United States Department of the Interior

FISH AND WILDLIFE SERVICE
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IN REPLY REFER TO:
FWS/RIFO

December 4, 2013

Colonel Mark Deschenes
U.S. Army Corps of Engineers,
Rock Island District
Attn: Wayne Hannel (OD-PE)
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Deschenes:

The enclosed document transmits the U.S. Fish and Wildlife Service's Biological Opinion for the proposed expansion of the Davenport Plant (quarry) owned by LaFarge North America, near Buffalo, Iowa, and its effects on the endangered Indiana bat (*Myotis sodalis*). This document also transmits the Service's Conference Opinion based on the review of the proposed project and its effects on the northern long-eared bat (*Myotis septentrionalis*).

These opinions are provided in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). If you have any questions, please feel free to contact Amber Schorg of this office at 309-757-5800, extension 222.

Sincerely,

Richard C. Nelson
Field Supervisor

Enclosure

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FINAL BIOLOGICAL AND CONFERENCE OPINIONS

FOR PUBLIC NOTICE No. CEMVR-OD-P-2011-1048

LAFARGE NORTH AMERICA, DAVENPORT PLANT EXPANSION

November 2013

Prepared by:

U.S. Fish and Wildlife Service
Amber Schorg, Biologist
Rock Island Field Office, Moline, Illinois

SUMMARY OF FINDINGS

Formal consultation was initiated by a letter dated September 16, 2012, from the U.S. Fish and Wildlife Service (Service) to the U.S. Army Corps of Engineers (USACE) and conducted by the Service in cooperation with the Rock Island District of the USACE, Lauren Bennett of Terracon Consultants, Inc., and Bonita Berry, representative of the applicant, LaFarge North America. The purpose of the formal consultation process was to evaluate how authorization of the project will alter current environmental conditions during and after completion of the project and the effect of these alterations on endangered species occurring within the action area.

The USACE's Public Notice CEMVR-OD-P-2011-1048 states that the overall purpose of the project is to expand the existing limestone quarry operation northward into an additional 71.7 acres adjacent to the existing quarry. The actions associated with the project will involve clearing of foraging and potential roosting habitat for the endangered Indiana bat and the northern long-eared bat (NLEB). The permit applicant has prepared a Biological Assessment that identifies effects to the Indiana bat and outlines measures to avoid and minimize those effects. Although the Biological Assessment provided by Terracon, in May 2013, focused on the Indiana bat and did not specifically address effects to the NLEB, the mist-net survey results and habitat analyses do provide insight into NLEB use of the area and potential expected effects. The USACE was notified that the Service would be preparing a conference opinion via an email from Amber Schorg to Wayne Hannel, dated November 14, 2013.

These biological and conference opinions are based on information provided in the May 2013 Biological Assessment prepared by Terracon Consultants, Inc., the USACE Joint Public Notice posted on November 23, 2013, a site investigation conducted on June 28, 2013, the Indiana Bat Draft Recovery Plan (First Revision), and the information provided in the 12-month finding proposing the listing of the northern long-eared bat as endangered (12-month finding), published in the Federal Register on October 2, 2013 (USFWS 2013).

These opinions cover the Indiana bat and the NLEB. The Service concurs with the USACE's determination that Higgins eye pearlymussel (*Lampsilis higginsii*) may be affected, but is not likely to be adversely affected by the project. Water quality will be conducted quarterly for one year before and one year after the stream relocation to confirm this determination. The prairie bush clover (*Lespedeza leptostachya*) and the western prairie fringed orchid (*Platanthera praeclara*) are not present in the project area and will not be addressed further.

CONSULTATION HISTORY

July 13, 2012 – A joint Section 404 permit application was submitted by LaFarge to the USACE and the State of Iowa.

August 13-14, 2012 – A mist-net survey of the impact area was conducted by Terracon Consultants, Inc, yielding the capture of 1 male Indiana bat.

November 23, 2012 - Public Notice CEMVR-OD-P-2011-1048 was issued.

December 14, 2012 - The Service issued a letter to the USACE indicating that the preparation of a Biological Assessment was warranted.

May 31, 2013 – Terracon Consultants, Inc. submitted a Biological Assessment on behalf of the USACE and LaFarge.

June 28, 2013 – Amber Schorg and Kraig McPeek of the Rock Island Field Office (USFWS) met Lauren Bennett of Terracon and LaFarge representatives Bonita Berry and Josh Esquibel for a site visit to the proposed project area.

September 16, 2013 - Service issued a letter to the USACE initiating formal consultation on the project.

November 6, 2013 – Draft Biological Opinion was submitted to the USACE.

November 2, 2013 – Wayne Hannel of the USACE responds to the Draft Biological Opinion with a letter of no objection.

November 8, 2013 – Wayne Hannel provides follow-up correspondence to the Draft Biological Opinion and indicates that the Terms and Conditions outlined in the final Biological Opinion, when received would be incorporated into the Special Conditions of the Department of the Army permit to be issued for the project.

November 14, 2013 – The Service informs Wayne Hannel that a conference opinion on the NLEB would accompany the final Biological Opinion for the Indiana bat.

November 14, 2013 – Lauren Bennett of Terracon, Inc. provides feedback on the draft Biological Opinion on behalf of the applicant.

1. Description of the Proposed Action

The USACE proposes to permit in-stream and wetland impacts under Section 404 of the Clean Water Act to Moore Creek, Dodges Creek, and Tributaries T4 and T5 near Buffalo in Scott County, Iowa. Tributary T6 will also be impacted, but this drainage area is not a jurisdictional water. This action is described in Public Notice CEMVR-OD-P-2011-1048, dated November 23, 2013, and the Biological Assessment dated May 2013. The applicant, LaFarge North America, requires authorization by both USACE and the Iowa Department of Natural Resources (DNR) to carry out these actions, which are associated with the quarry expansion.

For the purpose of this consultation, the Service considers the action area to include the 71.7 acre project area described in the map set provided with the Public Notice. The actions on the project area will include:

- The excavation of two new stream channels and the associated relocation of Streams T4, T5, and T6 in 2014.
- Phased clearing of 52.6 acres of forest in the project area, which includes clearing associated with stream channel creation. Clearing will occur incrementally over the next 40 years.
- Incremental excavation of overburden and extraction of rock from the project area, which will include impacts to 0.02 acres of wetland and effects to the existing stream channels.

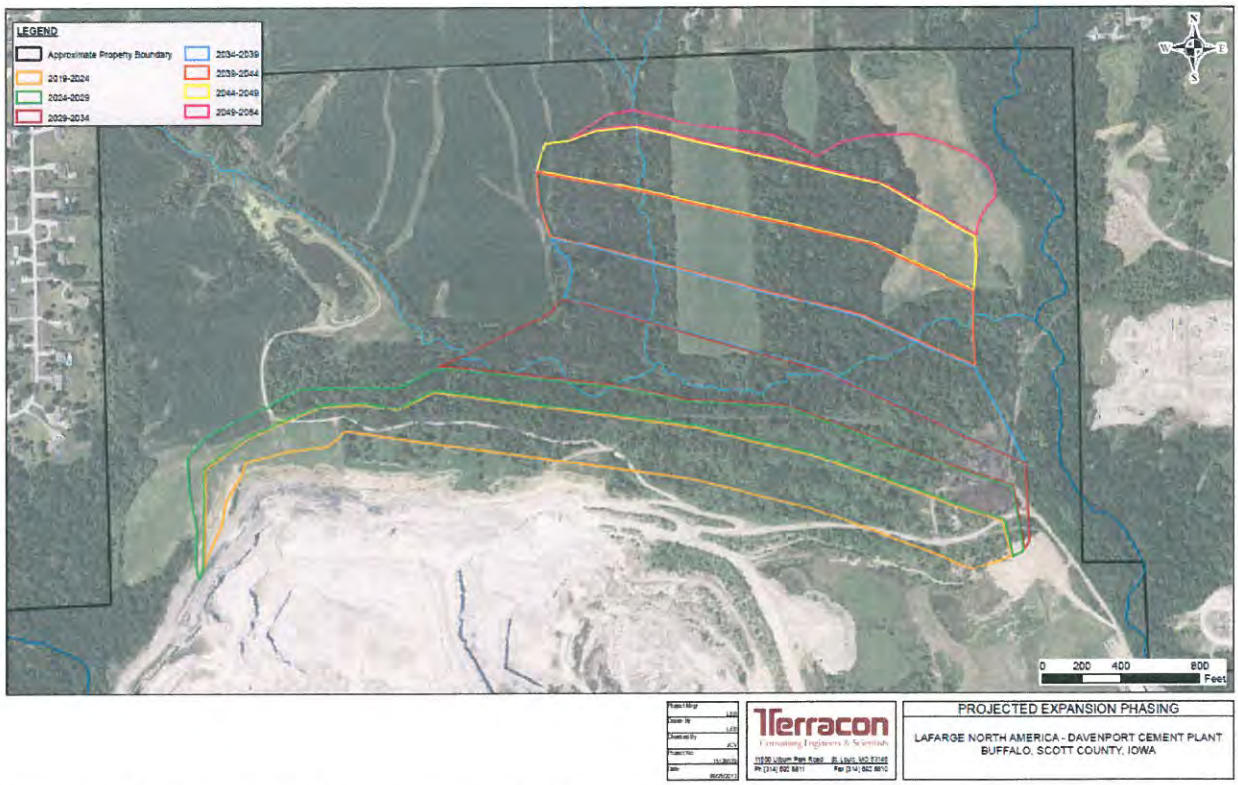

Figure 1. Delineation of the approximate phases of clearing and mining. This is an estimation of long-term expansion phases, and is subject to modification.

1.1 Conservation Measures

Conservation measures to minimize harm to listed species which are proposed by the action agency are considered part of the proposed action and their implementation is required under the terms of this consultation. The following conservation measures were proposed in the May 2013 Biological Assessment and via phone and email correspondence with Terracon the week of September 16, 2013. While these measures were proposed in response to discussions of impacts to the Indiana bat, the Service believes that these conservation measures are also relevant to the NLEB. Furthermore, these conservation measures represent an adaptive management approach to assessing impacts to listed bat species.

1. All clearing of forested areas will occur between October 1 and March 30, which is outside of the known maternity season for the Indiana bat and NLEB in Iowa.

2. Clearing of trees on the site will be done incrementally over the next 40 years, as estimated in Figure 1. Specifically, only the clearing necessary to facilitate the stream relocation and mining in approximately five-year increments will be cleared at one time. See Appendix A for a map of the approximate timing of the proposed impacts. (Exact timing of the expansion is not set in stone, but rather a best estimate was provided by the applicant for this consultation.)

3. Mitigation for lost wetland and stream impacts will be conducted before the streams are relocated. Also, newly created stream channels will be allowed to fully vegetate for at least one growing season prior to the redirection of stream flows.

4. Wetland and stream impacts will be mitigated onsite. Specifically, 0.25 acres of forested wetland will be created and/or enhanced and the new stream relocation channels and corridors will be revegetated.

5. Mitigation for lost forested resources will be conducted according to the following adaptive management plan:

    a. Forested habitat mitigation will occur upfront at a 1.03:1 ratio, which will equal 54.15 acres. This will be a combination of preservation and tree planting, onsite, as illustrated in Figure 2, below. Preservation will include areas next to Moore Creek that are currently forested and considered suitable Indiana bat habitat.
    b. A mist-net survey will be conducted in 2014 to gather additional bat use information and assess the potential for the presence of a maternity colony onsite.
    c. If the site is found to be occupied by a maternity colony, an additional 26.15 acres of forested habitat mitigation will be planted or preserved, and follow-up surveys will occur.
        i. Specifically, a pre-impact survey will be conducted the year before any identified maternity roost(s) will be cut. Following the roost tree clearing, two more surveys will be conducted in the two consecutive years to

document changes in bat use of the area and persistence or absence of the colony.

d. If the site is not found to be occupied by a maternity colony, a mist-net survey will be conducted prior to the next expansion phase that will impact potential roost trees.
e. If a maternity colony is identified in the next expansion phase, the steps outlined in c, above, will be followed.
f. If a maternity colony is not identified in the next expansion phase, the steps outlined in d, above, will be followed.

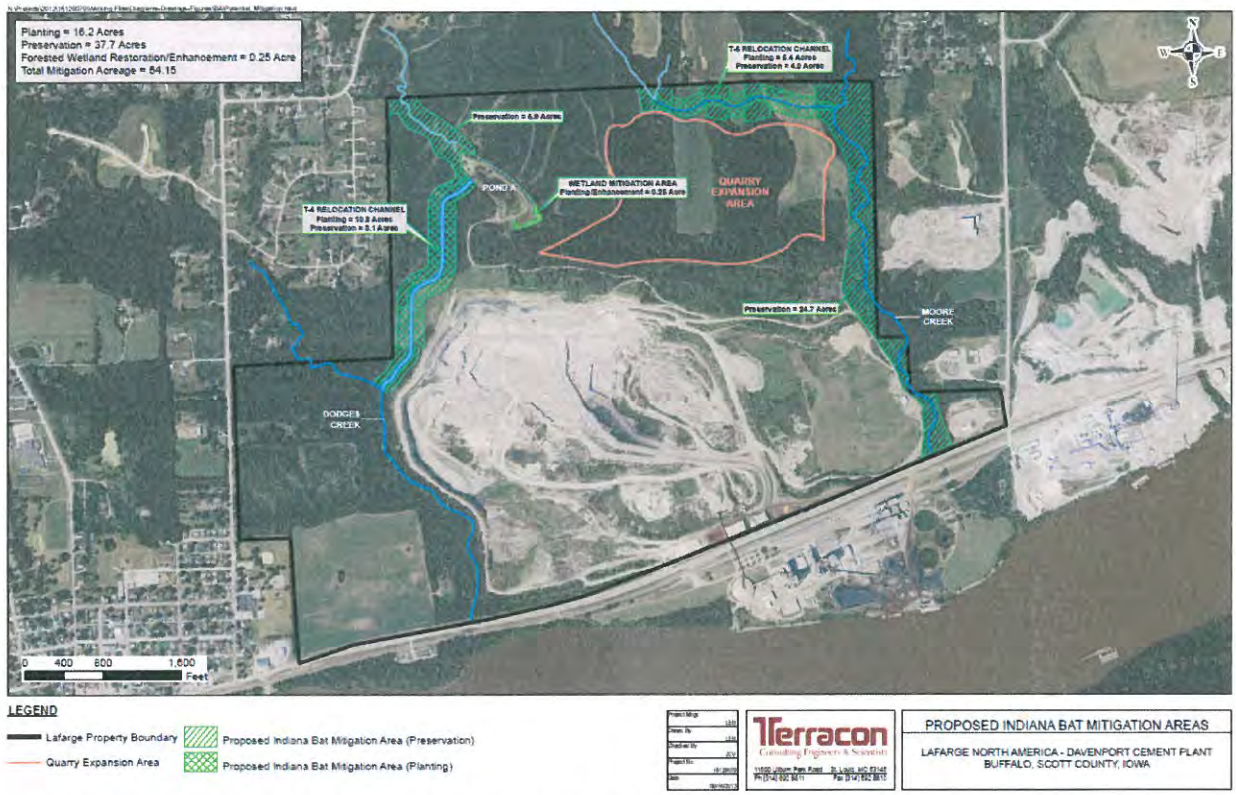

Figure 2. Illustration of the proposed forested habitat and stream/wetland mitigation activities.

2. Status of the Species

This section presents the biological or ecological information relevant to formulating this Biological Opinion. Appropriate information on the species' life history, its habitat and distribution, and other data on factors necessary to its survival are included to provide background for analysis in later sections. This analysis documents the effects of past human and natural activities or events that have led to the current range-wide status of the species. Portions of this information are also presented in listing documents, the Recovery Plan (USFWS 1983), and the draft revised Recovery Plan (USFWS 1999), and are referenced accordingly.

2.1 Species Description and Life History

Indiana bat

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.

Generally, Indiana bats hibernate from October through April (Hall 1962, LaVal and LaVal 1980), depending upon local weather conditions. Figure 3 provides a depiction of the annual cycle. They hibernate in 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). Upon arrival at hibernating caves in August-September, Indiana bats "swarm", a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, with relatively few roosting in the caves during the day (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.

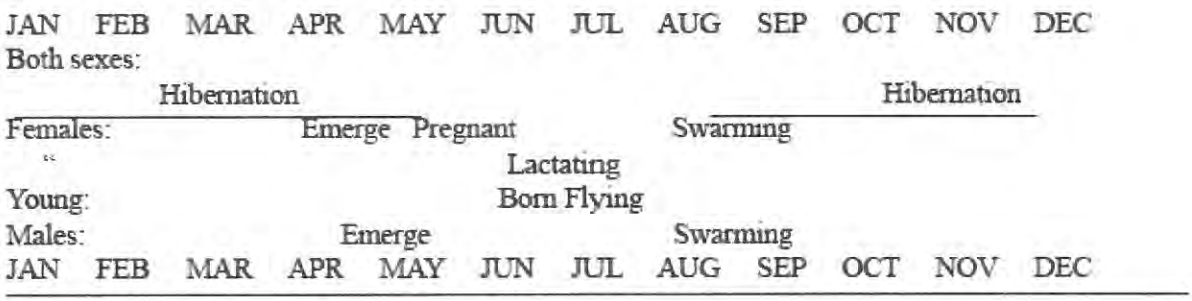

Figure 3. Indiana Bat Annual Chronology

Females emerge from hibernation ahead of males; most winter populations leave by early May. Some males spend the summer near hibernacula in Missouri (LaVal and LaVal 1980) and West Virginia (Stihler, pers. observ. October 1996, in USFWS 2000). In spring when fat reserves and food supplies are low, migration is probably hazardous (Tuttle and Stevenson 1977). Consequently, mortality may be higher in the early spring, immediately following emergence.

Females may arrive in their summer habitats as early as April 15 in Illinois (Gardner et al. 1991, Brack 1979). During this early spring period, a number of roosts (e.g., small cavities) may be used temporarily, until a roost with larger numbers of bats is established. 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. Birth of young occurs in late June and early July (Easterla and Watkins 1969, Humphrey et al. 1977) and 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. 1991a, Kurta et al. 1996). Female Indiana bats exhibit strong

site fidelity to summer roosting and foraging areas. That is, they return to the same summer range annually to bear their young (Garner and Gardner 1992).

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). 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 10-100 adult females (Kurta and Rice 2002), 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.

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 almost equal. Autumn "swarming" occurs prior to hibernation. During swarming, bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day. 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.

Male Indiana bats may be found throughout the entire range of the species. 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.

NLEB

The NLEB is a medium-sized bat with an average adult weight of 5 to 8 grams, average body length from 77 to 95 millimeters, and forearm length between 34 and 38 millimeters (Caceres and Pybus 1997). Its fur ranges from medium to dark brown on the dorsal side, and tawny to pale-brown on the ventral side. Its ears and wing membranes are dark brown, and the NLEB is most readily distinguished from other species of *Myotis* by its longer tragus and ears, ears which average 17 millimeters in length and extend beyond the nose when laid forward. (Whitaker and Mumford 2009).

During the summer, the NLEB occupies forested habitat and roosts (singly or in colonies) in the cracks, crevices, and bark of both live and dead trees (Lacki and Schwierjohann 2001), but they also have been found to roost in human made structures, such as buildings, barns, sheds, cabins, etc. Also, it appears that the NLEB does not depend on any specific species of tree, but rather the tree characteristics and/or tree decay structure are the most important factors in roost selection (Foster and Kurta 1999). The NLEB has been found to roost below the canopy in forests with a variety of canopy cover percentages, but research has indicated that females do tend to roost in more open areas than males (Perry and Thill 2007). Open areas receive greater solar insolation, which increases roost temperature and therefore pup development.

The NLEB occupy their summer habitat from approximately March through August and then begin to swarm near their hibernacula in August or September (Caire et al. 1979), depending on the geographical region. In Indiana, the majority of NLEB's in Copperhead Cave have been observed to enter hibernation during October, and emerge from about the second week of March to mid-April (Whitaker and Mumford 2009). Hibernation periods farther north may begin earlier and last longer (Stones and Fritz 1969; Fitch and Shump 1979). The NLEB has been observed to share hibernacula with other bat species (Whitaker and Mumford 2009), but is rarely observed in concentrations over 100 in one hibernaculum (Barbour and Davis 1969). NLEB individuals also rouse and may switch hibernacula throughout the winter, which makes it difficult to accurately estimate winter population numbers (Griffin 1940; Whitaker and Rissler 1992b; Caceres and Barclay 2000).

2.2 Diet and Foraging

Indiana Bat

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 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).

NLEB

The NLEB forages on a variety of insect types and does so primarily above the understory, but under the canopy in forested habitats (Nagorsen and Brigham 1993). It is capable of both capturing prey in midair and gleaning perched insects from surfaces. This gleaning ability, combined with agile flight capabilities, enables the NLEB to forage in dense forests with heavy understory (Foster and Kurta 1999). The NLEB has shown a preference for forested hillsides and ridges, as opposed to riparian areas (Brack and Whitaker 2001; LaVal et al. 1977) and other data indicates that mature forests are important foraging habitat for the NLEB (Caceres and Pybus 1998). It is estimated that the NLEB has a home range of 47 to 425 acres (Lacki et al 2009, with an average maternal home range of approximately 160 acres (Owen et al. 2003).

In general, the NLEB consumes moths, flies, leafhoppers, caddisflies, and beetles. However, the most common insects found in the diet of the NLEB are moths and beetles (Feldhammer et al. 2009; Brack and Whitaker 2001). The NLEB's foraging patterns include a peak activity period within five hours of sunset, and a second peak within 8 hours of sunset (Kunz 1973). Insects consumed during these periods do not seem to be significantly different (Brack and Whitaker 2001).

2.3 Range and Population Dynamics

Indiana Bat

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 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.

Based on censuses taken at all hibernacula, the total known Indiana bat population is estimated to number about 534,239 bats (Figure 4). Population trend data have shown a relatively stable population from 2005 to present. However, with the advent of White-nose syndrome, future population trends are uncertain.

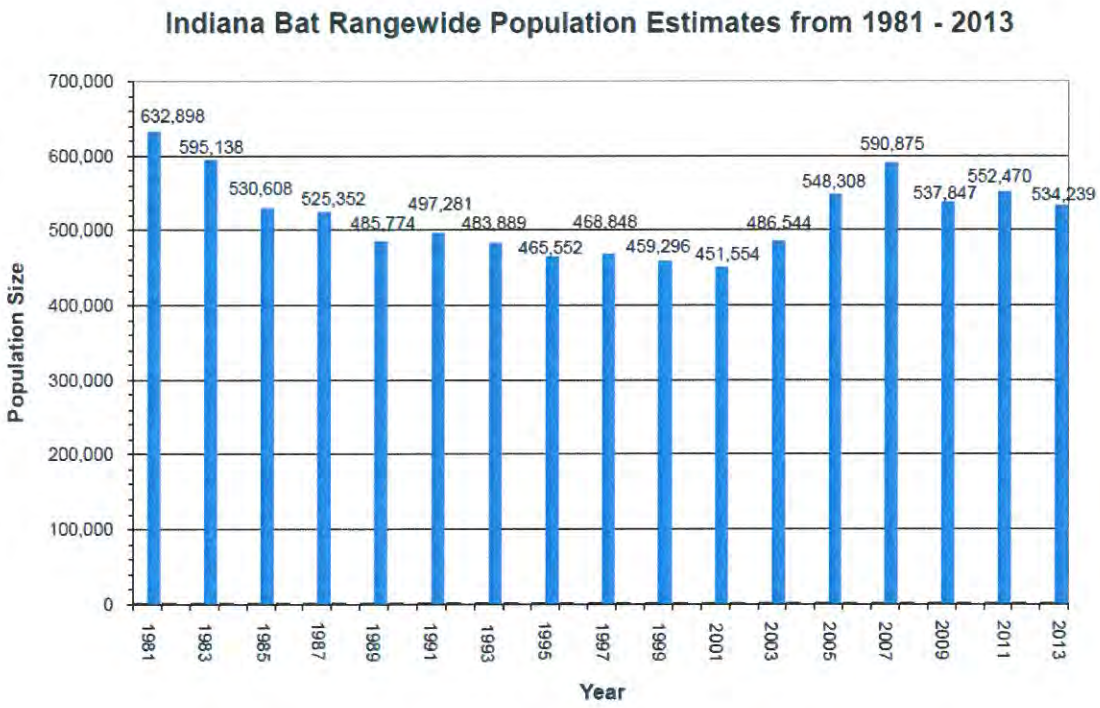

Figure 4. Indiana bat rangewide population estimates from (http://www.fws.gov/midwest/Endangered/mammals/inba/index.html).

NLEB

The NLEB is a wide-ranging North American species that is present from in all Canadian provinces across to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993, and Caceres and Pybus 1997). In the United States, the bat can be found in 39 states (including the District of Columbia) from Maine to Montana, south to Kansas and eastern Oklahoma, and southeast to the Florida Panhandle (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006).

While the species is wide ranging, it appears to be patchily distributed, and found in low numbers in both roosts and hibernacula (Amelon and Burhans 2006; Whitaker and Hamilton, 1998). However, populations are generally categorized into the Eastern Population, the Midwest Population, the Southern Population, the Western Population, and the Canada Population, although these will not be considered to be Distinct Population Segments under Endangered Species Act (ESA) (USFWS 2013). The NLEB has been noted in typically small numbers in numerous hibernacula across its range, but insufficient data is available at this time to estimate a range-wide population. Population estimates are also unavailable for the Midwest Population, although mist net survey data indicate that the species is commonly captured in this region during mist-netting efforts.

2.4 Status

Indiana Bat

The Indiana bat (*Myotis sodalis*) was listed as an endangered species via notice in the Federal Register on March 11, 1967 (32 Fed. Reg. 48) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U. S. C. 668aa(c)). The reasons for listing the species are summarized in the 2007 Draft Recovery Plan and include destruction/degradation of hibernation habitat, loss/degradation of summer habitat, migration habitat, and swarming habitat, disturbance of hibernating bats, disturbance of summering bats, disease and parasites, predation, and various anthropogenic factors (USFWS 2007).

Prior to the survey conducted for this project, the closest known Indiana bat occurrences were recorded in southeastern Mercer County, Illinois and Southeastern Louisa County, Iowa. Currently, the Service has knowledge of approximately 485 Indiana bat captures (males and females inclusive) statewide.

NLEB

The NLEB was proposed for listing as endangered on October 2, 2013, via a notice in the Federal Register (78 Fed. Reg. 191). A formal listing package is currently being prepared, and it is expected that the species will be placed on the endangered species list sometime in late 2014. The primary reason that it has been found warranted for listing is the recent severe and ongoing decline of the species due to white-nose syndrome.

2.5 Reasons for Decline

Indiana bat

Not all of the causes of Indiana bat population declines have been determined. 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:

Disturbance and vandalism. A serious cause of Indiana bat decline has been human disturbance of hibernating bats during the decades of the 1960s through the 1980s. Bats enter hibernation with only enough fat reserves to last until spring. When a bat is aroused, as much as 68 days of fat supply is used in a single disturbance (Thomas et al. 1990). Human use (e.g., including recreational cavers and researchers) near hibernating Indiana bats can cause arousal (Humphrey 1978, Thomas 1995, Johnson et al. 1998). If this happens too often, the bats' fat reserves may be exhausted before the species is able to forage in the spring.

Active programs by State and Federal agencies have led to the acquisition and protection of a number of Indiana bat hibernacula. Of 127 caves/mines with populations >100 bats, 54 (43%) are in public ownership or control, and most of the 46 (36%) that are gated or fenced are on

public land. Although such conservation efforts have been successful in protecting Indiana bats from human disturbance, they have not been sufficient to reverse the downward trend in many populations.

Improper cave gates and structures. Some hibernacula have been rendered unavailable to Indiana bats by the erection of solid gates in the entrances (Humphrey 1978). Since the 1950's, the exclusion of Indiana bats from caves and changes in air flow are the major cause of loss in Kentucky (an estimated 200,000 bats at three caves) (USFWS 1999). Other cave gates have so modified the climate of hibernacula that Indiana bats were unable to survive the winter because changes in air flow elevated temperatures which caused an increase in metabolic rate and a premature exhaustion of fat reserves (Richter et al. 1993).

Natural hazards. Indiana bats are subject to a number of natural hazards. River flooding in Bat Cave, Mammoth Cave National Park, drowned large numbers of Indiana bats (Hall 1962). Other cases of hibernacula being flooded have been recorded by Hall (1962), DeBlase et al. (1965), and USFWS (1999). A case of internal cave flooding occurred when tree slash and debris (produced by forest clearing to convert the land to pasture) were bulldozed into a sinkhole, blocking the cave's rain water outlet and drowning an estimated 150 Indiana bats (USFWS 1999).

Another hazard exists because Indiana bats hibernate in cool portions of caves that tend to be near entrances, or where cold air is trapped. Some bats may freeze to death during severe winters (Humphrey 1978, Richter et al. 1993). Indiana bats are vulnerable to the effects of severe weather when roosting under exfoliating bark during summer. For example, a maternity colony was displaced when strong winds and hail produced by a thunderstorm stripped the bark from their cottonwood roost and the bats were forced to move to another roost (USFWS 1999).

Suspected causes of Indiana bat decline include:

Microclimate effects. Changes in the microclimates of caves and mines may have contributed more to the decline in population levels of the Indiana bat than previously estimated (Tuttle, in lit. August 4, 1998). Entrances and internal passages essential to air flow may become larger, smaller, or close altogether, with concomitant increases or decreases in air flow. Blockage of entry points, even those too small to be recognized, can be extremely important in hibernacula that require chimney-effect air flow to function. As suggested by Richter et al. (1993) and Tuttle (in lit. August 4, 1998), changes in air flow can elevate temperatures which can cause an increase in metabolic rate and a premature exhaustion of fat reserves.

Land use practices. The Indiana bats' maternity range has changed dramatically since pre-settlement times (Schroeder 1991; Giessman et al. 1986; MacCleery 1992; Nigh et al. 1992). Most of the forest in the upper Midwest has been fragmented, fire has been suppressed, and native prairies have been converted to agricultural crops or to pasture and hay meadows for livestock. Native plant species have been replaced with exotics in large portions of the maternity range, and plant communities have become less diverse than occurred prior to settlement. Additionally, numerous chemicals are applied to these intensely cropped areas. The changes in the landscape and the use of chemicals (McFarland 1998) may have reduced the availability and abundance of the bats' insect forage base.

In the eastern U. S., the area of land covered by forest has been increasing in recent years (MacCleery 1992; Iverson 1994; Crocker et al. 2006). Whether or not this is beneficial to the Indiana bat is unknown. The age, composition, and size class distribution of the woodlands will have a bearing on their suitability as roosting and foraging habitat for the species outside the winter hibernation season.

Chemical contamination. Pesticides have been implicated in the declines of a number of insectivorous bats in North America (Mohr 1972, Reidinger 1972, Reidinger 1976, Clark and Prouty 1976, Clark et al. 1978, Geluso et al. 1976, Clark 1981). The effects of pesticides on Indiana bats have yet to be studied. McFarland (1998) studied two sympatric species; the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*M. septentrionalis keenii*) as surrogates in northern Missouri and documented depressed levels of acetylcholinesterase, suggesting that bats there may be exposed to sublethal levels of organophosphate and/or carbamate insecticides applied to agricultural crops. McFarland (1998) also demonstrated that bats in northern Missouri are exposed to significant amounts of agricultural chemicals, especially those applied to corn. BHE Environmental, Inc. (1999) collected tissue and guano samples from five species of bats at Fort Leonard Wood, Missouri and documented the exposure of bats to p,p'-DDE, heptachlor epoxide, and dieldrin.

New Threats/Disease epidemics: White-nose syndrome (WNS): WNS was first documented in New York in February of 2006 and has since been observed to have spread to western Virginia and Pennsylvania (www.nwhc.usgs.gov). 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 (www.fws.gov).

Overall mortality rates, primarily of little brown bats, for 2007 and 2008 ranged from 81% to 97% among four study sites. It is currently estimated that 1 million bats have died from WNS in infected regions (www.dnrec.delaware.gov). 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 to be down by 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 Albany and Scoharie Counties, 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 as far west as Illinois and Missouri. 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.

In response to many of these threats and in accordance with Federal law, a Recovery Plan has been drafted for the species that outlines strategies and actions believed to be necessary for the recovery of a species. In sum, the objectives of the Recovery Plan are to: (1) protect

hibernacula; (2) maintain, protect, and restore summer maternity habitat; and (3) monitor population trends through winter censuses.

NLEB

The NLEB has been found to be in danger of extinction throughout its entire range based on the severity of population impacts that have been realized in areas with WNS, and the expected population impacts that will likely occur with the spread of the disease in the future. There are other reasons for decline that are discussed in the 12-month finding, but none as serious as WNS (USFWS 2013). A listing package will be prepared in 2014 that will address the listing factors and reasons for decline in more detail.

3. Environmental Baseline

The purpose of the environmental baseline is to describe past and ongoing human and natural factors that have contributed to the current status of the species and its habitat in the project vicinity. Range-wide factors affecting the species include those listed previously under Reasons for Decline. Other factors with the potential to adversely affect roosting habitat include forest clearing by private industry within the summer range in Iowa, woodlot management and wetland drainage by landowners, and other private and municipal land management activities that affect the structure and abundance of forest resources in Iowa.

Much of the remaining forested land cover classes in the predominately agricultural areas of east-central Iowa represent potential summer habitat for the Indiana bat and the NLEB. Due to their migratory behavior, Indiana bats likely follow watershed drainage corridors en route to their summer habitats and possibly in returning to their hibernacula. In doing so, they may stop and roost temporarily in suitable floodplain trees, manmade structures such as barns or bridges, or may select an area to spend the summer in a maternity colony. The migratory movements of the NLEB and their relation to the landscape remain currently undefined, but a homing ability and hibernacula fidelity has been demonstrated (Caceres and Barclay 2000).

3.1 Status of the Species within the Action Area

The LaFarge Davenport Plant consists of approximately 600 acres of quarry-owned land near Buffalo, Iowa. This includes 350 acres of active limestone quarry and associated infrastructure. The proposed project action area includes the entire 71.7 acres associated with the quarry expansion, which contains approximately 52.6 acres of forested habitat, including stream corridors and wetland, and approximately 19.1 acres of agricultural land. In the May 2013 Biological Assessment, Terracon describes the forested area as secondary forest dominated by elm, black cherry, cottonwood, bur oak, white oak, and silver maple. Also, 26 potential roost trees were identified by Terracon biologists during a 2012 habitat survey.

The surrounding landscape consists of a mixture of row-crop agricultural fields, pasture land, open water, forested areas, and suburban housing. The small town of Buffalo, Iowa is approximately 1 mile to the west, and the City of Davenport begins approximately 5 miles to the east. The Mississippi River borders the LaFarge facility to the south. According to historical

imagery, the corridor of Moore Creek has been forested since at least the 1930's, and the remaining project area was covered by woody vegetation by the 1960's.

According to the August 2012 mist-net survey, the project area was occupied by at least one male Indiana bat and eight NLEBs. Six of these NLEBs were reproductive adult males, one was a post-lactating female, and the last was a non-reproductive female. The mist-nets for the survey were located at the very northern edge of the property, and the male Indiana bat was not radio-tracked. (Radio-tracking is typically reserved for female Indiana bat captures). NLEBs were also not tracked, as they were not proposed for listing at the time of the survey. Therefore, Indiana and NLEB bat roosting in the project area is unknown. However, based on current understanding of bat behavior, it is expected that both species of bats would at least be using the forest and forest edge areas for foraging. Additional surveys as described in section 1.1 above will elucidate bat use of the project area and potentially identify occupied roost trees. The Service currently does not have other mist-net or acoustic survey data for Scott County, so the distribution of Indiana bats and NLEBs immediately surrounding the project area is unknown.

3.2 Factors Affecting the Bat Environment within and adjacent to the Action Area

It is difficult to determine the importance of the action area to the species prior to the proposed additional surveys. However, given the life history information preceding, the capture of Indiana bats and NLEBs, and the presence of numerous suitable roost trees for both species, it is possible that portions of the action area are suitable maternity habitat and could support at least one summer colony of Indiana bats and/or NLEBs.

Although forest clearing will occur during winter months when bats are not present, destruction of multiple roost trees in a small area can greatly increase the thermoregulatory costs for individuals returning to familiar sites and could potentially disrupt the social bonds of a colony (Kurta and Murray 2002), should the area be occupied by maternity colony. It is not known if primary or alternate maternity roost trees will be removed in this area at this time, but additional surveys should provide greater detail of bat use and expected impacts to the bat. Also, tree clearing and the associated removal of potential roost trees will occur incrementally over 30-40 years.

The quarry expansion will also involve blasting and large vehicle traffic close to the remaining forested habitat. However, the existing quarry has been active since 1927 (http://www.lafarge-na.com, accessed 24-Sept, 2013), so the presence of both species of bat in the adjacent habitat indicates that these factors have not precluded bat use of the area, and are not likely to do so in the future.

Federally permitted actions within the project action area consist of wetland and stream impacts associated with the quarry expansion and the relocation of the stream channels. No other Federal actions in the immediate vicinity of the area are known to be proposed at the time of this Biological Opinion.

4. Effects of the Action

This section includes an analysis of the direct and indirect effects of the proposed action and associated interrelated and interdependent activities on the Indiana bat and its potential and critical habitat. The Service considered the following factors:

- Proximity of the action to the species and its potential and critical habitat
- Distribution/geographic area in which the action occurs
- Timing of the project in relation to the species life cycle
- Nature of the effect of the project on the species
- Duration of the project impact
- Frequency of project impacts to the species
- Intensity of the impact on the species
- Severity of the impact as it relates to species recovery from the impact

The proposed action and associated activities are discussed below in relation to the factors considered. Additionally, the expected response of the species (Indiana bat and NLEB) to the listed actions is identified, where applicable.

Stream relocation

The relocation of the stream channels is expected to permanently alter the hydrology, topography, and aquatic organism community associated with the existing streams. Bats returning to the area after the stream relocation has occurred will find an altered food base and habitat structure. It is expected, however, that Moore and Dodges Creeks will remain relatively unaffected and provide alternate foraging habitat. Eventually, the planted riparian corridors of the stream will mature, and a new aquatic-dependent organism community is expected to form.

Roost tree and forested habitat removal

Because removal of a roost tree while Indiana bats and NLEBs are present may result in killing, injuring, or otherwise harming individuals or a colony, the applicant has proposed in the above Conservation Measures that tree clearing be conducted outside of the maternity season for the two bat species to avoid direct take as a result of this action. Also, the clearing will be conducted incrementally over the next 40 years, and therefore only a few of the documented potential roost trees will be cut at any given time.

The likely behavioral response of bats returning in the spring to the cleared area and relocated streams will be to disperse to adjacent suitable habitat. However, dispersal to adjacent suitable habitat could affect the bats in the short term by causing increased energetic demands, exposure to inter and intra-specific competition, and exposure to predation while searching alternate habitats for new roosting and foraging areas.

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 permanently protected 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). This also applies to the NLEB, as discussed above in the life history section. Additionally, a proposed conservation measure includes the permanent preservation of the adjacent Moore Creek corridor and new tree planting. These combined actions will equal at least 52.6 acres of forested habitat mitigation. Preservation of the adjacent habitat and the new tree planting may provide returning bats familiar sheltering areas and new foraging habitat while they are searching for new roost sites, thereby helping to reduce energy demands immediately after migration.

4.2 Interrelated Activities, Interdependent Activities, and Indirect Effects

Blasting and rock extraction

Following the permitted action, rock will be extracted from the new quarry area with a combination of blasting and heavy equipment. This rock will be transported to the facility adjacent to the project area to the south and processed into cement. While blasting and rock extraction may periodically disturb wildlife in the vicinity, these types of activities have been ongoing in the quarry since its inception in 1927. Therefore, it is logical to conclude that wildlife in the area is acclimatized to these activities and the activities associated with quarry expansion are not likely to appreciably change the environment of the surrounding habitat.

Pollutant Discharge and Emissions

The LaFarge Davenport Plant is permitted by the U.S. Environmental Protection Agency to discharge air and water pollutants under a Title V Air Operating Permit and a National Pollutant Discharge Elimination System Permit. The facility also holds a State of Iowa Water Use Permit. Based on information provided by Lauren Bennett of Terracon in an email dated September 30, 2013, quarry expansion is not expected to facilitate an increase in any of the facility's permitted consumptions, emissions, or discharges. Therefore, no additional effects to the bat from these interrelated activities are expected.

5. Cumulative Effects

Cumulative effects include the effects of State, local or private actions that may occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. No additional activities in the project action area beyond those previously described are anticipated. As urban areas near the City of Davenport and Buffalo, Iowa expand, it is possible that more clearing of forested habitat in area surrounding the quarry will occur. However, it is difficult to predict and quantify the level of development and associated clearing that could occur.

Additionally, the Service is unaware of any other non-Federal actions that are reasonably certain to occur which may adversely affect the Indiana bat in the action area. Therefore, any cumulative effects due to non-Federal actions are considered to be negligible at this time.

6. Conclusion

Indiana bat

After reviewing the current status of the Indiana bat, 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 project, interdependent, and interrelated actions are not likely to jeopardize the continued existence of the Indiana bat. There is no critical habitat for the Indiana bat in the project area, and therefore, destruction or adverse modification of critical habitat as a result of the project is not foreseen.

Authorization of the proposed project, however, will negatively affect summer habitat for male Indiana bats and potentially female Indiana bats. Potential modification to Indiana bat habitat in the project area includes the removal of roost trees, loss of foraging habitat, and disruption of normal foraging and sheltering behavior in response to this habitat alteration. Given the presence of the Indiana bat in the project area and the level of habitat modification proposed, it is unlikely that all adverse impacts can be avoided. Therefore, take in the form of harm and harassment will occur. However, the proposed conservation measures offered by the applicant and the reasonable and prudent measures in conjunction with the terms and conditions identified by the Service in the Incidental Take Statement are anticipated to minimize the level of impact such that neither reproductive success nor survival of the species will be further reduced or appreciably affected.

NLEB

After reviewing the current status of the NLEB, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's conference opinion that the action, as proposed, is not likely to jeopardize the continued existence of the NLEB. No critical habitat has been identified for the NLEB at this time, and therefore, destruction or adverse modification of critical habitat will also not occur.

7. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA, prohibits 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 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 behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below (as applied to the Indiana bat) are non-discretionary, and must be undertaken by the USACE so that they become binding conditions of any grant or permit issued to the applicant, LaFarge, North America, for the exemption of Section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the USACE (1) fails to assume and implement the terms and conditions, or (2) fails to require the applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USACE must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement, pursuant to 50 CFR § 402.14(i)(3).

7.1 Extent of Take Anticipated

Because the quarry expansion will occur over the next 50 years, it is difficult to quantify the impacts to Indiana bats and the NLEB. There are multiple scenarios that could occur, ranging from impacts to bats after each clearing event for each phase of the expansion to impacts to bats after a single clearing event, after which the bats would relocate and no further effects would occur. Additionally, the timeframe in which these impacts will occur is also unknown. Bats, if not currently occupying the site, have the potential to begin utilizing the not-yet-disturbed portion of the site in the future. The adaptive management/ monitoring plans identified in Section 1.1. were designed to address these uncertainties.

Given these uncertainties, this incidental take statement must therefore identify the maximum anticipated take, but allow for the possibility that take may be less than identified here. The monitoring identified in Section 1.1 will allow the parties involved to ensure that the actual take that is likely occurring does not exceed that which was described and analyzed in this Biological Opinion. Should the take appear to be exceeding the allowed take, consultation will be reinitiated.

At maximum, we anticipate take, in the form of harm and harassment, of individuals from up to one maternity colony of Indiana bats and one maternity colony of NLEBs every five years (after each tree clearing event) until the quarry has been reached its expansion limit. Given the average maternity colony size of 60, harm and harassment would be inflicted on up to 60 female Indiana bats. The maternity colonies of the NLEB range from 30 to 60 individuals (Whitaker and Mumford 2009), so harm and harassment would be expected to occur to no more than 60 NLEBs. Take would result from the stress on bats returning to the area caused by the removal of roost trees, disturbance of foraging habitat, and alteration of the onsite water sources. This take amount assumes that a primary roost tree of a maternity colony of for each species of bat is cleared in the first expansion phase, and the maternity colonies establish a new primary maternity tree in the next expansion phase, which is then cleared, and so on. The repeated displacement of the colony could result in a gradual attenuation of the maternity colony to the point at which it has too few females to persist.

7.2 Effect of the Take

Indiana bat

As of 2013, the population of the Ozark-Central Recovery Unit was estimated to be 197,707 Indiana bats. In addition, the Service has records of approximately 485 Indiana bats captures in the State of Iowa. Assuming that each of those records can be attributed to a separate maternity or bachelor colony, with an approximate average size of 60 bats, the statewide population would be 26,100 bats. If the maximum take of 60 bats, as state above, is realized, less than 0.03% of the Ozark-Central population would be affected, and less than 0.2% of the statewide population would be affected. This level of expected take is unlikely to result in jeopardy to the species. Because only summer habitat is expected to be altered by the action, destruction, or adverse modification of critical habitat will not occur.

NLEB

The NLEB is consistently captured in the Midwest during mist-net surveys for the Indiana bat, indicating that it is widely distributed in our area. However, due to the lack of accurate hibernacula surveys in the region and unclear information on migratory patterns, it is difficult to estimate the total Midwestern population. The absence of an accurate population estimate notwithstanding, it is our conference opinion that take of NLEBs (described above) as a result of the project is not likely to jeopardize the existence of the species because survey data suggests that it is widespread and at least as common as the Indiana bat in the region.

7.3 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Indiana bat. At such time as the NLEB becomes listed and this conference opinion is adopted as the Biological Opinion, these measures will also apply to the NLEB.

1. Removal of trees in the project area that meet the current Service definition of potential Indiana bat roost trees is prohibited, except as follows:

    a. Potential roost trees may only be removed from the project area, before April 1 and after September 30 of any given year.

    b. If removal of a potential roost tree is necessary outside of that timeframe to protect human health and safety, the Service and the Iowa Department of Natural Resources shall be notified, and reasonable effort shall be made to determine if the tree is occupied by one or more Indiana bats, if it is safe to do so. If the tree is determined to be occupied, further coordination with the Service and Iowa Department of Natural Resources is encouraged, if safety can be provided for during further coordination.

2. All surveys should be conducted using the most recent Indiana bat (and/or NLEB) survey protocol available from the Service.

3. Should exit counts from an identified (Indiana bat or NLEB) maternity roost tree exceed 60 bats, consultation should be reinitiated.

4. The Service should be notified upon the capture of an Indiana bat and/or a NLEB during any performed survey and given an opportunity to review this Opinion for accuracy. If the Opinion and the analyses therein are no longer accurate, consultation will be reinitiated.

8. Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USACE must comply with the following terms and conditions. These terms and conditions are non-discretionary.

1. The conservation measures identified in Section 1.1, above, should be applied to the project.

2. The reasonable and prudent measures identified in Section 7.3, above, should be applied to the project.

3. Monitoring of the Indiana bat use of the project area should be conducted as described above in Section 1.1 to confirm the level of expected take and the efficacy of the conservation and reasonable and prudent measures.

4. Monitoring should follow the Service's most current rangewide Indiana bat summer survey guidelines. As of the issuance of this opinion, these can be found at: http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html. At such time as NLEB survey guidelines become available, they should also be applied to the project.

5. Monitoring results shall be submitted to the Rock Island Ecological Services Field Office of the Service by December 31 of the year in which the monitoring event occurred. Reports should contain:

    a. Amount of habitat cleared.
    b. The results of the mist-netting survey, including number, sex, age (mature or juvenile) and reproductive status of Indiana bats captured, if any.
    c. The results of radio-tracking efforts, including the location of any occupied roost trees onsite or in the adjacent habitat, wherever possible.
    d. Roost emergence counts.
    e. Whether or not dead Indiana bats or NLEBs were found in the project area. Should one or more Indiana bats be encountered during the course of the project, the Rock Island Field Office should be notified upon the discovery, and the number, age, sex, and reproductive status of the bat(s) should be reported.
    f. Any other information requested in the most current Indiana bat summer survey protocol used.

CLOSING

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. If, during the course of the monitoring period, the level of incidental take described above is exceeded, reinitiation of consultation and review of the reasonable and prudent measures is required. The Federal agency 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.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the November 23, 2012 Public Notice CEMVR-OD-P-2011-1048 and associated documents for the LaFarge North America, Davenport Plant, Scott County, Iowa. 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 reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

At such time as the NLEB becomes officially listed as an endangered species under the Endangered Species Act of 1973, as amended, this opinion shall be reviewed. Upon review, the conference opinion provided in this document will either be adopted as the Biological Opinion for the species, or, if found to be deficient in light of new information, a new Biological Opinion for the NLEB will be issued.

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