WNS was first documented in New York in February of 2006 and has since been confirmed in 20 states and 4

Canadian Provinces ([www.whitenosesyndrome.org/resources/map](http://www.whitenosesyndrome.org/resources/map)). It is currently unknown if WNS is the primary cause or a secondary indicator of another pathogen, but it has been correlated with erratic behavior such as early or mid-hibernation arousal that leads to emaciation and mortality in several species of bats, including the Indiana bat (<http://whitenosesyndrome.org/>; [www.fws.gov](http://www.fws.gov)).

Overall mortality rates, primarily of little brown bats, have ranged from 90 to 100 percent in hibernacula in the northeastern United States. It is currently estimated that 5.7 to 6.7 million bats have died from WNS in infected regions ([www.whitenosesyndrome.org/about-white-nose-syndrome](http://www.whitenosesyndrome.org/about-white-nose-syndrome)). Apparent losses of 685 Indiana bats in Hailes Cave and all but 124 of 13,014 Indiana bats in the Williams Preserve Mine in New York were documented during the first winter WNS was observed at each site. Additionally, Indiana bat surveys conducted at hibernacula in New York during early 2008 estimated the population declined 15,662 bats, which represents 3.3% of the 2007 revised rangewide population estimate.

WNS is thought to be transmitted by direct bat contact with an infected bat and by transmission of the causative agent from cave to cave. The distribution of WNS appears to be expanding in all directions from its epicenter in New York. Between 2007 and 2008, it was documented to have spread from a 9 km radius to a 200 km radius, and at the end of the 2008-2009 winter, it was documented in all major hibernacula in New York. Most recently it has been found in eastern Missouri, northern Alabama, Illinois, and suspected in eastern Iowa. The Service and partners are conducting research to develop management strategies to reduce the spread and impacts of WNS. However, it remains a significant and immediate threat to the Indiana bat.

At the time the revised recovery plan was drafted in 2007, the causative agent for WNS had not yet been discovered and the additive impacts to the already declining Indiana bat were not yet considered. Given the documented deaths of Indiana bat due to WNS in the Northeast since 2006, the species is further threatened with extinction. Numerous research projects have been completed and are ongoing at a rapid rate since the first discovery of WNS, a national response plan has been completed (available at [www.whitenosesyndrome.org](http://www.whitenosesyndrome.org)), multiple states and agencies have approved or are in the process of developing response action plans, and various management actions have been undertaken to slow the spread of the disease (e.g., cave closures, the development of decontamination protocols, etc.). Despite these efforts, there is no known cure for the disease and all bats in North America that hibernate in caves could be threatened with extinction.

### **Status within the Ozark-Central Recovery Unit**

The Indiana bat population in the Ozark-Central Recovery Unit (RU) has declined significantly since 1990 (USFWS 2007). Prior to 2012, the majority of hibernating bats in the Ozark-Central RU were assumed to overwinter in Pilot Knob Mine in Missouri. Dramatic declines in the hibernating population at this site occurred since the early 1980s from an original estimation of approximately 100,000 in the 1970s to an estimation of 1,678 in the 2000s. The discovery of a previously unknown P1 hibernation site has -increased the overall baseline size of the population in the Ozark-Central RU, but not necessarily the declining trend. The newly discovered site houses approximately 122,936 hibernating Indiana bats. Based on observations by private

cavers, the site has been occupied by a similar number of Indiana bats since the 1970s and would have concurrently occupied both sites; these bats are not considered to be bats that moved from Pilot Knob Mine. After incorporating bats from the newly discovered site, the current 2013 population estimate for the Ozark-Central RU is approximately 196,314. Despite the recent discovery, the Indiana bat population in the Ozark-Central RU is still considered to be declining.

#### **2.3.4 Conservation Needs of Indiana bat**

The Service's strategy for recovering Indiana bat is founded on three fundamental principles of conservation biology – representation, redundancy, and resiliency. Representation means conserving the breadth of genetic and ecological diversity to ensure the species' adaptive capabilities are preserved. Redundancy means having sufficient number of populations distributed across the landscape to ensure the species can withstand catastrophic events. Resiliency means having sufficiently large populations to ensure populations can withstand environmental fluctuations.

Implementing this recovery strategy entails five key conservation needs:

Conservation Need 1. Maintaining the current winter and summer range of Indiana bat. Conserving and managing Indiana bats across the species range requires maintaining self-sustaining Indiana bat populations in each RU (which is accomplished by achieving Conservation Needs 2-5).

Conservation Need 2. Conserving and managing winter colonies and hibernacula via:

1. Maintaining both large and small hibernating populations
2. Maintaining or providing appropriate physical structure, airflow, and microclimate of the hibernacula
3. Maintaining forest habitat surrounding hibernacula. This habitat is essential for maintaining the integrity of the hibernacula and provides foraging and roosting habitat for Indiana bats during the fall swarming period when they build up their fat reserves to successfully hibernate.
4. Avoiding disturbance of hibernating bats which can lead to excessive arousal and premature depletion of fat reserves.
5. Minimizing disturbance of bats during the swarming period that can lead to disruptions in mating and foraging activity.

Conservation Need 3. Conserving and managing maternity colonies via:

1. Locating maternity colonies in each RU via spring emergence radio tracking or summer surveys.
2. Ensuring a sufficient number of self-sustaining maternity colonies persist in order to support the regional population (i.e., RU population) by managing and controlling threats acting, singly and cumulatively, upon the fitness of maternity colonies.
3. Maintaining the ecological processes that ensure the continued availability of roosting, foraging, and commuting habitat needed to support maternity colonies

Conservation Need 4. Conserving migrating Indiana bats via:

1. Understanding Indiana bat migration, including:
  - a. migratory routes (e.g., determine if Indiana bats follow migratory pathways or landscape features,
  - b. migratory behaviors (e.g., migrate singly or in groups, use of stopover habitat, flight height); and
  - c. differences between fall and spring migration.
2. Maintaining safe and suitable migration pathways across the species range.
3. Conserving and managing important stopover habitat, if such habitat is deemed necessary.
4. Identifying limiting factors and manage threats during migration at levels that will not impede recovery, including:
  - a. determining if stopover habitat is limiting to Indiana bats during migration, and if so, conserve and manage stopover habitat,
  - b. minimizing/managing fatalities due to wind energy, and
  - c. minimizing/managing other (yet to be identified) threats to successful migration.

Conservation Need 5. Managing the effects of white-nose syndrome (WNS) via:

1. Avoiding/minimizing the transmission of *Geomyces destructans*.
2. Implementing measures to control *G. destructans* should effective, non-harmful measures become available.
3. Restoring and protecting populations affected by WNS, with emphasis on populations that are seemingly more resilient to the disease (e.g., hibernating populations that have shown lower levels of decline; maternity colonies that persist after the initial wave of high mortality).

### 3 ENVIRONMENTAL BASELINE

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the Action Area, i.e., the species status given the effects from all past, current and ongoing factors within the Action Area. The environmental baseline is a "snapshot" of a species' health at a specified point in time. It does not include the effects of the action under review in the consultation.

The Corps has stated their authority is limited to their permit and easement areas; however as described in Section 1.2, the Action Area for this consultation is the entire 593.1 mile length of the FS Pipeline, including the permanent ROW, temporary ROW, extra temporary work spaces, access roads, pipe yards, aboveground facilities (e.g. mainline valves and pump stations), contractor yards, and a buffer of 3,280 ft (1 km) around all of these areas. A more complete description of the FS Pipeline location, landownership, and land cover is provided in both BAs (USACE 2013; BIA 2013) and is incorporated by reference.

#### 3.1 Status of the Species within the Action Area

This portion of the environmental baseline section focuses on each listed species, describing what we know about its spatial distribution, population status, and trends within the Action Area.

### 3.1.1 Decurrent False Aster

There are no known populations of decurrent false aster in the Action Area. Suitable habitat occurs in and around the FS Pipeline crossing of the Illinois River in Mason and Fulton counties, Illinois. Enbridge performed pre-construction surveys along the pipeline ROW and did not detect any individuals; however, the surveys were not conducted during the August to October flowering period, as necessary to determine if the species is present. Also, the surveys were only general habitat assessments, not designed to detect or identify rare plants.

### 3.1.2 American Burying Beetle

The most current information for ABBs in both Oklahoma and Kansas can be found at the Service websites for the appropriate states ([http://www.fws.gov/southwest/es/Oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm) and <http://www.fws.gov/kansas/>). The proposed pipeline traverses approximately 126 miles within the range of the ABB. ABB presence has been confirmed since 1992 from the following Action Area counties: Osage and Washington counties, Oklahoma, and Chautauqua, Montgomery, and Wilson counties, Kansas. Additionally, ABBs were historically present in Creek County, Oklahoma. Suitable habitat and ABB presence is also likely in Pawnee County, Oklahoma. For the purposes of habitat delineation within the ABB range in Oklahoma, the Service has identified ABB conservation priority areas (CPA) based on habitat quality, survey data, and general habitat models (USFWS 2012a). No CPAs are present within the Action Area in Oklahoma, and no large populations of ABBs have been identified in Kansas.

Enbridge performed a survey of the entire project area in 2012 and 2013 using current ABB survey guidelines and Service-certified ABB surveyors to assess the presence of ABB within the FS Pipeline route. The 2012 surveys resulted in one trapped ABB in Washington County, Oklahoma; however, several of these surveys were invalid due to weather conditions. A separate trapping effort performed by the Kansas Department of Wildlife Parks and Tourism resulted in the capture of three ABB in Montgomery County, northwest of the town of Caney, Kansas and within one mile of the Project route. The 2013 ABB surveys were completed in accordance with Conservation Measure #15 on June 29, 2013. Surveys included a total of 160 traps covering 55.5 miles of ABB habitat in Kansas (Montgomery, Wilson and Chautauqua counties) and 70.8 miles of ABB habitat in Oklahoma (Washington, Osage and Pawnee counties). A total of three ABBs were captured from two different trap locations in Washington County, Oklahoma (MP 503.9 and MP 505.9), and six ABBs were captured from three different trap locations in Osage County, Oklahoma (MP 516.4, MP 519.2, MP 520.6, and MP 536.6). No ABBs were detected in 2013 in Kansas. Based on the Service's standard buffer of 0.5 mile circle radius around each positive trap location, the 2013 surveys indicate that ABBs are currently present along six miles of the pipeline route in Oklahoma. The 2012 and 2013 data suggest that the current density of ABB along the FS Pipeline route is low, though these presence/absence surveys cannot be used to estimate abundance.

Enbridge's environmental consultant URS has also developed a Soil Habitat Suitability Model that is included in Appendix H of the BAs (BIA 2013; USACE 2013). Soil characteristics along the majority of the pipeline route and at aboveground facilities were identified using the Soil

Survey Geographic database (Soil Survey Staff USDA NRCS, December 2012), and assessed for suitability for ABB brood rearing based on an analysis of soil characteristics and distribution within the FS Pipeline route. The soils were considered favorable, unfavorable, and unsuitable based on physical features and hydrology. The model predicted that 33% of the construction ROW in the ABB counties (924 out of 2826 acres) would be favorable for ABB reproduction and/or hibernation.

### **3.1.3 Indiana Bat**

The Action Area is within the Ozark-Central recovery unit of the Indiana bat. The population in this recovery unit has declined significantly since 1990 (USFWS 2007). Historically, the Ozark-Central Recovery Unit had the largest numbers of Indiana bats in hibernacula; however, the population has declined such that the Midwest unit is now the most numerous.

Approximately 376 miles of the proposed pipeline run through potential Indiana bat habitat. The Indiana bat has been documented near the FS Pipeline route in Lewis, Marion, Shelby, Macon, Randolph, and Chariton counties in Missouri, and Adams, Brown, Fulton, Livingston, Mason, Schuyler, Tazewell and Woodford counties in Illinois. Few or no surveys have been conducted in Saline, Lafayette, Johnson, Cass, and Bates counties in Missouri, but Indiana bats are likely to occur in areas where suitable habitat is present. No critical habitat occurs in any of these areas; however, the Service has recently confirmed the presence of a large population of Indiana bats using a previously unknown Priority 1 hibernaculum in northeast Missouri. Although the site is outside of the construction corridor, it is only about 20 miles away and likely within the swarming, staging, and foraging areas of bats using the site.

Occupied maternity habitat for Indiana bats exists throughout many portions of Missouri and Illinois. The majority of maternity roosting habitat for Indiana bats exists north of the Missouri River in Missouri and in the southern two-thirds of Illinois. The FS Pipeline route traverses some of the highest quality maternity habitat in both states. Several maternity colonies also occupy suitable habitat around the FS Pipeline in Illinois near the Mississippi River. Composition of trees species in forest stands varies across the alignment. Forest stands within the project area consist primarily of shagbark or shellbark hickory and various oak species, including white oak. Oak, hickory, maple, elm, ash, cottonwood, and locust are the dominant regeneration species.

Enbridge conducted surveys in forested stands in Illinois and Missouri to locate and evaluate potential Indiana bat habitat during the fall of 2012 and winter 2012-2013. A forested stand was defined as a contiguous forested area in the permanent ROW and temporary workspaces with trees primarily greater than or equal to four inches diameter at breast height (dbh). All potential habitat was surveyed within a 300 ft wide survey corridor along the FS Pipeline using the Habitat Assessment Form provided by the Service's Columbia Missouri Field Office. In addition, all potential maternity roost trees were identified, measured, and a GPS location was recorded. Data from these surveys are available in Appendix G of the BAs (BIA 2013; USACE 2013). In order to quantify habitat impacts, Enbridge categorized potential Indiana bat habitat into the following categories:

1. **Maternity Roosting Habitat:** A forested stand with one or more trees greater than or equal to nine inches that are either preferred tree species<sup>10</sup> with greater than or equal to 30 percent exfoliating bark or suitable snags.
2. **Non-maternity Roosting Habitat:** A forested stand with the following characteristics:
  - a. no trees that are greater than or equal to nine inches dbh that are either preferred tree species with greater than or equal to 30 percent exfoliating bark or suitable snags, and
  - b. trees greater than or equal to four inches dbh that are either preferred tree species or suitable snags.
3. **Foraging Habitat:** A forested stand with trees greater than or equal to four inches in diameter at breast height with no preferred tree species or suitable snags.

In total, Enbridge estimated that currently within the 300 ft survey corridor, approximately 2,612 acres of forested habitat is maternity roosting habitat, 650 acres of forested habitat is non-maternity roosting habitat, and 296 acres of forested habitat is foraging habitat. In addition, Enbridge identified 5,599 potential maternity roost trees within the survey corridor of the FS Pipeline. Based on the definitions for the Indiana bat habitat types, essentially all forested habitat within the FS Pipeline survey corridor was categorized as suitable habitat for the species. The large proportion of maternity roosting habitat compared to non-maternity roosting habitat and foraging habitat indicates that maternity roost trees are present within the majority of forested stands.

Enbridge's consultants URS and West are currently conducting Indiana bat surveys in accordance with Conservation Measure #25. To date, they have completed acoustic surveys at 98 sites for a total of 392 detector nights. Indiana bats were detected at 26 sites in Illinois and Missouri in the following counties (from east to west; Figure 1):

- Schuyler County, Illinois: 2 sites
- Adams County, Illinois: 4 sites
- Marion County, Missouri: 8 sites
- Shelby County, Missouri: 8 sites
- Randolph County, Missouri: 2 sites
- Chariton County, Missouri: 1 site.

Follow-up mist-netting is currently underway at these locations and two additional locations in Adams County, Illinois. To date, Enbridge has collected 19 Indiana bats and identified 17 maternity roosting trees. These data indicate that at least five maternity colonies occur within the Action Area, with one in Illinois and four in Missouri.

### **3.2 Factors Affecting Species Environment within the Action Area**

This section describes factors affecting the environment of the species or critical habitat in the Action Area. The environmental baseline includes state, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress.

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<sup>10</sup> Preferred tree species are shagbark hickory, cottonwood, white oak, maple, American elm, shortleaf pine, and other oak species. A snag is defined as a standing dead tree with greater than or equal to 30 percent exfoliating bark, crevices, or holes. Definitions based on the Columbia Missouri Habitat Assessment Form.

Related and unrelated federal actions affecting the same species and critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the Action Area that may benefit listed species or critical habitat.

### **3.2.1 Decurrent False Aster**

The primary threats and causes of decline for the decurrent false aster are discussed in Section 2.1.3, and these factors also apply within the Action Area. No recent biological opinions have been issued for decurrent false aster in the project Action Area. A biological opinion was issued on April 30, 2010 for the Rice Lake State Fish and Wildlife Area (SFWA) Habitat Rehabilitation and Enhancement Project, which is located in the LaGrange Pool of the Illinois River. The project included the construction of approximately 15,000 linear-feet of levee system including an overflow spillway, gatewell structure, pump station, and conveyance facilities, to protect Rice Lake SFWA from low level summer flooding and provide for active water level management. Although the project had a negative effect on the local population of decurrent false aster during construction of the levee system, it was designed to facilitate the establishment of moist-soil vegetation habitat which could result in additional habitat for the species. No additional known proposed Federal, State, or private actions that may affect decurrent false aster in the project Action Area or LaGrange Pool are known at this time.

### **3.2.2 American Burying Beetle**

The primary threats and causes of decline for the ABB are discussed in Section 2.2.3, and these factors also apply within the Action Area. In addition, the following Section 7 consultations and Section 10 permits, and their cumulative impacts, are evaluated in assessing the status of ABBs within the Action Area:

#### Section 7(a)(2) Consultations

During fiscal years 2011-2013, the Service consulted on hundreds of proposed actions, respectively, potentially affecting the ABB in Oklahoma and Kansas. Project types evaluated included pipelines, roads, quarries, communication towers, residential housing development, bridges, mining, petroleum exploration/extraction/production, commercial development, recreational development, transmission lines, and water and waste water treatment facilities. Impacts from these activities varied in size and duration, with projects such as quarries being hundreds of acres and having permanent impacts, to water treatment facilities of a few acres with both permanent and temporary impacts.

Of these, eleven BOs exempting take are in effect in Oklahoma and Kansas:

- Department of Defense pertaining to Camp Gruber near Braggs, Oklahoma;
- U.S. Forest Service regarding the Ouachita National Forest in southeast Oklahoma;
- Natural Resources Conservation Service for the Oklahoma Healthy Forests Reserve Program;
- Centennial Gardens in Osage County, Oklahoma;
- Federal Energy Regulatory Commission, Oklahoma;

- Bureau of Land Management for Wild Horse and Burro Program, Oklahoma;
- Rural Utility Service for a KAMO transmission project, Oklahoma;
- Federal Highway Administration for Oklahoma Department of Transportation activities;
- Rural Utility Services for Broadband Initiative Program, Oklahoma;
- Corps and Southwestern Power Administration for operation of reservoir projects on the Red River, Canadian River, and the Arkansas River Navigation System, Kansas and Oklahoma
- U.S. Department of Agriculture regarding a water Line in Chautauqua County, Kansas

### Section 10 Permits

Currently 35 entities or individuals in Oklahoma and eight entities or individuals in Kansas possess valid Section 10(a)(1)(A) scientific research permits to enhance the survival of the species. Although these permits are enhancement of survival permits, some authorized take of ABBs can occur. The research conducted 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 reduce and/or eliminate authorized take associated with research activities.

One HCP and related 10(a)(1)(B) incidental take permit was issued in 1996 to Weyerhaeuser for ABBs on their lands in southeast Oklahoma. 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. Before obtaining 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 identifies the following as foreseeable activities likely to be implemented by Weyerhaeuser over the period: 28,000 acres (average of 800 acres per year) of forest will potentially be harvested; 16 ponds constructed; 10 or fewer food plots planted; EPA-approved application of pesticides for control of pales weevil damage to planted pine seedlings; ROW vegetation control; 2 miles of road construction; 20 acres of mineral, oil or gas exploration; and no more than 600 acres of cattle grazing. From 1997 to 2006, Weyerhaeuser lands were surveyed for the ABB annually, and habitat sampling was conducted to determine effects from timber management on ABBs. From 1997 to 2006, the following numbers of ABBs were captured: 106, 64, 26, 41, 16, 25, 85, 19, 0, and 0, respectively. The population is now likely extirpated from this area (Schnell 2011).

The Service is developing a General Conservation Plan (GCP) for the Oklahoma and Texas portions of the ABB range, but it is not finalized and no incidental take has been issued at the time of this biological opinion.

All of these projects and permits negatively impact the ABB; however, the cumulative impact of all of these projects is relatively small, the amount of take authorized has been small, and the loss

of habitat is not great when considered on the landscape scale. Even though the action area has been impacted, it continues to provide suitable habitat for ABB.

### **3.2.3 Indiana Bat**

The primary threats and causes of decline for the Indiana bat are discussed in Section 2.3.3, and these factors also apply within the Action Area. In addition, the following Section 7 consultations Section 10 permits, and their cumulative impacts, are evaluated in assessing the status Indiana bats within the Action Area:

#### Other Consultations

During fiscal years 2011-2013, the Service consulted on approximately 331 proposed actions in Missouri, 101 in Arkansas, and a total of 763 in Illinois and Iowa potentially affecting the Indiana bat. Project types evaluated included wind energy projects, highway construction, transmission lines, commercial development, communication towers, residential housing development, bridges, pipelines, levee repair, forest management activities, and recreational construction.

Of these, three BOs exempting take are in effect in Missouri and Iowa:

- Corps of Engineers – St. Louis District, Wappapello Lake;
- U.S. Forest Service (USFS) Mark Twain National Forest programmatic biological opinion;
- Corps of Engineers – Rock Island District, Raccoon River Land Company

#### Section 10 Permits

Currently approximately 50 entities or individuals in Missouri, Illinois, and Iowa possess valid Section 10(a)(1)(A) scientific research permits to enhance the survival of the species. Although these permits are enhancement of survival permits, some authorized take of Indiana bats can occur. The research conducted must further conservation efforts for the species. The loss of some individual Indiana bats over the short-term from research is allowed as long as the survival of the Indiana bat is not jeopardized. The Service requires that every available precaution be implemented to reduce and/or eliminate authorized take associated with research activities.

No HCPs or 10(a)(1)(B) incidental take permits have been issued in Missouri or Illinois.

Currently the Service is developing a Multi-species HCP to address impacts to federally listed species by wind energy projects that will occur in Region 3. The Indiana bat is one of the covered species in the Multi-species HCP that will include wind energy projects in Missouri, Illinois, and Iowa. The HCP is not finalized and no incidental take has been exempted at the time of this BO; thus, the impacts from the future Section 10 permit are not considered in this BO.

Overall, the conservation status of the species in the action area is assumed to be declining as it is in the Ozark-Central RU. Furthermore, the action area and adjacent areas have been subject to previous tree clearing from installation and maintenance of previous projects, such as the Spearhead pipeline, which may have already had adverse effects on the Indiana bats present within the action area. The cumulative impacts of projects occurring in proximal areas of the Ozark-Central Recovery Unit, such as those described in this section, could negatively impact the Indiana bat within the action area.

Even though the action area has been impacted, it continues to provide dead or live trees suitable for Indiana bat roost trees. Based on the documentation of current Indiana bat presence in the action area, it remains suitable habitat (maternity roosting, roosting, and foraging) for the Indiana bat, despite the previous impacts. The action area plays an important role in the persistence and recovery of Indiana bats in the Ozark-Central RU. Portions of the action area provide summer habitat for males and non-reproductive females that is in close proximity to a P1 hibernation site. An even greater function is the role of the action area in supporting multiple maternity colonies of Indiana bats. The action area includes portions of what is considered the core of Indiana bat maternity habitat in Missouri and Illinois. Persistent maternity colonies in this core area that remain stable or increase in number of individuals are vital to the recovery of the species.

## **4 EFFECTS OF THE ACTION**

### **4.1 Factors Considered**

This section includes an analysis of the direct and indirect effects of the proposed action on the species and critical habitat and its interrelated and interdependent activities. Our analysis of the effect of the FS Pipeline considers the following factors:

Proximity of the action: The proposed action will affect occupied habitat of decurrent false aster, ABB, and Indiana bats. All three species likely occur within the FS Pipeline route and construction workspaces.

Distribution: The Action Area includes a relatively small fraction of the range of all three species.

Timing: The construction of the FS Pipeline will affect all life stages for the three species for about nine months beginning in fall 2013 and continuing through winter 2013/2014. O&M activities can occur at any time over the life of the pipeline.

Nature of the effect: Direct and indirect effects of the FS Pipeline are described for each species below.

Duration: The duration of the effects will primarily be short-term, although long-term and permanent effects are anticipated as well. Initial construction will take place over a nine-month period from August to April. Clean-up and restoration activities are projected to be complete by the end of the summer 2014. Some indirect impacts due to the increase in the permanent ROW will be permanent; however, these impacts are minimized (but still expected to occur in some

places) because the habitat was already fragmented by the Spearhead ROW throughout most of the FS Pipeline. Periodic O&M activities are also short-term.

Disturbance frequency: Pipeline construction activities will result in a prolonged, one-time disturbance to habitat within the Action Area. Additional O&M activities over the life of the pipeline will occur and disturbance frequency will vary. The most predictable disturbance will occur during vegetation maintenance of the permanent ROW, which will occur every 3-5 years for a short duration, usually during the summer months.

Disturbance intensity and severity: The intensity and severity of the disturbance are also described for each species below.

## **4.2 Analyses for Effects of the Action**

### **4.2.1 Decurrent False Aster**

The FSP crossing of the Illinois River where the decurrent false aster is likely to occur will be completed using UHDD. Therefore, the species will not be affected by earthmoving activities or the installation of the pipeline. All trees in the permanent ROW above the UHDD will be cleared during the construction phase. All potential direct effects to the decurrent false aster in the Action Area may result from the tree clearing in the permanent ROW and/or O&M activities. Existing plants and propagules may be crushed, buried, or otherwise destroyed by mowing or tree clearing equipment used to maintain the permanent ROW after the pipeline is installed. Initial clearing of vegetation within the ROW will be restricted to trees and other woody vegetation, and Enbridge estimates that will occur in late October or November after the decurrent false aster has flowered. Subsequent maintenance of the ROW will occur approximately every 3-5 years or when needed to eliminate woody invasives and maintain visual inspection. The decurrent false aster requires abundant light (USFWS 1990) and it is likely that if a population of the species occurs within the ROW it will be outside the tree clearing zone. Additionally, removal of trees and other dense cover may increase suitable habitat by eliminating shade and providing additional disturbance.

Indirect effects from the action include habitat loss or degradation, introduction and/or spread of exotic species resulting in disturbance to the growth and reproduction of the species, the exposure to herbicides/pesticides to control woody vegetation and invasive species, and mowing that may reduce primary productivity and seed dispersal and facilitate invasion of exotic species.

### **4.2.2 American Burying Beetle**

The impacts of FS Pipeline construction and operation and maintenance activities in ABB habitat can be divided into two general categories: 1) those that directly affect the beetle (e.g., earthmoving, soil compaction, etc.) and 2) those that affect the beetles indirectly through the reduction habitats or general fragmentation, which can affect the ABB or potential species on which it relies for a carrion source. Both direct and indirect effects can impact the ability of ABB to feed, shelter, and reproduce. Enbridge provided a detailed threats analysis table for the

species (see BIA 2013 and Corps 2013; Appendix F, Table 2), that outlines the potential effects from the FS Pipeline on ABBs and suitable habitat, and it is incorporated by reference.

The magnitude of the potential impacts to the ABB will depend on population densities in the Project area during construction, the type of Project disturbance to habitat and ABBs that will occur during construction and O&M, and the type of indirect effects that may remain after restoration. Typical construction projects are relatively short-term, usually completed in fewer than nine months. However, operation and maintenance activities are recurring impacts over the life of the project.

### Direct Effects

Direct adverse impacts to ABBs are likely to occur during the construction of the FS Pipeline as a result of ground disturbance from clearing the ROW with heavy mechanized equipment, excavating trenches for installation of pipe, building access roads, constructing pump stations, revegetation, and various other ground disturbing activities as described in Section 1. Ground disturbance within the ABB's range has the potential to harm, harass, or kill individuals. Direct effects of ground disturbance activities include: 1) heavy equipment crushing individuals or brood chambers; 2) excavation or exposure of individuals or brood chambers; 3) soil compaction rendering areas unsuitable for carcass burial; 4) and death or injury as a result of fuel spills.

ABBs are susceptible to death or injury by crushing and excavation/exposure at all stages of their life cycle during both the active and inactive seasons. This is particularly likely during the active season when vehicles and heavy equipment are operating in areas inhabited by reproducing ABBs and brood chambers are destroyed, along with the adults, eggs, and larvae contained within. Non-reproductive adults sheltering in soils or leaf litter during the day may also be killed or injured by crushing. Similarly, uncovering or digging into or near brood chambers may result in exposure of the brood chamber and/or ABBs inside resulting in mortality caused by desiccation, heat stress, and/or predation by various scavengers and small mammals. If construction takes place during the winter season, adult individuals could be crushed, and ABB re-emergence in late spring or early summer could be prohibited. Soil compaction by heavy equipment also inhibits reproduction by preventing carcass burial if construction takes place during the reproductive season.

Heavy equipment used to construct the Project will require refueling at various times. Death of ABBs could result from diesel and gasoline fuel spills at brood sites or where adult (non-reproducing) ABBs were sheltering or overwintering. The chance of a diesel or gasoline fuel spill occurring at the exact place where an ABB brood site occurs is very unlikely, but it is possible. Construction BMPs provided in Enbridge's CECP will be used to minimize this hazard, but the potential for diesel or gasoline fuel spills still exists.

Direct adverse impacts are also likely to occur during the O&M of the proposed pipeline but to a lesser degree than during pipeline construction because the amount of heavy equipment operation and ground disturbance will be greatly reduced relative to initial pipeline construction. Because the ROW will be restored following construction, there is a strong likelihood that ABBs, if present, will use habitats within the Action Area after restoration is complete. Any

O&M activities that would result in additional ground disturbance would have similar effects as described during construction above. Vegetation management O&M activities (i.e., clearing, mowing, brushing) results in heavy equipment travel along the permanent ROW, and this may also crush ABBs or their brood chambers. However, Enbridge has avoided this impact by conducting these activities when the ABB is not active from October to early May (Conservation Measure #20).

One additional aspect of the operational phase that is not well-understood is the effect of increased soil temperatures caused by the pipeline. Evidence suggests that the transport of oil through the pipeline creates heat that is dissipated through the soil to the ground surface. This effect is believed to have a greater impact on ABBs in more northern latitudes; therefore, the effect of soil heating by the operational pipeline would be negligible for ABB for the FS Pipeline.

### Indirect Effects

Construction activities and related habitat disturbance can indirectly affect the ABB by 1) resulting in the loss, fragmentation, and alteration of suitable habitat; 2) limiting or reducing available carrion; and 3) disrupting the normal behavior of ABBs.

Habitat impacts can be expressed in acres temporarily and permanently disturbed and the specific characteristics of the habitat proposed for disturbance. Enbridge estimated habitat impacts using the 2013 survey data and the Service's standard buffer of 0.5 mile radius circle around a positive trap location, and the Service's definition of exclusionary (i.e., not suitable) habitat. The construction of the FS Pipeline will result in the temporary loss of 99.3 acres, the permanent cover change (i.e., conversion to herbaceous vegetation in some areas of the permanently maintained ROW) of 14.1 acres, and the permanent loss of 24 acres of occupied ABB habitat in Oklahoma. Because the ABB is an annual species, it may not be present in the same areas from one year to the next, and surveys are valid until the next ABB active season. The ABB was not detected in Kansas in 2013, and construction will be complete prior to the next ABB active season in 2014.

ABBs are particularly sensitive to habitat loss and habitat alteration; it is the primary factor leading to its decline. In addition, the forest fragmentation impact analysis was used to evaluate fragmentation and the increase in the amount of edge habitat. Approximately 322 acres of forested habitat within the ABB range in Oklahoma and Kansas will be removed from temporary workspaces (TWS, ETWS, and pipe yards), 165 acres will be permanently converted to herbaceous (permanently maintained ROW), and 0.3 acre will be permanently lost (access roads and aboveground facilities). The increase in the amount of edge habitat within the range of the ABB may result in unsuitable habitat conditions. Areas of increased edge also often support large populations of small mammal scavenger species such as skunks, raccoons, foxes, and coyotes (Wilcove et al. 1986). These mammals are thought to compete with ABBs for carrion and opportunistically prey directly on ABBs. Additionally, fragmentation can reduce the carrion prey base of appropriate size for ABB reproduction (Oxley et al. 1974) or increase invasive plant and animal species (Marvier et al. 2004).

ABBs may also be indirectly affected during construction of the FS Pipeline by disruptions of their normal behavior resulting from increased human activity, vehicle traffic, noise, and use of artificial lighting for work taking place at night. Similarly, reductions in soil moisture and increases in soil temperature resulting from clearing and grading may cause ABBs to alter their behavior patterns to avoid these areas.

ABBs may be adversely affected by intense human activity, elevated levels of vehicle traffic, and excessive noise. Human activity may displace individual ABBs from the construction ROW, potentially resulting in increased interspecific competition for resources and increased exposure to avian and mammalian predators. It is also possible that increased construction activity could lead to a decrease in direct mortality because ABBs may abandon the area for areas where direct take is less likely. Behavior disruption may be reduced when construction activity takes place during later fall and winter when the beetles are inactive. However, some construction and restoration activities are expected when the beetles are active.

In addition, like many insects, ABBs are attracted to artificial lights (Bedick et al. 1999). This attraction may disrupt their normal feeding and reproductive behavior. However, most construction activities will occur during the day, so disruption of behavioral patterns caused by artificial light will be reduced but may still occur in select locations.

Clearing of vegetation and grading ROWs exposes soils to sun and wind and thereby may result in decreased soil moisture and elevated soil temperature. ABBs are known to be sensitive to changes in soil moisture and high temperature (Bedick et al. 2006). ABBs apparently seek out areas with relatively higher soil moisture and may cope with elevated air temperatures by remaining inactive and buried in soil. In some situations, mortality of ABBs could be caused by reduction of soil moisture and elevated temperature in areas near sheltering, brooding, or overwintering areas. Grading and revegetation of ROWs during later spring and summer therefore may result in mortality or temporary behavioral changes, which may directly or indirectly adversely affect the ABB.

Indirect effects during the O&M phase of the project will be minimal but still expected to occur. Indirect effects resulting from ground disturbance are likely to occur when excavation occurs during the O&M phase of the project. It is difficult to predict the amount of O&M that would impact ABBs because it is an annual species that may not be present in the same areas from one year to the next. Based on the 2013 surveys, ABBs are currently present along six miles of the proposed pipeline in Oklahoma. We assume that ABBs will continue to be present at about the same density over the life of the pipeline at various locations in Oklahoma and Kansas. Given this assumption, Enbridge estimates that over the next 50 years, one ground disturbing maintenance activity would occur at least once on each of the six miles, resulting in 0.25 acres of ground disturbance per event. Travel to each maintenance activity would disturb an additional 1.15 acres per event. Together, the ground disturbance and travel disturbance equals 8.4 acres of total disturbance over the 50 years of project O&M. Enbridge rounded the total amount of ground disturbance from O&M activities to 9 acres. They then multiplied this number by 10 to be conservative if ABBs are present throughout more of the project area than anticipated. Therefore, we anticipate O&M construction activities will result in the temporary loss of no more than 90 acres of habitat in the ABB range along the proposed pipeline over the next 50

years. Vegetation management O&M activities may also result in habitat disturbance; however, Enbridge would avoid this impact by conducting these activities when the ABB is not active from October to early May (Conservation Measure #20). Some behavioral disruption may also occur during O&M activities through limited human activity and the use of artificial lights. However, artificial lights at above-ground facilities will be down-shielded and only installed at the Pershing Pump Station. Other artificial lights along the Project ROW would only occur in the event of emergency repairs or other unexpected maintenance activities. Therefore, indirect effects from behavioral disruption due to artificial lights are not anticipated.

### Summary

Direct and indirect effects occurring during the construction phase of the project are likely to adversely affect ABBs through the following means: 1) ground disturbance resulting in crushing and/or exposing individuals or making soils unsuitable for reproduction, 2) potential diesel or gasoline fuel spills resulting in death or injury, 3) loss, conversion, alteration, or fragmentation of habitat resulting in population declines, 4) increased soil temperature and decreased soil moisture making soil unsuitable for sheltering, brooding, or overwintering, and 5) increased human activities (traffic, noise, artificial light) may interrupt normal behavior and result in impacts to breeding, feeding or sheltering ABBs. These impacts have not been avoided and are expected to occur, though the effects have been minimized. Similarly, direct and indirect effects are likely to adversely affect ABBs during the O&M phase of the project if new excavation is necessary. Impacts are not expected to occur during O&M unless new excavation is occurring.

#### **4.2.2 Indiana Bat**

As a result of construction of the FS Pipeline, maternity and non-maternity summer roosting habitat and foraging habitat will be removed. Using the classification of habitat into maternity roosting, non-maternity roosting, and foraging habitat (see Section 3.2.3), Enbridge determined impacts to habitat would occur within the permanently maintained ROW, TWS, and ETWS. These impact acreages were parsed by counties in Illinois and Missouri and are presented in the BAs (BIA 2013; USACE 2013). Updated final Indiana bat impact acreages were provided by email dated July 20, 2013, from Enbridge's Joe McGaver to the Service's Karen Herrington. Overall, Enbridge anticipates that approximately 432 acres of maternity roosting habitat, 154 acres of non-maternity roosting habitat, and 35 acres of foraging habitat (totaling 621 acres) for Indiana bats will be removed as a result of the Project. Roughly speaking, twice as much of this habitat occurs in Missouri than Illinois.

According to surveys, within the acres removed, 1,870 maternity roost trees will likely be cleared from the maintained right-of-way and construction workspaces will likely be cleared as a result of the Project. These maternity roost tree locations were also parsed by county and are presented in the BAs (BIA 2013; USACE 2013). Trees are distributed throughout the alignment in Illinois and Missouri.

There are three primary impacts of the construction of the FS Pipeline on Indiana bats: 1) direct impacts to individuals if an occupied roost tree is felled during the active season (April 1 to

October 31 or October 1 from mile marker 0 to 164<sup>11</sup>); 2) indirect effects from the removal of active maternity roost trees during the inactive season that may result in decreased viability of the maternity colony; and 3) indirect effects from the removal of summer habitat resulting in substantial habitat degradation.

#### Direct Effects to Individuals from Active Season Clearing

Removal of roost trees while Indiana bats are present may result in direct effects by killing, injuring, or otherwise harming individuals or a maternity colony. Clearing during the active season may impact migratory bats (females, males, and juveniles), non-maternity individuals in summer habitat (males and non-reproductive females), females and juveniles roosting in an unidentified maternity tree, and all bats within the swarming habitat range of the new P1 hibernaculum. In order to minimize direct effects, Enbridge plans to clear Indiana bat habitat after August 7 (Conservation Measure #27-30). Young bats are generally flying and eating on their own by early August, and maternity colonies are beginning to disperse. Females typically arrive at hibernacula later than males but are found within swarming areas from August to October. Therefore, the risk of direct effects to all bats is reduced, though still possible if an occupied roost tree is felled from August until the bats hibernate. Enbridge is further minimizing this impact to female and juvenile Indiana bats by conducting Indiana bat surveys, and where maternity roost trees occur or are assumed to occur within the Action Area, clearing within 3,280 ft (1 km) will occur during the inactive season (Conservation Measure #30.a, #30.b.ii, #30.c.ii). The 3,280 ft (1 km) clearing buffer distance is intended to ensure that no other unidentified maternity roosts occur within the area, using the assumption that alternate maternity roosts typically occur within 1 km (USFWS 1997).

#### Indirect Effects from Removing Active Maternity Roost Trees

Indirect effects to Indiana bats may also occur if active maternity roost trees (i.e., occupied in the summer) are cleared during the hibernation period (inactive season). Removal of maternity roost trees during this time renders them unavailable to pregnant bats that exhibit maternity area and/or maternity roost tree fidelity following migration in the spring. Active primary maternity roost trees are larger trees that are rare across the landscape, and we do not have complete understanding of how they are selected. It can be difficult for a maternity colony to find a suitable replacement even if a suite of alternate maternity roost trees in the area are already being used. Periods of pregnancy, birth, and lactation are the most sensitive and energetically demanding times of year for reproductive females. Resulting indirect effects from the loss of maternity trees during these periods may include a reduction in foraging, increases in energetic demands, exposure to inter and intra-specific competition, exposure to predation, and decreases in the long-term reproductive success and viability of the colony in the area. This substantial habitat modification may result in harm by significantly impairing behavioral patterns, including breeding, feeding, or sheltering within a maternity colony. If no adequate primary and alternate maternity roosts remain adjacent to the area of impact, indirect effects would be expected to

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<sup>11</sup> The typical active season in Illinois occurs from April 1 to September 30; however, the newly identified P1 hibernaculum indicates that swarming habitat occurs from MP 164 west to the IL/MO border. Indiana bats are likely to be using those areas until October 31.

occur as pregnant females search potentially unfamiliar habitat for new roosting and foraging areas the following year.

In order to avoid or minimize the effect of removing active maternity roost trees, Enbridge has committed to completing Indiana bat surveys with the intent to identify occupied maternity roost trees housing more than six Indiana bats within the Action Area (Conservation Measure #25). We selected six bats as our threshold because this number of bats, generally speaking, represents 10% of the average number of bats comprising a maternity colony, which constitutes a significant portion of a maternity colony. Enbridge has also committed to avoid these trees and a 100 ft buffer around the tree to protect its microclimate (Conservation Measure #30.c.i). If it is not possible to avoid clearing within a 100 ft buffer of the tree, Enbridge will clear no more than two occupied maternity roost trees provided: 1) there are at least four additional potential maternity roost trees that can serve as functional replacements within 1,000 feet of the lost maternity roost tree; 2) the two cleared maternity roost trees are not within a 2.5 mile radius of each other; 3) clearing within 3,280 (1 km) of the roost tree will occur in the inactive season; and 4) removal of any occupied maternity roost tree will occur with the Service's approval (Conservation Measure #30.c.ii). Four functional replacements were selected in order to increase the chances that one of these trees will be used as the replacement maternity tree. Functional replacements must occur within 1,000 ft of the occupied tree because this is the maximum distance that an Indiana bat will travel over open areas. The 2.5 mile radius limit is intended to ensure that the impact does not occur within the same maternity colony in order to ensure that habitat supporting the maternity colony is not significantly degraded. The 3,280 ft (1 km) clearing distance is intended to ensure that no other unidentified maternity roosts occur within the area, using the assumption that alternate maternity roosts typically occur within 1 km (USFWS 1997). Given that Enbridge strictly adheres to these conservation measures, we anticipate that disturbance, injury and death of individuals will be greatly minimized.

#### Indirect Effects from Removing Summer Habitat

Indirect effects may also occur through the removal of foraging and roosting habitat. If the removal of foraging and roosting habitat results in substantial degradation of habitat quantity or quality, a maternity colony may be harmed via a significant impairment of behavioral patterns, including breeding, feeding, or sheltering. As stated earlier, a maternity colony needs at least 10% suitable habitat (i.e., forested habitat) to exist at a given point on the landscape. Enbridge has committed that no more than 5% of suitable habitat will be removed within an Indiana bat home range (i.e., maternity colony) over the life of the Project (Conservation Measure #26). This was recommended based on the Service's desktop review of the habitat within each maternity colony and our best professional judgment that the loss of less than 5% of the current habitat would not likely degrade the quality of quantity of habitat for roosting or foraging purposes. Given that Enbridge strictly adheres to these conservation measures, we do not expect that removal of foraging and roosting habitat will modify or degrade the foraging or roosting habitat such that death or injury or other harm will occur.

The construction of the FS Pipeline may result in these additional direct impacts (harassment, injury, or death) due to burning vegetation and debris near occupied maternity roost trees, aerial application of herbicides and insecticides during the active season, and construction activities

preventing normal emergence and return to roosts for foraging. Enbridge has committed to avoid these impacts through Conservation Measures 31-33.

Enbridge provided a detailed threats analysis table for the species (see BIA 2013 and Corps 2013; Appendix F, Table 3), that outlines all of the potential effects from the FS Pipeline on Indiana bats and suitable habitat, and it is incorporated by reference. All impacts to Indiana bat habitat are expected to occur during the construction of the FS Pipeline. No impacts are expected on Indiana bat habitat during operation and maintenance. Although some ecological succession will occur on the permanently maintained ROW, regular maintenance via mowing, brush clearing, and branch trimming will ensure that the ROW will be an open area for the term of the Project. Expected impacts during O&M activities include herbicide application and noise and presence of humans during vegetation management, ROW repair, access road maintenance, and aerial inspection, and we anticipate that impacts during the O&M phase of the project are not likely to adversely affect Indiana bats.

### Summary

Direct and indirect effects occurring during the construction phase of the project are likely to adversely affect Indiana bats through the following means: 1) removal of occupied roost tree resulting in death or injury of individuals, and 2) removal of active maternity roost trees may result in decreased viability of the maternity colony. These impacts have not been fully avoided and are expected to occur. Indirect effects of the removal of foraging and roosting habitat are also likely to occur, but we do not expect the habitat loss to affect the quality and quantity of habitat within the Action Area. Direct and indirect effects are not likely to adversely affect Indiana bats during the O&M phase of the project because all potential impacts have been avoided.

## **4.3 Species' Response to the Action**

### **4.3.1 Decurrent False Aster**

We do not know how many individuals or populations of decurrent false aster may be affected by the construction, operation, and maintenance of the FS Pipeline because a survey for the decurrent false aster has not been conducted. Only one area with potential habitat is known. While the use of the conservation measures described above should reduce impacts to individuals, some mortality and reduction in growth and reproduction is expected if the species occurs in the areas that will be cleared or maintained, as a result of mowing, introduction and/or spread of exotic species, and exposure to herbicides. The construction activities will result in a short, temporary disturbance to potential decurrent false aster habitat. Direct and indirect impacts are expected to occur when trees in the permanent ROW above the UHDD are initially cleared and during vegetation management activities that will occur during O&M of the pipeline.

Overall, we expect these impacts to be minimal since the amount of potential habitat is relatively small. In the pipeline alignment, the species only occurs at the Illinois River crossing. Also, initial ROW tree clearing activities will occur after the plant has flowered. Most of the impacts from O&M activities and initial ROW tree clearing will occur outside of the species' preferred

habitat minimizing direct impacts to the species. Given the fecundity of the species and long-term viability of its seeds in the soil, it is likely that the species will persist and recover at the site. Because decurrent false aster has the potential to colonize disturbed areas with the appropriate hydrology in its known range, one possible beneficial effect of the construction and maintenance of the FS Pipeline is the expansion of decurrent false aster into disturbed habitat along the temporary workspace and permanent ROW. It could benefit from reduced competition for solar exposure with other herbaceous ground cover species.

#### **4.3.2 American Burying Beetle**

Some ABBs in all life stages may be disturbed or killed during the construction, operation, and maintenance of the FS Pipeline. This result would most likely occur in instances where sheltering or reproducing ABBs were present in the construction ROW during land clearing and excavation activities. It is very difficult to predict the number of ABBs that would be impacted by the FS Pipeline. Although surveys indicate that ABBs are currently present along six miles of the pipeline in Oklahoma, these surveys can only be used to indicate presence or probable absence, not population numbers or population trends. Although direct take is possible, it is estimated to be relatively low and we do not anticipate population-level effects because ABB populations are dispersed across a wide geographical area, no portions of the pipeline route are within designated CPAs in Oklahoma, Kansas ABB populations are believed to be small, and survey results from 2012 and 2013 indicate that the species is not present in much of the available habitat. The activities producing acute impacts (e.g., land clearing, grading compaction, access road regrading and re-graveling, potential fuel spills, possible herbicide use, and ROW repair activities occurring on an occasional basis along the pipeline route) would be limited geographically; however, they would place some stress on the population within the area of occurrence.

Most of the potential impacts to the ABB are expected to be indirect through the loss and disturbance of a total of 115.5 acres of occupied habitat (temporary loss of 99.3 acres, the permanent cover change of 14.1 acres, and the permanent loss of 2.1 acres) during pipeline construction and the temporary loss of 90 acres of habitat in the ABB range during O&M construction activities along the proposed pipeline over the next 50 years. The ABB is particularly susceptible to impacts from habitat alteration or changes that result from the modification of land use practices. While soil disturbance will be extensive during construction, the areas with temporary loss and permanent cover change will be revegetated; therefore, we anticipate that ABBs will re-establish populations in suitable areas within the TWS, ETWS, and permanent ROW. Indirect impacts are also not anticipated to be severe because none of the habitat within the Action Area is designated as a CPA. In addition, the conservation measures described above minimize the impact to the ABB and mitigate the impacts to its habitat where impacts are not avoided. Therefore, we expect the impact of the construction, operation, and maintenance FS Pipeline on ABBs to be minimal.

#### **4.3.3 Indiana Bat**

Despite the conservation measures, we anticipate that some male, female, and juvenile Indiana bats may be killed or injured during clearing that occurs during construction of the FS Pipeline in

the active season from August 7, 2013 to October 31, 2013 (or October 1, 2013 from MP 0 to 164). This is likely to occur if a tree that they are roosting in is felled during summer roosting/foraging or migration. We expect that most of this potential impact would occur during migration to hibernacula. Maternity colonies are beginning to disperse after August 7, and females are also less restrictive in their choice of roost trees at that time because their young are independent. The majority of males begin migration by August. It is difficult to predict the number of potential Indiana bats that will be affected because Indiana bat roosting locations are changing on a daily basis as they return to hibernacula. It is unlikely that a roosting tree will be felled given the dispersed nature of Indiana bats on the landscape and their frequent movement during migration, the relatively small amount of clearing that would occur on a daily basis (6,300 ft/day at 3 locations within Indiana bat habitat; see information on construction spreads in Section 1.3.1), and the amount of available roosting trees both within the survey corridor and in the landscape as a whole. However, it is not discountable, and mortality and injury could occur.

For the purposes of this analysis, we assumed that all roosting locations during migration were confined to the 1,870 potential maternity roost trees that will be cleared during construction. Given the small likelihood of felling an occupied roost tree during the migratory period, we assumed that no more than 1% of the 1,870 trees (i.e., 19 occupied roost trees) would have roosting bats at the time of clearing and no more than 10 Indiana bats would be roosting in a tree at any given time. Finally, we assumed that 5% of disturbed adult bats would not escape from felled roost trees during clearing activities (Belwood 2002). Given the above, we anticipate no more than one bat will be killed, harmed, or harassed in each of the 19 trees that may be felled. Thus, we anticipate up to 19 Indiana bats (male, female, or juveniles) may be directly disturbed, injured, or killed during project implementation.

We also anticipate the loss of two active maternity roost trees and/or their 100 ft buffer during the construction of the pipeline. Enbridge's conservation measures ensure that the impact of the removal of the two maternity roost trees is minimized by providing other roosting opportunities at four nearby trees, ensuring that one maternity colony is not significantly impacted by the removal of more than one active maternity roost, and avoiding direct impacts by clearing when the bats are not present. Assuming that the average maternity colony size is 60 females, there is a potential to impact 120 female Indiana bats and 2 maternity colonies. Given the conservation measures, the level of impact is not likely to result in death or the loss of the maternity colonies. The likely behavioral response of bats returning in the spring to the cleared area will be to disperse to adjacent suitable habitat. However, such dispersal is likely to cause a short term delay in birth by increasing the amount of time it takes to settle into a maternity roost and increasing energetic demands. Loss of familiar roost trees and associated foraging habitat, while adverse in the short term, are not expected to have long term consequences for a colony because of the remaining forested habitat within the known foraging range of the Indiana bat (Sparks et.al. 2005) and the propensity of the species to utilize alternative roost sites (Carter and Feldhammer 2005). We expect that 120 female Indiana bats will be harmed and harassed by the loss of familiar roost trees, and we anticipate that this will be a temporary impact.

Generally speaking, the loss of 621 acres of high quality habitat and 1,870 potential maternity roosting trees would generally lead to adverse effects for Indiana bats. However, the conservation measures proposed will minimize the adverse effects that are incurred. Although

individual impacts are likely, these individual impacts are not likely to incur population-level effects. As explained above, losses from habitat removal are not likely to affect the maternity colony fitness (i.e., long-term reproductive potential or persistence of the colony). The disturbance, injury or death of individuals are not likely to be confined to a single colony but rather spread among the colonies. Thus, the death of one or several bats from a single colony over the life of the project is not likely to affect the fitness of that colony. Even if the affected maternity colonies are declining at the rate of the RU, we do not anticipate a change in the fitness of maternity colonies due to this project. That is, we believe the maternity colonies within the Action Area can withstand the anticipated losses that may occur as a result of the project.

#### **4.4 Interrelated and Interdependent Actions**

We must consider along with the effects of the action the effects of other activities that are interrelated to, or interdependent with, the proposed action (50 CFR sect. 402.02). Interrelated actions are part of a larger action and depend on the larger action for their justification. Interdependent actions have no independent utility apart from the proposed action. At this time, the Service is unaware of actions that are interrelated and interdependent with the construction, operation, and maintenance of the FS Pipeline that have not already been considered in this biological opinion.

### **5 CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the Action Area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of any specific plans within the Action Area that would affect ABBs or decurrent false aster that would not be covered under section 7. Indiana bats within the Action Area may be affected by wind energy developments and tree clearing activities on private land. The operation of wind turbines has been documented to cause mortality of Indiana bats (Good et al. 2011, Service 2011). No wind energy developments are currently planned in Missouri. Several wind energy projects are planned or being constructed in Illinois; however, none of these projects are near the Action Area or within migration distance. Therefore, we do not expect cumulative effects from wind projects to impact Indiana bats in the Action Area. We also considered the effects of tree clearing on private land. Although this is reasonably certain to occur in the Action Area, we have no way to predict the spatial or temporal extent of the impact.

### **6 CONCLUSION**

#### **6.1 Decurrent False Aster**

Our analysis indicates that the proposed project would have a negative effect the decurrent false aster, but it will not appreciably reduce the survival and recovery of the decurrent false aster. Most direct and indirect effects will occur during construction and vegetation management, and they are expected to be small, temporary, and recovery will be rapid. The decurrent false aster is

currently considered stable, and given its natural ability to colonize disturbed areas and its high fecundity and population viability, the probability of species extinction is low and the recovery potential is high.

After reviewing the current status of the listed species, 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 proposed construction, operation, and maintenance of the FS Pipeline will not jeopardize the continued existence of the decurrent false aster. No critical habitat has been designated for the decurrent false aster.

## **6.2 American Burying Beetle**

The FS Pipeline will likely modify a total of 205.5 acres of ABB habitat: 115.5 acres of occupied ABB habitat will be disturbed during construction, and 90 acres of habitat in the ABB range will be disturbed during O&M construction activities over the next 50 years. Some ABBs may be disturbed or killed during FS Pipeline construction and related ground disturbance activities, but most of the effects are expected to be infrequent, of short duration, reversible, and are not expected to have a population-level effect. Habitat loss will have a negative impact, but 113.4 acres of the total 115.5 acres will be revegetated after the pipeline is constructed, and we expect that ABBs will recolonize these areas. We also expect ABBs to recolonize the 90 acres that may be impacted during O&M activities. In addition, mitigation is expected to offset the impact. The ABB population within the action area is likely to be small and not representative of that which is considered most critical to ABB recovery (*i.e.* high density areas such as those within the Oklahoma ABB CPAs). Therefore, our analysis indicates that the proposed project would have a negative effect on the American burying beetle, but it will not appreciably reduce the survival and recovery of the American burying beetle.

After reviewing the current status of the listed species, 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 proposed construction, operation, and maintenance of the FS Pipeline will not jeopardize the continued existence the American burying beetle. No critical habitat has been designated for the ABB. However, the proposed action likely will result in incidental take of ABBs.

## **6.3 Indiana Bat**

The proposed action will likely modify 621 acres of Indiana bat habitat over 376 miles of the pipeline and harm or harass 120 reproductive female Indiana bats and potentially kill 19 non-reproductive or migratory individuals. Our analysis, however, indicates that these impacts are not likely to cause maternity colony impacts. We anticipate that the 120 females that may be harmed and harassed will return to hibernacula in the fall, and the potential loss of 19 individuals is not likely to impact the hibernating populations. Because maternity colony and hibernaculum impacts are not anticipated, we do not expect that this Project will result in a loss of fitness at the population level or recovery unit level. In addition, Enbridge has also committed to mitigating the loss (both temporary and permanent) of all occupied and presumed occupied Indiana bat habitat (Conservation measures #24, 27, 29, and 30). For these reasons, it is unlikely that the

anticipated effects from this proposed action will affect the likelihood of achieving the recovery needs of the species, and therefore, is not likely to appreciably reduce the survival and recovery of the Indiana bat.

After reviewing the current status of the listed species, 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 proposed construction, operation, and maintenance of the FS Pipeline will not jeopardize the continued existence of the Indiana bat. No critical habitat occurs within the Action Area; therefore, no critical habitat will be affected. However, the proposed action likely will result in incidental take of Indiana bats.

## **7 INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the 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 an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering [50 CFR §17.3]. Incidental take is defined as take that is incidental to, and not the purpose of, an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement (ITS).

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

The measures described below are non-discretionary, and the Corps and BIA must insure that they become binding conditions of any contract or permit issued to carry out the proposed action for the exemption in section 7(o)(2) to apply. The BIA is responsible for all Reasonable and Prudent Measures, and Terms and Conditions for the American burying beetle (ABB). The Corps is responsible for all Reasonable and Prudent Measures, and Terms and Conditions for the Indiana bat. The Corps and BIA have a continuing duty to regulate the action covered by this incidental take statement as it relates to their permit and easement actions. If the Corps and BIA: (1) fail to assume and implement the terms and conditions or, (2) fail to require any contracted group to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, easement, or lease documents, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps and BIA

must report the progress of the action and its impact on the species to the Service as specified in the ITS [50 CFR §402.14(I)(3)].

## **7.1 AMOUNT OR EXTENT OF TAKE ANTICIPATED**

### **7.1.1 American Burying Beetle**

Incidental take of American burying beetles is reasonably certain to occur as a result of the construction, operation, and maintenance of Enbridge's Flanagan South Pipeline (FS Pipeline). Harassment to individual beetles may occur from construction activities conducted within occupied areas. Harm to the species may occur through activities that kill individual ABBs as well as those that alter the suitability of the habitat to support ABBs. Take of ABBs is anticipated to occur on all affected occupied habitat (measured in acres).

It is difficult to predict the number of ABBs that will be taken because there is no density estimate for the Action Area, and presence/absence surveys conducted cannot be used to estimate abundance. Take, in the form of killing, harming, and/or harassment, is also difficult to precisely quantify and usually cannot be measured in terms of numbers of individuals of ABBs for the following reasons: 1) the ABB has a small body size making it hard to locate, which makes encountering dead or injured individuals unlikely; 2) ABB losses may be masked by annual fluctuations in numbers and highly concentrated movements; and 3) ABBs spend a substantial portion of their lifespan underground. These factors make it extremely difficult to detect the amount of take that will occur. Although we cannot estimate the number of individual ABBs that will be incidentally taken, the Service is providing a mechanism to quantify when take would be considered to be exceeded. For purposes of this biological opinion, the Service defines incidental take in terms of the number of acres disturbed. The Service considers using acres of habitat disturbed as an appropriate surrogate, because habitat disturbance is the primary cause of take associated with the project.

The Service concludes that the incidental take of ABB will be considered to be exceeded if the total number of occupied acres disturbed during the construction of the FS Pipeline, access roads and aboveground facilities is more than 115.5 acres. In addition, take will be exceeded if more than 90 acres of occupied habitat is disturbed during the operation and maintenance activities of the pipeline over the next 50 years. The BIA is required to reinitiate consultation with the Service if changes in the construction, operation and maintenance of the FS Pipeline exceed the number of acres anticipated to be affected.

### **7.1.2 Indiana Bat**

Despite the conservation measures, we anticipate that some male, female, and juvenile Indiana bats may be killed or injured during clearing that occurs during construction of the FS Pipeline in the active season from August 7, 2013 to October 31, 2013 (or October 1, 2013 from MP 0 to 164). This is likely to occur if an occupied roost tree is felled during summer roosting/foraging or migration; however, we expect that most of this potential impact would occur during migration to hibernacula. We anticipate that clearing during the active season will result in take,

in the form of death, harm, or harassment, of no more than 19 male, female, or juvenile Indiana bats. Take will be detected by observing mortality or injury.

We also anticipate the loss of two active (i.e., occupied in the summer) maternity roost trees and/or their 100-ft buffer during the inactive season. We anticipate that removal of maternity roost trees during the inactive season will result in harm and harassment of no more than 120 reproductive female Indiana bats. Take will be measured by the number of active maternity roost trees removed.

The Corps must reinitiate consultation with the Service if more than 19 Indiana bats are killed or injured or if more than two active maternity roost trees and/or the 100 ft buffer are removed during the Project.

## **7.2 EFFECT OF THE TAKE**

### **7.2.1 American Burying Beetle**

Approximately 115.5 acres of occupied ABB habitat will be disturbed during the construction of the FS Pipeline, and up to 90 acres of habitat in Oklahoma and Kansas may be impacted during O&M activities. This is a small percentage of the ABB range within the total Action Area. Some ABBs may be disturbed or killed during FS Pipeline construction and related ground disturbance activities, but most of the effects are expected to be infrequent, of short duration, and reversible. Habitat loss will have a negative impact, but mitigation is expected to reduce the impact. In the accompanying opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the ABB.

### **7.2.2 Indiana Bat**

Overall, the harm and harassment of 120 reproductive female Indiana bats and death, harm, or harassment of 19 individuals over two maternity colonies and 621 acres of Indiana bat habitat is not likely to cause population-level (maternity and hibernaculum) effects. In the accompanying opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Indiana bat.

## **7.3 REASONABLE AND PRUDENT MEASURES**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of ABBs and Indiana bats during the construction, operation, and maintenance of the FS Pipeline.

### **7.3.1 American Burying Beetle (ABB)**

To minimize potential take of the ABB, the Service recommends the following RPMs to BIA:

1. The BIA will ensure the lessee will monitor the level of take associated with the construction of the FS Pipeline.

2. The BIA will ensure the lessee will take every precaution to minimize the potential for direct killing of American burying beetles occurring in soil in the impact area, before, during, and after project implementation.

### **7.3.2 Indiana Bat**

To minimize potential take of the Indiana bats, the Service recommends the following RPMs to the Corps:

1. The Corps will ensure the permittee will monitor take to verify that the authorized level of take has not been exceeded.
2. The Corps will ensure that the permittee will monitor Indiana bats to determine their response to the proposed actions and the efficacy of the Conservation Measures.

## **7.4 TERMS AND CONDITIONS**

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and BIA must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are mandatory.

### **7.4.1 American Burying Beetle (ABB)**

RPM 1.

1. The BIA will ensure that Enbridge track the amount of O&M activity and soil disturbance conducted over the life of the project. The total amount of habitat disturbance during O&M activities cannot exceed 90 acres. Enbridge can chose to survey for ABBs prior to the O&M activity following the Service's guidelines that are currently accepted at the time the surveys occur (likely to change over the 50 years of the project). If no ABBs are found, the O&M activity and impacted acreages would not be counted towards the total 90 acres. However, if no surveys are conducted, ABBs will be assumed to be present.
2. The BIA will ensure that Enbridge provides the Service an annual report detailing the area (acres) impacted by soil disturbance through pipeline construction and O&M activities. This report must include a copy of all ABB survey results and reasonable and prudent measures implemented.
3. 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 Office of Law Enforcement, 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 within seven (7) calendar days.

4. 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.

#### RPM 2.

4. Excavated soil from the pipeline trench shall be removed as carefully as possible, with as little mixing as possible, and set aside and not disturbed. When replacing excavated material avoid over-compacting the soil. Avoid compacting at all where possible.
5. Fill dirt, if necessary for any phase of project activity, shall come from areas of non-native vegetation where the beetle is not expected to be present. Soil should not have been treated with insecticides recently prior to use.
6. If construction concludes during the dormant season, disturbed areas will be temporarily stabilized immediately following soil ripping by broadcasting cool season species such as annual rye grass or wheat seed. These grasses are annual species that will not become permanently established. Where necessary, clean, weed-free straw mulch, hydromulch, or erosion control blanket will be used to protect seed and conserve soil moisture. During the first growing season following construction or immediately following soil ripping if construction concludes during the growing season, a mixture of native warm season grasses will be planted within the ROW. This will include species such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*).

#### 7.4.2 Indiana Bat

##### RPM 1.

1. Take by injury and mortality during pipeline construction when trees are being cleared from the construction ROW during the active season will be monitored. This will include ensuring that all contractors, ROW managers and others present during clearing activity are fully informed of the potential to encounter dead or injured bats and of Enbridge's responsibilities if dead or injured bats are encountered. Individuals present during

clearing activities will be diligent in their efforts to locate dead or injured bats. If dead or injured bats are encountered, the number and location will be reported through the chain of command to Enbridge. The procedures outlined in #4 will also be followed. In addition to encountering dead or injured bats, those present on the ROW during clearing activities will be diligent and aware of other factors that might indicate bat presence such as watching for bats flying away from areas where trees are cleared. These data will be reported to the Service as described below.

2. Take by harm and harassment when active maternity trees are removed during the inactive season will be monitored through documentation of the number of active roost trees removed. The number of trees and amount of 100 ft buffer removed will be provided to the Service along with the number of individuals known to occupy the tree(s) during the active season from results of exit counts during 2013 surveys. These data will be reported to the Service as described below.
3. The Corps will ensure that Enbridge provides the Corps with an annual report detailing the area (acres) of forested habitat removed, number of active maternity roost trees and/or the 100 ft buffer removed, and the number of Indiana bats killed or injured during the construction of the FS Pipeline. This report must include a copy of all Indiana bat survey results and reasonable and prudent measures implemented. The Corps will verify that the report covers their permit areas prior to submitting it to the USFWS. The Corps will submit the full report by December 31 every year.
4. If a dead or impaired Indiana bat 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 Indiana bat 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 Indiana bat. Initial notification must be made to the nearest U. S. Fish and Wildlife Service Office of Law Enforcement, at (636) 441-1909, then the Columbia Missouri Ecological Services Field Office, at (573)234-2132 and the Rock Island Field Office at (309) 757-5800. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information, including age, sex, and reproductive condition of the individual(s). Formal written notification also must be submitted.

#### RPM 2.

5. The Corps will ensure the permittee will monitor for Indiana bat presence in previously occupied non-maternity roosting habitat (i.e., where males and non-reproductive females were captured) to determine the response to the proposed actions and the efficacy of the Conservation Measures by conducting acoustic surveys in survey areas where male or non-reproductive female Indiana bats were captured. The acoustic surveys will take

place the second survey season after construction is complete to determine if Indiana bats remain present in the area.

6. The Corps will ensure the permittee will monitor presence and habitat use of maternity colonies documented during 2013 survey efforts to determine the response to the proposed actions and the efficacy of the Conservation Measures by conducting roost tree and mist net monitoring as follows:
  - a. Occupied maternity trees (i.e. roost trees to which reproductive females or juveniles were tracked) located during initial surveys will be relocated and monitored on three occasions following construction. The first monitoring event should be conducted during the maternity season after the construction of the FS Pipeline. Additional surveys should also be conducted two and five years after the first monitoring survey. Monitoring will include documentation of the presence and condition of the roost tree and conducting exit counts to document whether or not bats are still occupying the roost tree. In order to adequately monitor the response of the maternity colony, all surveys should encompass the same scope for three consecutive survey efforts to ensure scientific comparability.
  - b. In all survey areas where reproductive females or juveniles were captured during initial mist net surveys (i.e., presence of a maternity colony), follow-up mist net surveys, telemetry, and exit counts will be conducted on three occasions. The first monitoring event should be conducted during the maternity season after completion of the construction of the FS Pipeline. Additional surveys should also be conducted two and five years after the first monitoring survey. In order to adequately monitor the response of the maternity colony, all surveys should encompass the same scope for three consecutive survey efforts to ensure scientific comparability. All active maternity roost trees located initially and in follow-up surveys will be monitored in the subsequent years' survey. New maternity roost trees located during the third survey iteration (5 years post-construction) will not require subsequent monitoring, only exit counts during the current survey effort.
  - c. To determine the location of occupied roost trees, researchers federally permitted to place radio transmitters on Indiana bats, and who capture the species within the project area during mist-net surveys are required to place a radio transmitter on the first reproductive female Indiana bat captured following permit conditions outlined in approved Section 10 (a)(1)(A) Federal permit and report such activities within 24 hours to either the Columbia Missouri Ecological Services Field Office or the Rock Island Field Office of the Service, depending on the state in which the individual was captured.
7. All monitoring results shall be submitted to both the Columbia Missouri Ecological Services Field Office and the Rock Island Field Office of the Service by December 31 of the year in which the monitoring event occurred. Reports must contain:
  - a. Any management or habitat manipulations that have occurred to date;
  - b. The results of the acoustic surveys;
  - c. The results of the mist netting survey, including number, sex, age (mature or juvenile) and reproductive status of all bat captured, including Indiana bats, if any;

- d. Status and occupancy of previously documented maternity roost trees;
- e. Location and occupancy of newly documented maternity roost trees.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the action will result in the following:

1. disturbance of 115.5 acres of occupied ABB habitat during pipeline construction
2. disturbance of no more than 90 acres of ABB habitat throughout the ABB range in Oklahoma and Kansas during O&M activities
3. the mortality, harm, and harassment of no more than 19 Indiana bats, and
4. the harm and harassment of an additional 120 female Indiana bats through the removal of two active maternity roost trees and/or the 100 ft buffer.

If, during the course of the action, these numbers are exceeded, such incidental take represents new information requiring the reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps (for Indiana bats) or BIA (for ABBs) must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

## **8 CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by conducting conservation programs for the benefit of endangered and threatened species. Towards this end, conservation recommendations are discretionary activities that an action agency may undertake to minimize or avoid the adverse effects of a proposed action, help implement recovery plans, or develop information useful for the conservation of listed species. The following conservation measures are an update of the measures listed in our previous opinions.

The Service recommends that the Corps:

Require Enbridge to develop a Decurrent False Aster Management Plan for the Illinois River crossing. This management plan should include a survey of potential habitat for the occurrence of the plant and the development of site-specific conservation measures if it is found. Site specific conservation measures should include ways to avoid and minimize impacts to the species during construction and maintenance of the project. Conservation measures could include the collection of seeds from plants that will be impacted for distribution during revegetation efforts, limiting construction to the dormant season, and minimizing the application of herbicides during ROW maintenance. In order for the Service to be kept informed of actions that either minimize or avoid adverse effects or benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## 9 REINITIATION NOTICE

This concludes formal consultation on the action outlined in the BO. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information shows that the action may affect listed species in a manner or to an extent not considered in this BO; (3) the action is subsequently modified in a manner that causes an effect to the listed species not considered in this BO; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for the information and cooperation provided by your offices in this consultation. Questions or comments should be referred to Karen Herrington (850-348-6495) of this office.

Sincerely,



Acting

Lynn Lewis  
Assistant Regional Director

cc: Assistant Regional Director, Ecological Services, Albuquerque, NM  
Assistant Regional Director, Ecological Services, Denver, CO  
Rock Island Ecological Services Field Office, FWS, Rock Island, IL  
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