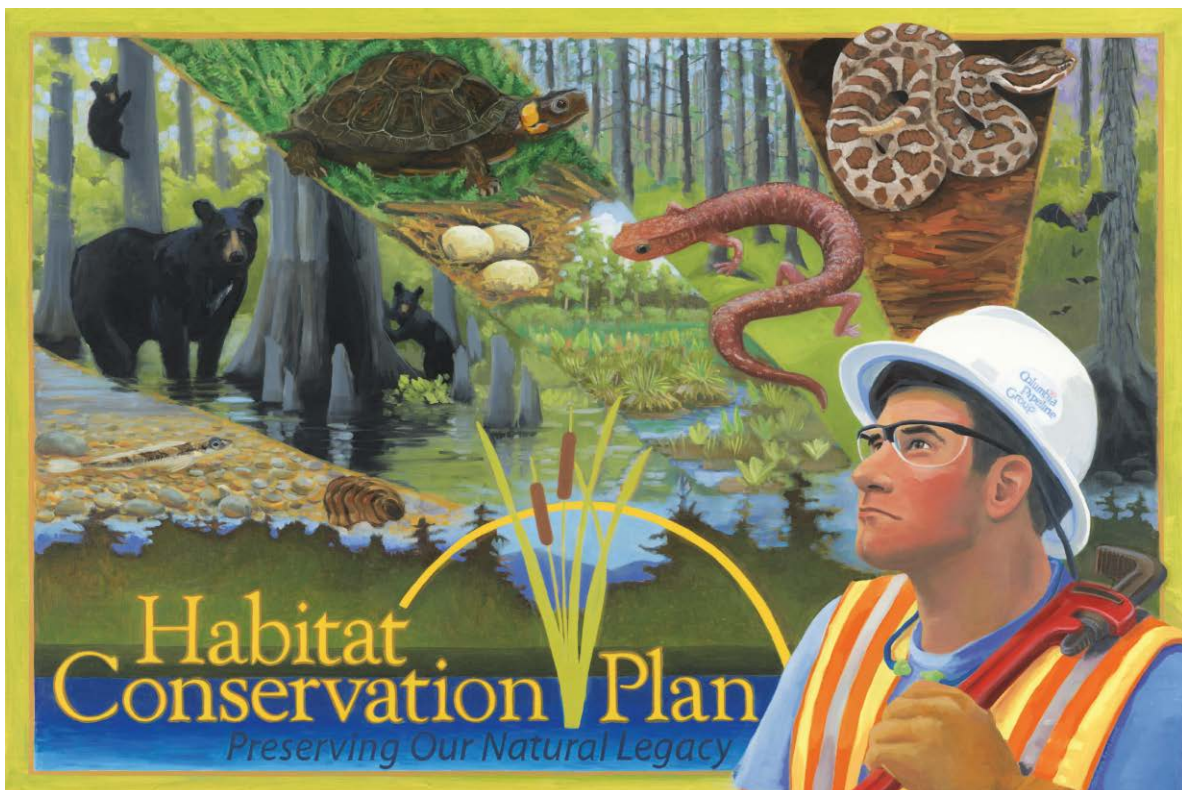




Northern long-eared bat (Myotis septentrionalis)
Photo by Virgil Brack; ESI

Multi-Species Habitat Conservation Plan Amendment Northern Long-eared Bat

January 2015



NiSource Multi-Species Habitat Conservation Plan Amendment Executive Summary

NiSource's Multi-Species Habitat Conservation Plan (MSHCP) represents an innovative approach to provide for both enhanced conservation of listed species and streamlined regulatory compliance for facility activities. The MSHCP addressed 42 species and provided an organized and efficient way to avoid adverse effects to, and also minimize and mitigate for any anticipated take of, these species potentially caused by covered activities. It satisfied applicable provisions of the Endangered Species Act (ESA) pertaining to federally listed species protection, and it concurrently has improved the permitting efficiency for the construction, operation, and maintenance of NiSource's natural gas pipelines and ancillary facilities by providing a predictable regulatory process for ESA issues under which pipeline activities can proceed. NiSource Inc. was issued an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (Service or USFWS) on September 13, 2013 and full implementation began on January 1, 2014.

As contemplated in Chapter 9 *Amendment Process* in the original MSHCP, from time to time the MSHCP would need to be amended to add newly listed species that might be affected by NiSource's activities. The intent of this Amendment is to add the Northern long-eared bat (*Myotis septentrionalis*) to the MSHCP and ITP. Before amending the ITP, the Service will undertake a combined intra-agency and inter-agency "Section 7 consultation" to include the Service and other federal agencies with jurisdiction over some of NiSource's covered activities, specifically the Federal Energy Regulatory Commission, U.S. Army Corps of Engineers, U.S. Forest Service, and the National Park Service. This Section 7 consultation on the ITP and resulting Biological Opinion, which will be programmatic in nature, will guide the agencies in any subsequent ESA reviews for needed approvals or permitting of the covered activities.

NiSource's ITP was issued with a 50-year permit duration and requests that the amended ITP have the same termination date.

The key elements are organized in a manner that follows the basic textual content of the MSHCP.

Covered Activities. In developing this Amendment, NiSource seeks ESA take coverage for a suite of covered activities associated with its natural gas facilities within the covered lands, including (1) general operation and maintenance of NiSource's natural gas systems; (2) safety-related repairs, replacements, and maintenance of NiSource's natural gas systems; and (3) certain expansion activities related to NiSource's natural gas systems. The Amendment does not cover activities outside the covered lands, emergency response activities, or any activities associated with NiSource's Midstream facilities.

Covered Lands. The Amendment planning area extends across three Service regions and 14 states to cover an area stretching from Louisiana northeastward to New York where NiSource natural gas systems are in place. The lands covered by the Amendment are tied to existing NiSource facilities (e.g., pipelines, ancillary structures, and storage fields). Lands that fall within a one-mile-wide corridor – i.e., one-half mile

(2,640 feet) on either side of the centerline of a NiSource pipeline or existing ancillary company structure or building – are considered part of the plan area. The onshore pipeline system is 15,562 miles long. In addition to these lands, the following counties are included in their entirety to permit potential expansion of the existing storage fields contained therein: Hocking, Fairfield, Ashland, Knox, and Richland counties, Ohio; Bedford County, Pennsylvania; Allegany County, Maryland; Kanawha, Jackson, Preston, Marshall, and Wetzel counties, West Virginia. The total area encompassed in the covered lands is 9,783,200 acres, of which only a small percentage would be impacted annually by NiSource’s covered activities.

This geographic scope was chosen to be consistent with NiSource’s business philosophy of managing its natural gas facility activities as a unified system. This has the conservation planning advantage of encompassing a larger portion of a species’ population and habitat so the Amendment can more comprehensively address conservation best management practices and mitigation measures.

Species Included in the Amendment. One mammalian species, Northern long-eared bat, has been analyzed in this Amendment. NiSource is requesting incidental take authorization (i.e. “take species”) for this species.

The Service will be required to analyze the impacts to additional species listed under the ESA as part of its review of the Amendment. NiSource elected not to include these species in the MSHCP or this Amendment. As such, the Service must analyze these species when preparing both its Biological Opinion and its environmental analyses under the National Environmental Policy Act. The resulting documentation and analyses may facilitate the ESA permitting requirements for future NiSource projects or subsequent reviews required of other agencies.

Permit Duration. The Amendment is written to provide compliance with the ESA for the next 49 years, and NiSource requested that the ITP have the same duration. Assessments conducted as part of this plan are therefore based on this 49-year timeframe. NiSource intends to convene periodic meetings with the Service and other stakeholders, as needed, throughout the life of the ITP to evaluate the success of and possible changes to Amendment implementation; to address any potential unforeseen circumstances, changed circumstances, or adaptive management considerations; and to consider any other issues that may affect NiSource’s implementation of the Amendment.

Avoidance and Minimization Measures. This Amendment includes an analysis of the anticipated impacts of covered activities on the Northern long-eared bat. Based on these anticipated impacts, the Amendment identifies AMMs designed to ameliorate such impacts. It also includes NiSource’s Environmental Construction Standards (ECS), which provide detailed environmental specifications for NiSource construction, operation, and maintenance activities in environmentally sensitive areas, including habitat for federally listed and candidate species. Consistent and coordinated use of these standards and practices, and the development of revised or new standards relevant to the Northern long-eared bat, will serve to avoid and/or minimize effects on such species, reducing or eliminating the need for mitigation.

Mitigation. Although implementation of the AMMs usually will represent the most streamlined, efficient, and economic approach to conservation, there will be instances in which the AMMs will not completely ameliorate the effects of the covered activities on the Northern long-eared bat. To offset effects that cannot be avoided or minimized, the Amendment uses a landscape-level approach to mitigation, which is embodied by the use of a green infrastructure assessment for strategic conservation planning developed for NiSource by The Conservation Fund (TCF). Green infrastructure offers a conceptual approach for identifying mitigation opportunities at an ecosystem level. Specifically, it is a strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations. The result of TCF's assessment is a framework that can be used to identify mitigation opportunities that provide the greatest benefit for the species. The green infrastructure assessment will not be used to determine how much mitigation should occur in response to a take, but rather will be one tool available when selecting the locations for mitigation opportunities, consistent with the mitigation criteria specified in the Amendment and ITP.

The compensatory mitigation is divided into two components; *aggregate or O&M* and *project specific*. The aggregate or O&M mitigation is designed to compensate for impacts from ongoing operations of existing facilities (ROW maintenance, minor erosion for the ROW, vehicles traveling on the ROW, etc.). These impacts, while too small to be determined or calculated on their own, may result in overall habitat degradation for the Northern long-eared bat. Since ROW maintenance activities typically occur on a seven-year cycle, the compensatory mitigation is scheduled to occur within the first seven years of MSHCP implementation. A summary of the mitigation type, amount, cost and funding schedule is provided in **Table 8.2.2-1**. As shown, NiSource anticipated that the total aggregate or O&M mitigation funding will be \$799,595. Funding for this mitigation will be made in seven separate payments to the NFWF Fund by January 15th for each of the first seven years.

Project-specific mitigation is designed to compensate for impacts resulting from certain construction or O&M non-recurring activities. Examples include impacts to Northern long-eared bat during the clearing of potentially suitable habitat while the bats are present during a pipeline looping project to deliver natural gas to expanding markets. The specific effects and corresponding compensation required will be measured on a project-by-project basis and any required mitigation ratio will be applied to determine the overall amount of mitigation required for that project. These impacts, mitigation ratios, and mitigation project type are described in detail in Chapter 6. Funding for this compensatory mitigation will be provided prior to the impact occurring. A summary of the mitigation type, amount, and cost is provided in **Table 8.2.2-2**. As shown, NiSource expects that the total project specific mitigation funding over the life of the permit would be \$40,212,346 should all of the requested take be used. Before work may be undertaken on any project, NiSource would be required to deposit projected costs into the NFWF Fund.

Mitigation need not necessarily occur within one year of when the impacts occurred. In other words, funds contributed to mitigate for impacts to individual

species may be aggregated over multiple years so that larger, more significant projects can be funded. It is the goal to expend the mitigation funds that NiSource contributed on mitigation measures within two years of take, whenever practical. In addition, mitigation measures may be undertaken that provide greater mitigation than is required to compensate for the previous year's take. Such mitigation may provide a "credit" toward future impacts.

NiSource has established a Mitigation Panel which will solicit proposals from various NGOs, affected states, academics, Tribes, and others for some of the mitigation projects. The proposals also must conform to the mitigation requirements identified in the Amendment for the Northern long-eared bat. The Mitigation Panel will make final recommendations to NiSource, which will make a decision, subject to Service approval. In evaluating mitigation options, the Mitigation Panel may consider opportunities identified in TCF's green infrastructure assessment, recovery plans, or other ecoregional studies, so long as the mitigation criteria in the Amendment are first satisfied.

Other Key Elements. This Amendment also includes information on monitoring, reporting, adaptive management (a feedback-loop process for improving implementation of the MSHCP during the permit term), "No Surprises" assurances, changed and unforeseen circumstances, implementation costs and funding assurances, and an analysis of alternatives.

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Acronyms and Abbreviations

ABB	American burying beetle
AMMs	Avoidance and minimization measures
ATVs	all-terrain vehicles
AFS	Appurtenant facility site
BMPs	Best management practices
BO	Biological Opinion
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
Columbia	Columbia Pipeline Group
CP	Cathodic protection
CPG	Columbia Pipeline Group
CRP	Conservation Reserve Program
CTM	Critical Thermal Maxima
CWA	Federal Clean Water Act
DBH	diameter at breast height
E&S	Erosion and sediment control
EA	Environmental Assessment
EM&CP	Environmental Management & Construction Plan
ECOS	Environmental Conservation Online System
ECS	Environmental Construction Standards
EDF	Environmental Defense Fund
EIS	Environmental Impact Statement
EMCS	Environmental Management & Construction Standards
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Forest Service
FR	Federal Register
FSA	Farm Service Agency
GAP	Gap Analysis Program
GHG	Greenhouse gas
GIS	Geographic information system
GPS	Global positioning system
HCP	Habitat Conservation Plan
HDD	Horizontal Directional Drill
HP	High Potential
HUC	Hydrologic unit code
IA	Implementing Agreement
IACET	International Association for Continuing Education and Training
IPaC	Information Planning and Consultation system
IPCC	Intergovernmental Panel on Climate Change
ITP	Incidental Take Permit
ITS	Incidental Take Statement
JSM	James spinymussel
LDC	Local Distribution Company

Acronyms and Abbreviations (Continued)

MCI	Madison Cave isopod
MBTA	Migratory Bird Treaty Act
MI	Miles
MOU	Memorandum of Understanding
MSHCP	Multi-Species Habitat Conservation Plan
NASA	National Aeronautic and Space Administration
NGA	Natural Gas Act
NGO	Non-government Organization
NEPA	National Environmental Policy Act of 1969
NFWF	National Fish and Wildlife Foundation
NGTS	NiSource Gas Transmission & Storage Companies
NJDEP	New Jersey Department of Environmental Protection
NLCD	National Land Cover Dataset
NLEB	Northern Long-eared Bat
NMFS	National Marine Fisheries Service
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRP	Columbia Natural Resource Permits Group
NWI	National Wetland Inventory
O&M	Operation and Maintenance
OPS	Office of Pipeline Safety
P	Priority, as in P1, P2, P3, or P4 hibernacula
PAS	Population Analysis Site
PEIF	Project Environmental Information Form
PHMSA	Pipeline Hazardous Materials Safety Administration
ROW	Right-of-way
SAFE	State Acres for Wildlife Enhancement
SCADA	Supervisory Control and Data Acquisition
Service	U.S. Fish & Wildlife Service
SF	Storage Field
SPCC	Spill Prevention Control and Countermeasures
SPI	Standardized Precipitation Index
TCF	The Conservation Fund
TOY	Time of Year
TNC	The Nature Conservancy
TVA	Tennessee Valley Authority
USC	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VAFO	Virginia Field Office
Waterloo WA	Waterloo Wildlife Area
Wayne NF	Wayne National Forest
WNS	White-nose syndrome

WRP
YOY

Wetlands Reserve Program
Young of the Year

1.0 Introduction

1.1 Background

NiSource Inc. was issued an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (Service or USFWS) on September 13, 2013 and full implementation began on January 1, 2014. Implementation of the ITP and the attendant Multi Species Habitat Conservation Plan (MSHCP) is intended to provide for both enhanced conservation of listed species and streamlined regulatory compliance requirements for NiSource's pipeline activities. NiSource Inc.'s wholly owned pipeline subsidiaries, Columbia Gas Transmission, LLC, Columbia Gulf Transmission LLC, Crossroads Pipeline Company, Central Kentucky Transmission Company, and NiSource Gas Transmission and Storage Company (companies referred to collectively as "Columbia" or "CPG" throughout this Amendment) are interstate natural gas companies whose primary operations are subject to the Natural Gas Act and fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and the U.S. Department of Transportation (USDOT).

As contemplated in Chapter 9 *Amendment Process* in the original MSHCP, from time to time the MSHCP would need to be amended to add newly listed species that might be affected by Columbia's activities. The intent of this Amendment is to include the Northern long-eared bat (NLEB) (*Myotis septentrionalis*) into the MSHCP and ITP.

1.1.1 Overview of NiSource

No changes to the original MSHCP are needed for this Amendment.

1.1.2 Genesis of the Habitat Conservation Plan

No changes to the original MSHCP are needed for this Amendment.

1.1.3 Purpose of the Multi-Species Habitat Conservation Plan Amendment

The MSHCP represents an approach to provide for both enhanced conservation of listed species and streamlined regulatory compliance requirements for Columbia's pipeline activities. It provides a means to avoid, minimize, and/or mitigate for take of species caused by covered activities. It also memorializes measures to be undertaken to avoid and minimize adverse effects to certain species for which take is therefore not anticipated. In doing so, the MSHCP satisfies applicable provisions of the ESA pertaining to federally listed species protection, and it concurrently improves the permitting efficiency for the construction, operation, and maintenance of Columbia's natural gas pipelines and ancillary facilities by providing a predictable and accepted structure under which pipeline activities can proceed.

Prior to the issuance of the ITP, the Service conducted a combined intra-agency and inter-agency consultation with the Federal Energy Regulatory Commission (FERC), U.S. Army Corps of Engineers (Corps), U.S. Forest Service, the National Park Service, pursuant to section 7 of the Endangered Species Act (ESA). This programmatic consultation analyzed the federal agency actions related to the implementation of the

MSHCP and the impacts on all 89 listed and candidate species within the covered lands. Columbia has been implementing the MSHCP since January 1, 2014, conducting pipeline construction, operation, and maintenance projects as needed.

On October 2, 2013, the Service proposed listing the NLEB as an endangered species under the ESA. The NLEB was not included in the MSHCP or the programmatic consultation for federal agency actions associated with the MSHCP. As contemplated in Chapter 9 *Amendment Process* in the MSHCP, from time to time it would need to be amended to add newly listed species that might be affected by Columbia's activities. The intent of this Amendment is to include the NLEB into the MSHCP and ITP. Although 42 species were analyzed in the original MSHCP and an additional 47 species were considered by the Service during its ESA Section 7 review of the ITP application, NLEB was not included as it was not a candidate species at that time.

This Amendment addresses the impacts of Columbia's covered activities on the NLEB. The same three general categories of activities related to Columbia's natural gas systems: (1) general operation and maintenance; (2) safety-related repairs, replacements, and maintenance; and (3) expansion are included. The geographic scope and covered lands of this Amendment will also remain the same as described in detail in Chapter 2 of the original MSHCP. After accounting for its commitments to avoidance and minimization measures, Columbia anticipates take of the NLEB. Thus take coverage is requested and the species would be added to the ten "take species" for which take coverage has already been granted in the ITP.

1.1.3.1 Conservation Benefits to Species

No changes to the original MSHCP are needed for this Amendment.

1.1.3.2 The Green Infrastructure Assessment

No changes to the original MSHCP are needed for this Amendment.

1.1.3.3 Benefits to NiSource

No changes to the original MSHCP are needed for this Amendment.

1.1.3.4 Benefits to the Service

No changes to the original MSHCP are needed for this Amendment.

1.1.3.5 Benefits to Other Federal Agencies

No changes to the original MSHCP are needed for this Amendment.

1.1.4 Statement of Principles

No changes to the original MSHCP are needed for this Amendment.

1.2 Scope of the Multi-Species Habitat Conservation Plan Amendment

The scope of the Amendment includes the duration of the incidental take permit that Columbia is requesting (permit duration); areas for which Columbia is requesting incidental take coverage for its covered activities (covered lands); the otherwise lawful activities for which Columbia is requesting incidental take coverage (covered activities); the additional species for which Columbia is requesting incidental take authorization (take species); and the entities for whom incidental take coverage is requested (permittee). Each of these elements is described below.

MSHCP Amendment Key Components
<ul style="list-style-type: none">• Permit Amendment Duration: Consistent with original ITP, ending Sept 13, 2063.• Covered Lands: One-Mile-Wide Linear Corridor Approximately 15,562 Miles in Length, plus 12 Counties where storage fields occur equaling approximately 9,783,207 acres.• Covered Activities: ROW Vegetation Maintenance, O & M Activities, and Construction• Take Species: One additional species for which Columbia is requesting incidental take authorization.• Permittee: NiSource, Inc.

1.2.1 Permit Duration

The duration of Columbia’s MSHCP was selected to comply with the Service’s Five-Point Policy for HCPs, 65 Fed. Reg. 35242 (June 1, 2000), which outlines the following factors to consider when determining the length of incidental take permits:

- The duration of the covered activities and the expected positive and negative effects on species covered by the ITP.
- The extent to which the operating conservation program will increase the long-term survivability of the listed species or enhance its habitat.
- The extent of information underlying the HCP.
- The time necessary to implement and achieve the benefits of the operating conservation program.
- The extent to which the program incorporates adaptive management strategies to address biological uncertainty.

Based on these factors, this Amendment is written to cover certain activities over the original permit duration, ending September 2063. Assessments conducted as part of this plan are therefore based on this same timeframe.

1.2.2 Covered Lands

No changes to the original MSHCP are needed for this Amendment.

1.2.3 General Description of Covered Activities

No changes to the original MSHCP are needed for this Amendment.

1.2.4 Species Analyzed in this MSHCP Amendment

One mammalian species, NLEB, has been analyzed in this Amendment (*See Table 4-1*). Columbia is requesting incidental take authorization for this species (i.e. “take species”).

1.2.5 Permittee

No changes to the original MSHCP are needed for this Amendment.

1.3 What the Multi-Species Habitat Conservation Plan Does Not Do

No changes to the original MSHCP are needed for this Amendment.

1.4 Legal Framework

No changes to the original MSHCP are needed for this Amendment.

1.4.1 Regulatory Agencies

No changes to the original MSHCP are needed for this Amendment.

1.4.2 Federal Endangered Species Act

No changes to the original MSHCP are needed for this Amendment.

1.4.3 National Environmental Policy Act

No changes to the original MSHCP are needed for this Amendment.

1.4.4 Natural Gas Act

No changes to the original MSHCP are needed for this Amendment.

1.4.5 Natural Gas Pipeline Safety Act

No changes to the original MSHCP are needed for this Amendment.

1.4.6 Clean Water Act

No changes to the original MSHCP are needed for this Amendment.

1.4.7 Migratory Bird Treaty Act

No changes to the original MSHCP are needed for this Amendment.

1.4.8 Bald and Golden Eagle Protection Act

No changes to the original MSHCP are needed for this Amendment.

1.4.9 Conservation Reserve Program

No changes to the original MSHCP are needed for this Amendment.

1.4.10 State Wildlife Laws

No changes to the original MSHCP are needed for this Amendment.

1.4.11 State or Local Conservation Easements

No changes to the original MSHCP are needed for this Amendment.

1.4.12 Landowner Easement Agreements

No changes to the original MSHCP are needed for this Amendment.

1.5 Overview of the Multi-Species Habitat Conservation Plan Amendment Preparation Process

1.5.1 MSHCP Amendment Planning

On October 2, 2013, the Service proposed listing the NLEB as an endangered species under the ESA. The NLEB was not included in the MSHCP or the programmatic consultation for federal agency actions associated with the MSHCP. As contemplated in Chapter 9 *Amendment Process* in the MSHCP, from time to time it would need to be amended to add newly listed species that might be affected by Columbia's activities. The intent of this Amendment is to include the NLEB into the MSHCP and ITP. Although 42 species were analyzed in the original MSHCP and an additional 47 species were considered by the Service during its ESA Section 7 review of the ITP application, NLEB was not included as it was not a candidate species at that time.

1.5.2 Coordination with Federal Agencies, States, Tribes and Non-Governmental Organizations

No changes to the original MSHCP are needed for this Amendment.

1.5.3 MSHCP Advisory Team

No changes to the original MSHCP are needed for this Amendment.

1.5.4 Species-Specific Specialists

No changes to the original MSHCP are needed for this Amendment.

1.6 Overview of MSHCP Implementation

No changes to the original MSHCP are needed for this Amendment.

1.7 Document Organization

No changes to the original MSHCP are needed for this Amendment.

2.0 Covered Lands and Covered Activities

2.1 Introduction

No changes to the original MSHCP are needed for this Amendment.

2.2 Description of Pipeline System

No changes to the original MSHCP are needed for this Amendment.

2.3 Covered Lands

No changes to the original MSHCP are needed for this Amendment.

2.4 Covered Activities

No changes to the original MSHCP are needed for this Amendment.

2.5 Activities Not Covered by the Multi-Species Habitat Conservation Plan

No changes to the original MSHCP are needed for this Amendment.

3.0 Physical and Biological Environmental Setting

3.1 Introduction

No changes to the original MSHCP are needed for this Amendment.

3.2 Data Collection

No changes to the original MSHCP are needed for this Amendment.

3.3 Ecoregions

No changes to the original MSHCP are needed for this Amendment.

3.4 Watersheds

No changes to the original MSHCP are needed for this Amendment.

3.5 Existing Land Use

No changes to the original MSHCP are needed for this Amendment.

3.6 Existing Conservation Areas within Covered Lands

No changes to the original MSHCP are needed for this Amendment.

3.7 Climate

No changes to the original MSHCP are needed for this Amendment.

4.0 Species Analyzed in the MSHCP Amendment

4.1 Introduction

The MSHCP originally analyzed 43 species, consisting of 41 federally listed species and two candidate species (*see Table 4-1* in the original MSHCP). Prior to issuance of the ITP, one of the candidate species (sheepnose) was listed as an endangered species (effective April 12, 2012 FR 77, No. 49, 14914-14949) and the Lake Erie watersnake was delisted (effective September 15, 2011 FR 76, No. 158, 50680-50702).

On October 2, 2013, the Service proposed listing the NLEB as an endangered species under the ESA. The NLEB was not included in the MSHCP or the programmatic consultation for federal agency actions associated with the MSHCP. As contemplated in Chapter 9 *Amendment Process* in the MSHCP, from time to time it would need to be amended to add newly listed species that might be affected by Columbia's activities. The intent of this Amendment is to include the NLEB into the MSHCP and ITP. Although 42 species were analyzed in the original MSHCP and an additional 47 species were considered by the Service during its ESA Section 7 review of the ITP application, NLEB was not included as it was not a candidate species at that time.

Consistent with the original MSHCP and for the purpose of this Amendment, we refer to the NLEB for which take coverage is requested as a "take species." We refer to all species analyzed in the MSHCP and Amendment as "MSHCP species."

Altogether, the 43 MSHCP species represent those species in which Columbia would no longer need to consult with the Service prior to undertaking covered activities within the covered lands, subject to the conditions of the ITP or BO, or the reinitiation or programmatic tiering of that document.

4.2 Process for Species Inclusion in the MSHCP Amendment

As indicated above, the Service has recently proposed listing the NLEB as an endangered species under the ESA. Since this species range, habitat and biology is similar to the Indiana bat, the self-implementing benefits of the MSHCP and ITP to Columbia would be diminished if Columbia did not amend the documents. Columbia sought Service guidance in the development of the plan. While inclusion of other non-MSHCP species in this amendment might also be beneficial, adequate resources and time to fully develop those analyses is not available. As before, other species of concern will likely benefit from the measures provided by this Amendment.

4.2.1 Federally Listed Species

No changes to the original MSHCP are needed for this Amendment.

4.2.2 Candidate Species

No changes to the original MSHCP are needed for this Amendment.

4.2.3 State-Listed Species

No changes to the original MSHCP are needed for this Amendment.

4.3 Species Analyzed in the MSHCP Amendment

One mammalian species, NLEB, has been analyzed in this Amendment (*See Table 4-1*). Columbia is requesting incidental take authorization (i.e. “take species”) for this species.

Table 4-1 MSHCP Amendment Species List

Common Name	Scientific Name	Federal Status	Take Determination
Mammals			
Northern long-eared bat	<i>Myotis septentrionalis</i>	PE	Take

Notes:

- E=Endangered
- PE= Proposed Endangered
- T=Threatened
- C=Candidate
- XN=Experimental, Non-essential

Species in **bold** represent those species to be included in the ITP.

5.0 Conservation Strategy

5.1 Overview

No changes to the original MSHCP are needed for this Amendment.

5.1.1 Goals of the Conservation Strategy

No changes to the original MSHCP are needed for this Amendment.

5.1.1.1 Core Values and Guiding Principles

No changes to the original MSHCP are needed for this Amendment.

5.1.2 Columbia Environmental Practices

No changes to the original MSHCP are needed for this Amendment.

5.1.2.1 Environmental Construction Standards (ECS)

No changes to the original MSHCP are needed for this Amendment.

5.1.2.2 Pre-Construction Environmental Compliance Program

No changes to the original MSHCP are needed for this Amendment.

5.1.3 Training

No changes to the original MSHCP are needed for this Amendment.

5.2 Conservation Program

No changes to the original MSHCP are needed for this Amendment.

5.2.1 Avoidance and Minimization Measures

No changes to the original MSHCP are needed for this Amendment.

Non-Mandatory AMMs

The mitigation strategy for NLEB fully compensates for all impacts (both direct and indirect) regardless of when potential habitat is removed. Therefore, the decision whether to apply non-mandatory AMMs will be made by the project manager, taking into account the needs of the project, and will not be included in the annual report to the Service. No other changes to the original MSHCP are needed for this Amendment.

Pre-Construction Project Planning

No changes to the original MSHCP are needed for this Amendment.

5.2.1.1 Waterbody Crossing Method Selection Process

No changes to the original MSHCP are needed for this Amendment.

5.2.2 Covered Activities that Avoid Take

The definition of “Special Areas” described in this section is modified to include known NLEB hibernacula, maternity colonies, and roost trees. No other changes to the original MSHCP are needed for this Amendment.

5.3 Mitigation Program

5.3.1 Mitigation Strategy

To the extent that Columbia undertakes conservation efforts to offset the impacts of a given activity on Indiana bat, and such conservation efforts also offset that activity’s impacts on NLEB, Columbia may use those conservation efforts to satisfy, in whole or in part, its mitigation obligations for that activity under this Amendment. Although there is potential for competition between bat species for some needed resources, the expectation is that most take of bat species will be in the form of harassment. Conservation efforts in areas where both species are known to be present are expected to provide sufficient benefit to offset the impact of the expected harassment to both species. Likewise, where mitigation undertaken pursuant to this Amendment to offset an activity’s impacts to NLEB also serves to offset impacts of that activity to one or more migratory bird species, Columbia may use that mitigation to satisfy, in whole or in part, any commitment Columbia has made under the MBTA. No other changes to the original MSHCP are needed for this Amendment.

5.3.2 Mitigation Undertaken by Columbia

No changes to the original MSHCP are needed for this Amendment.

5.3.3 Mitigation Undertaken by Third Parties

No changes to the original MSHCP are needed for this Amendment.

5.3.4 Columbia Mitigation Panel

No changes to the original MSHCP are needed for this Amendment.

5.4 Species-Specific Conservation Strategies

No changes to the original MSHCP are needed for this Amendment.

6.0 Species Assessments, Impact Analysis, and Mitigation

No changes to the original MSHCP are needed for this Amendment.

6.1 Species Assessment Methodology

6.1.1 Take Species Analysis

No changes to the original MSHCP are needed for this Amendment.

6.1.2 Information Used to Perform Species Analyses

No changes to the original MSHCP are needed for this Amendment.

6.1.3 Species Maps

No changes to the original MSHCP are needed for this Amendment.

6.1.4 Species for Which the Covered Activities Will Have No Effect or No Adverse Impact

No changes to the original MSHCP are needed for this Amendment.

6.1.5 Summary of Incidental Take Requested for Take Species

Columbia is requesting incidental take for one additional species NLEB (Table 6.1.5-1). A detailed take calculation for NLEB is provided in Section 6.2.11.5 “Calculation of Incidental Take” for that species. As noted in the species-specific analysis, accurately predicting the number of individuals that may be taken isn’t always possible. Where it is not, the MSHCP explains so and provides a rationale for the surrogate value (e.g. acres of habitat) chosen to monitor take.

No other changes to the original MSHCP are needed for this Amendment.

Table 6.1.5-1 Summary of Incidental Take over the 50-Year Permit Duration

Species	Summary of Take Requested
Northern Long-eared bat	Incidental take is requested for no more than 93,500 acres of summer and/or spring staging/fall swarming habitat that could support up to 4,618 NLEB individuals.

6.2 Species Assessments, Avoidance and Minimization Measures, Take Calculations, Impact Analysis, and Compensatory Mitigation

No changes to the original MSHCP are needed for this Amendment.

6.2.1 Indiana Bat

No changes to the original MSHCP are needed for this Amendment.

6.2.2 Bog Turtle

No changes to the original MSHCP are needed for this Amendment.

6.2.3 Madison Cave Isopod

No changes to the original MSHCP are needed for this Amendment.

6.2.4 Clubshell Mussel

No changes to the original MSHCP are needed for this Amendment.

6.2.5 Northern Riffleshell Mussel

No changes to the original MSHCP are needed for this Amendment.

6.2.6 Fanshell Mussel

No changes to the original MSHCP are needed for this Amendment.

6.2.7 James Spinymussel

No changes to the original MSHCP are needed for this Amendment.

6.2.8 Sheepnose Mussel

No changes to the original MSHCP are needed for this Amendment.

6.2.9 Nashville Crayfish

No changes to the original MSHCP are needed for this Amendment.

6.2.10 American Burying Beetle

No changes to the original MSHCP are needed for this Amendment.

6.2.11 Northern Long-eared Bat

On October 2, 2013, the Service proposed the NLEB for listing as an endangered species under the ESA. No critical habitat has been proposed at this time. A listing decision is expected on April 2, 2015.

The NLEB ranges across much of the eastern and north central United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia. Historically, the species has been found in greater abundance in the Northeast and portions of the Midwest and Southeast, and has been more rarely encountered along the western edge of the range. It is found in each of the 14 states within the covered lands.

LIFE HISTORY & BIOLOGICAL BACKGROUND

The NLEB is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. The key stages in the annual cycle of NLEBs are: hibernation, spring staging and migration, pregnancy, lactation, volancy/weaning, fall migration and swarming. While varying with weather and latitude, generally NLEBs will typically hibernate between mid-fall through mid-spring each year. The spring migration period likely runs from mid-March to mid-May. 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 in mid- to late-July. Fall migration likely occurs between mid-August and mid-October.

Winter Habitat and Ecology

Generally, NLEBs hibernate from October to April depending on local weather conditions (November-December to March in southern areas and as late as mid-May in some northern areas). They roost singly or in small groups (USFWS 2013), and hibernating population sizes range from a few individuals to around 1,000 (USFWS unpublished data). NLEB display more winter activity than other cave species, and they often move between hibernacula throughout the winter (Griffin 1940, Whitaker and Rissler 1992, Caceres and Barclay 2000). However, they have shown a high degree of philopatry to the hibernacula used.

Spring Staging and Migration

After hibernation ends in late March or early April (as late as May in some northern areas), most NLEBs migrate to summer roosts. Female NLEBs emerge from hibernation prior to males. Reproductively active females store sperm from autumn copulations through winter. Ovulation takes place after the bats emerge from hibernation in spring. 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. This period can be as short as a day for an individual NLEB but not all bats emerge on the same day.

Migration may be stressful for the NLEB, particularly in the spring when their fat reserves and food supplies are low and females are pregnant. Overall, NLEB is not considered to be a long distance migrant (typically 40-50 miles) although known migratory distances vary greatly between 5 and 168 miles. Unlike Indiana bats, males are routinely found with females in maternity colonies.

Summer Roosting and Foraging

Maternity colonies and roosts

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies. Coloniality is a requisite behavior for reproductive success. Maternity colonies range in size from 7-100 individuals, although 30-60 may be most common (USFWS 2013). Female NLEB show some degree of interannual fidelity to single roost trees and/or maternity areas.

NLEBs roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥ 3 inches dbh). They form social groups in networks of roost trees often centered around a central-node roost tree (Johnson et al. 2012). Central-node roost trees were directly linked to 2-6 roost trees in roost networks comprised of 3-16 roost trees. Central-node roost trees may be similar to Indiana bat primary roost trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems flexible in selecting roosts, using tree species based on presence of cavities or crevices or presence of peeling bark. NLEBs have also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Reproduction

Young are born in late-May or early June to July with females giving birth to a single offspring. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years.

Fall Swarming and Mating

Upon arrival at hibernacula in mid-August to mid-November, NLEBs “swarm,” a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in caves during the day. Swarming continues for several weeks and mating occurs during the latter part of the period. After mating, females enter directly into hibernation. A majority of bats of both sexes hibernate by the end of November (by mid-October in northern areas).

HABITAT CONSIDERATIONS

Winter Habitat

Suitable winter habitat (hibernacula) for the NLEB includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). There may be other landscape features being used by NLEB during the winter that have yet to be documented. Known hibernacula typically have significant cracks and crevices for roosting; relatively constant, cool temperatures (0-9 degrees Celsius) and with high humidity and minimal air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. NLEBs often hibernate in the same hibernacula with other species of bats and are occasionally observed clustered with or adjacent to other federally listed species, including gray bats (*Myotis grisescens*), Virginia big-eared bats (*Corynorhinus townsendii virginianus*), and Indiana bats (Service 1999).

Summer Habitat

Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. Suitable NLEB roosts are trees (live, dying, dead, or snag) with a diameter at breast height (DBH) of three inches or greater that exhibits any of the following characteristics: exfoliating bark, crevices, cavity, or cracks. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 feet from the next nearest suitable roost tree within a woodlot, or wooded fencerow.

NLEBs are typically associated with upland forests with generally more canopy cover than Indiana bats. NLEB seem to be focused in upland, mature forests (Caceres and Pybus 1998) with occasional foraging over forest clearings, water and along roads (Van Zyll de Jong 1985). However, most hunting occurs on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001; LaVal et al. 1977).

Fall Swarming and Spring Staging Habitat near Hibernacula

NLEBs use roosts in the spring and fall similar to those selected during the summer. Suitable spring staging/fall swarming habitat for the NLEB consists of the variety of forested/wooded habitats where they roost, forage, and travel, which is most typically within 5 miles of a hibernaculum. This includes forested patches as well as linear features such as fencerows, riparian forests and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 feet from the next nearest suitable roost tree, woodlot, or wooded fencerow.

RANGE-WIDE THREATS

No other threat is as severe and immediate for the NLEB as the disease white-nose syndrome (WNS). More information about WNS can be found in Section 6.2.1 (Indiana bat) of the original MSHCP. If this disease had not emerged, it is unlikely that NLEB populations would be declining so dramatically. Since symptoms were first observed in New York in 2006, WNS has spread rapidly in bat populations from the Northeast to the Midwest and the Southeast. Population numbers of NLEB have declined by 99 percent in the Northeast, which along with Canada, has been considered the core of the species' range. The degree of mortality attributed to WNS in the Midwest and Southeast is currently undetermined. Although there is uncertainty about how quickly WNS will spread through the remaining portions of the species' range, it is expected to spread throughout the entire range. In general, the Service believes that WNS has reduced the redundancy and resiliency of the species.

Although significant NLEB population declines have only been documented due to the spread of WNS, other sources of mortality could further diminish the species' ability to persist as it experiences ongoing dramatic declines. Specifically, declines due to WNS have significantly reduced the number and size of NLEB populations in some areas of its range. This has reduced these populations to the extent that they may be increasingly vulnerable to other stressors that they may have previously had the ability to withstand. These impacts could potentially be seen on two levels. First, individual NLEBs sickened or struggling with infection by WNS may be less able to survive other stressors. Second, NLEB populations impacted by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover making them more prone to extirpation. The status and potential for these impacts will vary across the range of the species.

6.2.11.1 Activities and Impact Analysis

The following Columbia O&M and new construction activities could adversely impact the NLEB: tree clearing associated with a wide variety of activities, tree side-

trimming, access roads maintenance and construction, well plugging, presence of the pipeline corridor, construction and maintenance of waste pits, and herbicide application (**Appendix M, Table 6.2.11.1-1**). These activities could result in a variety of stressors to the NLEB including tree removal, crushing bats, flushing bats, entrapment, noise, and chemical contaminants, which may kill, wound, harm, harass if they are present during the work.

Impacts and potential resulting take of NLEB from Columbia covered activities may occur in the states and counties identified below. Columbia and the Service anticipate that the covered activities will have **no effect** on the NLEB on lands found outside of these counties.

- Delaware –*New Castle [NON-IBAT county]*;
- Indiana - DeKalb, Elkhart, Lake, LaPorte, Marshall, Noble, Porter, and St. Joseph counties;
- Kentucky - Adair, Allen, Barren, Bath, Bourbon, Boyd, Bracken, Campbell, Carter, Casey, Clark, Clay, Estill, Fayette, Floyd, Garrard, Greenup, Jackson, Johnson, Knott, Lawrence, Lee, Letcher, Lewis, Lincoln, Madison, Martin, Mason, Menifee, Metcalfe, Monroe, Montgomery, Morgan, Nicholas, Owsley, Pendleton, Perry, Pike, Powell, Robertson, and Rowan counties;
- Louisiana - *Avoyelles, Catahoula, East Carroll, Franklin, Grant, La Salle, Madison, Rapides, Richland*;
- Maryland - *Allegany, Baltimore, Cecil, Garret, Harford, Howard, Montgomery and Washington* counties;
- Mississippi - *Alcorn, Calhoun, Carroll, Grenada, Humphreys, Issaquena, Lafayette, Leflore, Pontotoc, Prentiss, Sharkey, Sunflower, Tippah, Union, Warren, Washington, and Yalobusha* counties;
- New Jersey –*Gloucester, Hunterdon, Morris, Salem, and Warren* counties;
- New York – *Allegany, Broome, Cattaraugus, Chemung, Delaware, Orange, Rockland, Schuylar, Steuben, Sullivan, Tioga and Yates* counties;
- North Carolina – *Northampton*;
- Ohio - Adams, Allen, Ashland, Ashtabula, Athens, Belmont, Brown, Butler, Carroll, Champaign, Clark, Clermont, Clinton, Columbiana, Coshocton, Crawford, Cuyahoga, Defiance, Delaware, Erie, Fairfield, Fayette, Franklin, Gallia, Geauga, Greene, Guernsey, Hancock, Hardin, Harrison, Henry, Hocking, Holmes, Huron, Jackson, Jefferson, Knox, Lawrence, Licking, Logan, Lorain, Lucas, Madison, Mahoning, Marion, Medina, Meigs, Monroe, Montgomery, Morgan, Morrow, Muskingum, Noble, Ottawa, Paulding, Perry, Pickaway, Putnam, Richland, Ross, Sandusky, Scioto, Seneca, Stark, Trumbull, Tuscarawas, Union, Vinton, Warren, Washington, Wayne, Wood, and Wyandot counties;
- Pennsylvania - undefined at this time, Adams, Allegheny, Armstrong, Beaver, Bedford, Bucks, Butler, Cambria, Cameron, Centre, Chester, Clarion, Clearfield, Clinton, Cumberland, Delaware, Elk, Fayette, Franklin, Fulton, Greene, Indiana,

Jefferson, Lancaster, Lawrence, Lehigh, McKean, Monroe, Montgomery, Northampton, Pike, Somerset, Washington, Westmoreland and York counties;

- Tennessee - Davidson, Hardin, Lewis, Macon, Maury, McNairy, Sumner, Trousdale, Wayne, Williamson, and Wilson counties;
- Virginia - Albemarle, Alleghany, Augusta, Botetourt, *Chesterfield*, *Chesapeake*, Clarke, *Culpeper*, *Dinwiddie*, *Fairfax*, *Fauquier*, Frederick, Giles, Goochland, Greene, *Greensville*, *Hampton*, *Hanover*, *Henrico*, *Isle of Wight*, *James City*, *Loudoun*, *Louisa*, Madison, *Newport News*, Orange, Page, Powhatan, *Prince George*, *Prince William*, Rockbridge, Rockingham, Shenandoah, *Southampton*, *Surry*, *Sussex*, *Suffolk*, and Warren counties as well as the independent cities of *Colonial Heights*, *Hopewell*, *Lexington*, *Petersburg*, *Richmond City* and *Waynesboro*; and
- West Virginia –Boone, Braxton, Brooke, Cabell, Calhoun, Clay, Doddridge, Fayette, Gilmer, Grant, Greenbrier, Hampshire, Hancock, Hardy, Harrison, Jackson, Kanawha, Lewis, Lincoln, Logan, Marion, Marshall, Mason, McDowell, Mercer, Mineral, Mingo, Monongalia, Monroe, Morgan, Nicholas, Ohio, Pendleton, Pocahontas, Preston, Putnam, Raleigh, Randolph, Roane, Summers, Taylor, Tucker, Tyler, Upshur, Wayne, Webster, Wetzel, Wirt, Wood, and Wyoming counties.

The most direct threat involves the clearing of vegetation (e.g., trees suitable for roosting) associated with covered activities while bats are present. This may cause take (e.g., kill, wound, harm, harass) of NLEB by crushing bats when the roost tree is felled. Additional take may result from the entrapment of bats in waste pits (kill), noise associated with construction equipment (harassment), chemical contamination of bats drinking from waste pits (harm leading to the likelihood of death or injury), and predation from bats being flushed from roost trees (harm leading to the likelihood of death or injury). Indirect effects potentially resulting in take of NLEB would result from the loss or degradation of roosting, foraging, and travel corridor habitats along the ROW (harassment).

MODELING

To aid in identifying impact areas and assist in determining take for the project, a swarming and staging habitat model and a summer habitat identification model were developed for the NLEB.

Swarming and Staging Impacts

Impacts to NLEB swarming and staging habitat were based on identified hibernacula in or near the covered lands. The process started with more than 1,200 known hibernacula records. Records for the same location in different years or from different sources were considered duplicates and only the most recent was used in the analysis. Hibernacula more than 5 miles away from any areas of the covered lands were removed from the analysis because NLEBs using those hibernacula beyond 5 miles of the covered lands would not be impacted by covered activities. This left 95 potentially impacted hibernacula in or near the covered lands.

The acres of intersection between the covered lands and the swarming and staging area around hibernacula were calculated. Swarming and staging areas were defined as areas within 5 miles of a hibernaculum. The amount of staging/swarming habitat was determined utilizing the methodology described in the summer habitat identification discussion below because habitats used in staging/swarming are similar to summer. Acreages were rounded to the nearest 100 acres.

Areas of SF & ROW Covered Lands in swarming area:	15,800 acres
Areas of ROW Covered Lands only in swarming area:	140,600 acres
Areas of SF Covered Lands only in swarming area:	310,100 acres

Areas in swarming area total:	466,500 acres
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Maternity Colony Impacts

The summer habitat identification methodology was based on the suitable habitat modeling method used for Indiana bats. The data available that covers the entire analysis area is unlikely to be detailed enough to show distinctions between the highly similar summer habitats of these two species. The same classification used for Indiana bat was used to identify suitable National Land Cover Database (NLCD) and vegetation classifications that could be negatively impacted by Columbia’s covered activities. These classifications were in turn utilized to determine, in part, the impact area for the MSHCP. The NLCD classifications identified include:

- (21) Developed open space
- (22) Developed, low intensity
- (23) Developed, medium intensity
- (41) Deciduous forest
- (42) Evergreen forest
- (43) Mixed forest
- (90) Woody wetlands

Potential impacts to NLEB maternity colonies were estimated by making a few assumptions, and using these to model the number of maternity colonies within the covered lands. The number of maternity colonies within the covered lands was initially calculated to identify a reasonable worst case scenario for impacts. This reasonable worst case was then adjusted to reflect what is known about NLEB occupancy rates from recent survey data. Assumptions included:

- 2011 NLCD data can accurately predict NLEB suitable habitat;
- NLEB home ranges do not overlap;
- NLEB home ranges are consistent in size and shape (1.5 mile radius circles);
- NLEB density is equally distributed across its entire range; and
- Geographic distribution of NLEB is consistent between the entire NLEB range and the covered lands areas (when applying adjustment ratio).

The covered lands intersect approximately 9,389,500 acres of the NLEB range (about 3% of the overall NLEB range). The total number of potential NLEB maternity colonies within the covered lands was estimated by simulating colony points across the NLEB range using a set of three-mile triangular grids¹. All potential colonies inside the range were initially considered viable because they contained suitable habitat for the NLEB (i.e., any of the NLCD classifications identified above). This method produced an estimate of 4,469 viable maternity colony home ranges that intersect the covered lands.

This number is not a realistic estimate of the number of NLEB colonies. The maternity colony impact estimates needed to be adjusted because the analysis of maternity colonies in the covered lands took into account the complex geographic extent of the covered lands. The substantially linear shape of the covered lands produces more intersections with colonies than would occur with a compact shape with the same acreage. Because the actual locations of maternity colonies throughout the covered lands are not known, the covered lands analysis assumed that maternity colonies were regularly spaced and occurred anywhere there was enough suitable habitat. NLEB do not occupy all suitable habitat within the covered lands, so this method overestimates the number of impacted colonies.

The analysis of colonies within the covered lands used the subset of potential colonies in the entire range that fell within 1.5 miles of the covered lands. Colonies were counted and then split into categories depending on which types of covered lands (ROW or Storage Field [SF] counties) they were in or near. As described above, the analysis produced an estimate of 4,469 viable colonies in or near the covered lands.

- 492 are within 1.5 miles of both pipeline buffer (the one-mile-wide corridor) and storage field county lands.
- 3,474 are within 1.5 miles of pipeline buffer lands only.
- 503 are within 1.5 miles of storage field county lands only.

The above estimates are used in the take calculation in Section 6.2.11.4.

To account for the overestimate mentioned above, occupancy rates were examined across the entire NLEB range. Occupancy rates were calculated using the proportion of sites occupied with NLEB to the total number of sites sampled from recent survey data in each state where the data were available. Statewide mist net surveys in Ohio from 2007-2011 indicate an occupancy rate of 47.6%. In West Virginia, 233 sites were sampled with mist nets in 2013, and the NLEB occupancy rate was 45.9%. In Virginia, 27 sites were sampled with mist nets, and the NLEB occupancy rate was 22.2%. Statewide mist net surveys at 651 sites in Indiana from 2010-2013 resulted in an occupancy rate of 33.2%. This produced an overall mean ratio of 0.372 occupied

¹ Thirteen separate grids were run through the same process, each having a different grid angle in relation to the covered lands. Multiple grids were analyzed to identify any impact of the grid alignment with the largely linear shape of the covered lands. The number of potential colonies in each category was highly similar for all angles (within 3% of the mean) although values varied slightly for each angle. Because increased values in one category generally had corresponding lower values in another category, mean values for each category were used for the analysis.

to viable NLEB maternity colonies in the entire NLEB range. The ratio identifies the amount of adjustment to be applied to the model results to account for a lower than 100% occupation rate of viable modeled colonies.

An adaptive management program is necessary for a species with significant uncertainties and high levels of risk. See Sections 7.4.1 and 7.6.4.7 for the proposed adaptive management program for the NLEB.

6.2.11.2 Biological Goals and Objectives

Pursuant to the Service's Five Point Policy (65 Fed. Reg. 35242, June 1, 2000), Columbia and the Service cooperated in developing the Biological Goals and Objectives for the Amendment. In doing so, we considered, among other relevant information, the recovery plans for those species for which a plan had been developed. Columbia, however, through the MSHCP and the ITP, is not required to recover the species. As stated in the preamble to the Policy:

biological goals and objectives should be consistent with recovery but in a manner that is commensurate with the scope of the HCP....We do not explicitly require an HCP to recover listed species or contribute to the recovery objectives, but do not intend permit activities that preclude recovery....However, the extent to which an HCP may contribute to recovery is an important consideration in any HCP effort, and applicants should be encouraged to develop HCPs that produce a net positive benefit on a species. The Service can use recovery goals to frame the biological goals and objectives.

65 Fed. Reg. at 35243; *see also* the Service's HCP Handbook at 3-20 ("HCPs were designed by Congress to authorize incidental take, not to be mandatory recovery tools"; "contribution is often an integral product of an HCP, but is not an explicit statutory requirement").

As detailed in this Chapter and in other parts of this Amendment, Columbia will, to the maximum extent practicable, minimize and mitigate the impacts of any incidental taking of the NLEB. With these general goals in mind, the main conservation objective is to avoid or minimize impacts to summer and winter habitat for the NLEB and avoid or minimize impact to individual bats, primarily through conducting activities outside the summer active season and minimizing ROW impacts. Following are specific biological goals and objectives of the Amendment to be considered while developing compensatory mitigation for those impacts that cannot be avoided or minimized. However, note that none of these is intended to obligate Columbia to recover this species.

Goal 1 - Permanently protect, restore, enhance and/or manage priority NLEB hibernacula, including establishing and maintaining buffer lands surrounding each priority hibernaculum.

Rationale: Conservation and management of important hibernacula across the NLEB's range is essential to the species' continued existence, recovery, and long-term conservation. To be considered protected, the hibernacula can be publicly or privately owned, but there must be a long-term voluntary landowner agreement, such as a stewardship plan, conservation easement, habitat management plan, or memorandum of agreement that protects the hibernacula in perpetuity. Protection of hibernacula includes assuring minimal disturbance to the bats during the season of hibernation.

Protection of hibernacula also includes conserving a buffer zone around each hibernaculum and restoration of hibernacula if necessary. Hibernacula are highly vulnerable to changes made on the land's surface, especially areas that drain to them. Boundaries of forested buffer zones ideally should be custom designed to conform to the unique topography and natural features surrounding each hibernaculum rather than drawn as a generic circle. One strategy would be to ensure landowners adjacent to priority hibernacula understand various options for restoring and maintaining their land as buffer lands for NLEB hibernacula.

Goal 2 - Permanently protect, restore, and/or manage optimal NLEB summer habitat to maximize survival and fecundity. This includes, but is not limited to, maternity sites, foraging habitat, water sources, and travel corridors.

Rationale: Protecting summer habitat, with known maternity colonies, will help ensure habitat availability for the NLEB and address the potential threat posed by habitat loss and degradation. NLEB maternity areas generally consist of multiple roost trees that are part of a roost tree network. NLEBs eat terrestrial and aquatic insects while foraging in forested habitats at night (Caceres and Pybus 1998; Van Zyll de Jong 1985; Brack and Whitaker 2001; LaVal et al. 1977). NLEBs tend to avoid vast open spaces, so wooded corridors linking roosting sites with foraging areas are important in areas where forests are fragmented. Habitat connectivity (corridors) among roost sites, foraging areas, and drinking water sources influence the quality of a roosting site. Optimal juxtaposition among these resource elements is likely determined by the distance between sites, the quality and quantity of the prey base, and the intervening cover.

Goal 3 - Permanently protect, restore, and/or manage NLEB fall swarming/spring staging habitat to maximize survival and fecundity. This includes, but is not limited to, roost sites, foraging habitat, water sources, and travel corridors.

Rationale: Protecting fall swarming/spring staging habitat around known hibernacula will help ensure habitat availability for the NLEB and address the potential threat posed by habitat loss and degradation. NLEB fall swarming/spring staging areas generally consist of varying numbers of roost trees used by varying numbers of bats, which are dependent upon the population using the hibernaculum. NLEBs eat terrestrial and aquatic insects while foraging in forested habitats at night (Caceres and Pybus 1998; Van Zyll de Jong 1985; Brack and Whitaker 2001; LaVal et al. 1977). NLEBs tend to avoid vast open spaces, so wooded corridors linking roosting sites with foraging areas are important in areas where forests are fragmented (do we have a citation?). Habitat connectivity (corridors) among roost sites, foraging areas, and drinking water sources influence the quality of a roosting site. Optimal juxtaposition among these resource elements is likely determined by the distance between sites, the quality and quantity of the prey base, and the intervening cover.

Based on the background information above and the available information on the species, its status, and conservation,² Columbia developed a list of general

² Columbia relied heavily on information from the proposed listing rule, the draft NLEB conference guidance, state heritage information, and the knowledge of experienced NLEB biologists to derive this list, but a number of other sources of information were also used.

minimization and mitigation sub-goals for NLEBs within the covered lands and range-wide. If achieved, these sub-goals would support the conservation strategy discussed above. The sub-goals are listed below in order of preference:

- Protect and manage known hibernacula.
- Protect and manage (including restoration) existing forested habitat:
 - a. Swarming habitat within 5 miles of a known hibernaculum; and/or
 - b. Summer habitat within 1.5 miles of a documented maternity roost tree or within 3.0 miles of a capture (mist-net) record.
- If and when suitable control options are available for WNS, Columbia would fund implementation of these measures at infected hibernacula.
- Restore winter habitat conditions in degraded hibernacula that exhibit the potential for successful restoration.

6.2.11.3 Measures to Avoid and Minimize Impacts

Explanation of Terms

Throughout this document, certain terms are used repeatedly to describe NLEB habitat. For the purpose of this document the following definitions are provided:

1. “Known habitat” refers to suitable summer habitat or suitable spring staging/fall swarming habitat that is located within 5 miles of a documented hibernaculum, 3 miles of a documented capture record or a positive identification of NLEB from properly deployed acoustic devices (unless Columbia conducts further site specific studies), or 1.5 miles of a documented roost tree. It also refers to suitable winter habitat (i.e., hibernacula) that has been documented to have housed NLEBs within the last 20 years or is identified by the Service as important to future recovery efforts.
2. “Summer habitat” refers to suitable summer habitat used by NLEB. Foraging and roosting habitat typically occurs within 3 miles of a documented capture record or a positive identification of NLEB from properly deployed acoustic devices (unless Columbia conducts further site specific studies), or 1.5 miles of a documented roost tree.
3. “Occupied” refers to known and suitable habitat that is expected or presumed to be in use by NLEBs at the time of impact. For summer habitat, this applies from May 15 through August 14; for staging/swarming habitat, this period is from April 1 to May 15 and August 15 to November 14, respectively.
4. “Suitable habitat” occurs where summer and/or winter habitat is appropriate for use by NLEBs.
 - a. Suitable winter habitat (hibernacula) is restricted to underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). These hibernacula typically have a wide range of vertical structures; cool, stable temperatures, generally between 32°F and 48.2°F; with high humidity and minimal air currents.

b. Suitable summer habitat for NLEBs consists of the variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 ft. from the next nearest suitable roost tree, woodlot, or wooded fencerow. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat.

c. Suitable spring staging/fall swarming habitat for NLEBs consists of the variety of forested/wooded habitats where they roost, forage, and travel. This includes forested patches as well as linear features such as fencerows, riparian forests and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 ft. from the next nearest suitable roost tree, woodlot, or wooded fencerow.

5. “Suitable roost tree” refers to a tree (live, dying, dead, or snag) with a diameter at breast height (DBH) of 3 inches or greater that exhibits any of the following characteristics: exfoliating bark, crevices, cavity, or cracks.

6. “Unoccupied” refers to suitable habitat not expected to be in use by NLEBs at the time of impact. For summer habitat, this is the period from August 15 through May 14; for swarming habitat, this period is from November 15 to March 31.

Measures to avoid and minimize impacts to NLEB

Based on the relative similarities between the Indiana bat and the NLEB, Columbia has agreed to modify the Indiana bat avoidance and minimization measures from the MSHCP and programmatic consultation, and apply them within the range of the NLEB in the covered lands. These measures apply to all known occupied locations (i.e., where individuals have been documented to occur) and/or suitable habitats where occurrence may be presumed in Delaware, Indiana, Kentucky, Louisiana, Maryland, Mississippi, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia counties. These species-specific measures supplement (and supersede where conflicting) the general BMPs specified in the CPG ECS. Measures in standard font text will be applied for all activities. Application of measures in italic font text will be considered on a case-by-case basis depending on the project needs as more fully described in Chapter 5 of the Columbia MSHCP.

Columbia can use the survey processes outlined below (or assume presence) in order to determine the presence of habitat or habitat use. These will inform Columbia about the level of anticipated effects that covered activities may have on the NLEB.

Once a determination is made whether the species and/or its habitat are present within the proposed covered activity's action area and the type and extent of effects are identified, the relevant AMMs will be implemented.

Habitat Assessments/Surveys to Evaluate the Presence of the Species and/or Suitable Habitat

1. Habitat Assessment to Determine Presence of Suitable Summer Habitat

Habitat assessments will be used to complete a project-specific, on-the-ground analysis to determine if proposed activities will adversely affect NLEBs and/or their habitat. Columbia is responsible for developing and providing sufficient information as to whether suitable summer NLEB habitat exists within a proposed project area. In order to accomplish this, Columbia must have knowledge of the project area sufficient to adequately and accurately describe the potential suitable NLEB summer habitat conditions that may or may not exist on-site. This knowledge can be derived from any number of sources including, but not limited to, on-site visits, review of aerial photography and other maps, previous mining records (if applicable), forest inventories, previous species survey reports, and the work of Columbia's consultants or other designees. At a minimum, however, Columbia must determine if suitable NLEB habitat is present, define the general quality of that habitat (i.e., trees ≥ 3 " dbh present), and quantify the extent of each habitat class identified. The results of such assessments will be recorded and documented in Columbia's annual compliance report. Results will be valid for one year and can be completed any time of year. Appendix B provides specific guidance for completing these habitat assessments.

i. Examine identified impact areas for the following characteristics:

- a. Suitable summer habitat (*See* definition of this habitat as well as suitable roost trees in the "Explanation of Terms" section above).
- b. Suitable spring staging and fall swarming habitat is habitat meeting the summer habitat definition that is located within a 5-mile radius of hibernacula.

2. Assessments to Determine Presence of Suitable Winter Habitat (hibernacula)

Columbia will develop sufficient information as to whether potentially suitable winter NLEB habitat exists within a proposed project area. This knowledge will be derived from, but not limited to, the following sources: on-site visits, review of aerial photography and other maps, previous mining records (if applicable), forest inventories, previous species survey reports, and the work of Columbia's consultants or other designees. NLEBs have been documented using caves (and their associated sinkholes, fissures, and other karst features), quarries, and abandoned mine portals (and their associated underground workings) as winter hibernation habitat.

Columbia personnel or its consultants will determine whether potentially suitable winter habitat exists within the project area by conducting "Winter Habitat Assessments" as described below. The results of these assessments will be recorded and documented in Columbia's annual compliance report. Results will be valid for two years and can be completed any time of year. The Winter Habitat Assessment Protocols are:

- i. Examine identified impact areas for the following characteristics:
 - a. The ground openings at least one foot in diameter or larger.
 - b. Underground passages should continue beyond the dark zone and not have an obvious end within 40 feet of entrance (Note: This may not be verifiable by surveyor due to safety concerns).
 - c. Entrances that are flooded or prone to flooding (i.e., debris on ceiling), collapsed, or otherwise inaccessible to bats will be excluded.
 - d. Ground openings that have occurred recently (i.e., within the past 12 months) due to creation or subsidence will be excluded. However, a written description and photographs of the opening must be included in the pre-survey report.

Surveys to Confirm Use of Suitable Winter Habitat

ii. If suitable winter habitat is discovered as a result of the habitat assessments above (AMM#2i), do not alter, modify, or otherwise disturb entrances or internal passages of caves, mines, or other entrances to underground voids (potential hibernacula) within the MSHCP covered lands until a “Determination of Suitable Winter Habitat for NLEB” is completed. The survey protocols to make this determination are provided in Appendix B and will be followed to determine if the suitable habitat is in fact, occupied. Some surveys will require modification (or clarification) of these guidelines; therefore, coordination with the Service Field Office responsible for the state in which the site-specific project occurs is necessary prior to initiating suitable winter habitat surveys. Results of completed surveys will be submitted to the responsible Service Field Office(s) prior to clearing of identified habitat. The Service will accept the results of these surveys for the purposes of determining whether and to what degree take is anticipated.

If surveys (conducted using approved methodology) fail to detect NLEB’s AMMs in winter habitat are not mandatory. However, Columbia may voluntarily elect to employ any of the AMMs to maintain the viability of the suitable winter habitat.

Alternatively, Columbia may assume presence of NLEBs in this suitable winter habitat and apply mandatory AMMs.

Surveys to Determine Presence in Suitable Summer Habitat

3. Columbia may conduct summer surveys to determine presence or probable absence of NLEBs within suitable summer habitat for site-specific projects not located within known habitat as defined above. The current “Indiana Bat Mist-Netting Guidelines” or future versions of superseding Service-approved guidelines will be applied. Some surveys will require modification (or clarification) of these guidelines; therefore, coordination with the Service Field Office responsible for the state in which the site-specific project occurs is necessary prior to initiating summer presence/absence surveys. Results of completed summer surveys will be submitted to the responsible Service Field Office(s) prior to clearing of identified suitable summer habitat. The Service will accept the results of these surveys for the purposes of determining whether

and to what degree take is expected. Negative survey results are valid for a minimum of two years unless new information changes the Service's view on whether certain geographic areas provide suitable summer habitat for NLEBs.

If no NLEBs are captured and no other recent information suggests the presence of NLEBs, no further AMMs or mitigation are necessary. If NLEBs are captured, the relevant AMMs and mitigation would apply.

Alternatively, Columbia may elect to assume presence of NLEBs in suitable summer habitat and apply the AMMs and mitigation measures.

Measures to Avoid and Minimize Impacts to NLEBs in Known or Presumed Occupied Caves /Winter Habitat

4. When burning brush piles within 0.25 mile of known or presumed occupied hibernacula from August 15 to May 15, the brush piles can be no more than 25 feet by 25 feet, must be spaced at least 100 feet apart, and located at least 100 feet from known hibernacula entrances and associated sinkholes, fissures, or other karst features.
5. No woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known or presumed occupied hibernacula entrances and associated sinkholes, fissures, or other karst features (*See* related adaptive management discussion in Chapter 7).
6. Protect potential recharge areas of cave streams and other karst features that are hydrologically connected to known or presumed occupied hibernacula by employing the relevant CPG ECS standards such as Section III, Stream and Wetland Crossings, and Section IV, Spill Prevention, Containment and Control.
7. Blasting within 0.5 mile of known or presumed occupied hibernacula will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula (e.g., maximum charge of two inches per second ground acceleration avoids impact to nearby structures) (*See* related adaptive management discussion in Chapter 7 of the Columbia MSHCP).
8. Drilling within 0.5 mile of known or presumed occupied hibernacula will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula (e.g., outer drilling tube filled with concrete to ensure no modification to any karst encountered) (*see* related adaptive management discussion in Chapter 7).
9. If authorized by the landowner, block (e.g., gate) access roads and ROWs leading to known or presumed occupied hibernacula from unauthorized access.
10. Equipment servicing and maintenance areas will be sited at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst features.
11. Operators, employees, and contractors (working in areas of known or presumed NLEB Habitat as described in this section) will be educated on the biology of the NLEB, activities that may affect bat behavior, and ways to avoid and minimize these effects.

12. Restrict use of herbicides for vegetation management within 5 miles of known or presumed occupied hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).

Measures to Avoid and Minimize Impacts to NLEBs in Spring Staging/Fall Swarming Habitat

13. No clearing of suitable spring staging and fall swarming habitat within a 5-mile radius of any presumed occupied hibernacula from April 1 to May 31 and August 15 to November 14.

14. Placeholder; intentionally left blank

15. Operators, employees, and contractors (working in areas of known or presumed NLEB habitat as described in this section) will be educated on the biology of the NLEB, activities that may affect bat behavior, and ways to avoid and minimize these effects.

16. No woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known or presumed occupied hibernacula entrances and associated sinkholes, fissures, or other karst features (*See* related adaptive management discussion in Chapter 7).

17. Protect potential recharge areas of cave streams and other karst features that are hydrologically connected to known or presumed occupied hibernacula by following relevant CPG ECS standards such as Section III, Stream and Wetland Crossings, and Section IV, Spill Prevention, Containment and Control.

18. Blasting within 0.5 mile of known or presumed occupied hibernacula will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula (e.g., maximum charge of two inches per second ground acceleration avoids impact to nearby structures) (*See* related adaptive management discussion in Chapter 7).

19. Drilling within 0.5 mile of known or presumed occupied hibernacula will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula (e.g., outer drilling tube filled with concrete to ensure no modification to any karst encountered) (*See* related adaptive management discussion in Chapter 7).

20. Activities (e.g., drilling) involving continuing (i.e., longer than 24 hours) noise disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) within a one-mile radius of known or presumed occupied hibernacula should be avoided during the spring staging (April 1 to May 31) and fall swarming (August 15 to November 14) seasons.

21. Equipment servicing and maintenance areas will be sited at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst features.

22. Within 5 miles of hibernacula and only in areas identified as suitable summer habitat, retain snags, dead/dying trees, and trees with exfoliating (loose) bark \geq 3-inch diameter at breast height (dbh) in areas \leq one mile from water.

23. Contaminants, including but not limited to oils, solvents, and smoke from brush piles, should be strictly controlled as provided for in the EMCS and ECS, Section II.C.2, and Section IV so the quality, quantity, and timing of prey resources are not affected.

24. *Placeholder; intentionally left blank*

25. *From April 1 to May 31, and August 15 to November 14, use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits within 5 miles of hibernacula.*

26. Implement strict adherence to sediment and erosion control measures, ensure restoration of pre-existing topographic contours after any ground disturbance, and restore native vegetation (where possible) as specified in the ECS upon completion of work within and known or presumed occupied spring staging and fall swarming habitat.

Measures to Avoid and Minimize Impacts to NLEBs in Summer Habitat

27. *No clearing of known maternity colony or suitable summer habitat within the covered lands of the MSHCP from April 1 to May 31 and August 2 to October 15 to avoid direct affects to females (pregnant, lactating, and post-lactating) and juveniles (non-volant and volant) (See related adaptive management discussion in Chapter 7).*

28. *Retain snags, dead/dying trees, and trees with exfoliating (loose) bark ≥ 3 inches dbh in areas identified as known maternity colony summer habitat and \leq one mile from water.*

29. No clearing or “side-trimming” of known maternity colony or suitable summer habitat within the covered lands of the MSHCP from June 1 to August 1 to protect non-volant NLEB pups.

30. *Placeholder; intentionally left blank*

31. *Placeholder; intentionally left blank*

32. Operators, employees, and contractors (working in areas of known or presumed NLEB habitat as described in this section) will be educated on the biology of the NLEB, activities that may affect bat behavior, and ways to avoid and minimize these effects.

33. *No aerial application of herbicide on ROWs from April 15 to August 15 to protect maternity colonies in summer habitat.*

34. *Retain snags, dead/dying trees, and trees with exfoliating (loose) bark ≥ 3 inches dbh in areas identified as suitable summer habitat and \leq one mile from water.*

35. Contaminants, including but not limited to oils, solvents, and smoke from brush piles, should be strictly controlled as provided for in the EMCS and ECS, Section II.C.2, and Section IV so the quality, quantity, and timing of prey resources are not affected.

36. Implement and strictly adhere to sediment and erosion control measures, ensure restoration of pre-existing topographic contours after any ground disturbance, and restore native vegetation (where possible) as specified in the ECS upon completion of

work within suitable summer habitat and known or presumed occupied spring staging and fall swarming habitat.

37. Equipment servicing and maintenance areas will be sited at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst features.

38. Between April 1st and November 14th, use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits in known maternity colony habitat within the covered lands of the MSHCP.

39. *Between April 1st and November 14th, use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits in suitable summer habitat within the covered lands of the MSHCP.*

40. *Avoid conducting construction activities after sunset in known or suitable summer habitat to avoid harassment of foraging NLEBs.*

A detailed EM&CP will be prepared for any project within NLEB habitat. The plan will incorporate the relevant requirements of Columbia's current ECS and include site-specific details particular to the project area and potential impact. The plan will be strongly oriented towards avoiding and minimizing disturbance to known hibernacula, spring staging and fall swarming habitat, as well as known summer maternity colony and suitable summer habitats as well as impacts within known foraging habitat. The plan will also incorporate the applicable AMMs prescribed in the Amendment. The plan will be approved in writing by Columbia NRP personnel, prior to project implementation, and will include a tailgate training session for all onsite project personnel to highlight the environmental sensitivity of the habitat and any NLEB AMMs which must be implemented.

6.2.11.4 Calculation of Incidental Take

The calculation of incidental take was derived utilizing the following assumptions and operating facts:

Covered Lands:

- (1) There are approximately 6,193,700 acres of suitable summer habitat within the covered lands; estimated using the methodology outlined in the modeling section (3,767,200 linear and 3,048,900 storage fields, 622,300 acres of which are in both);
- (2) There are a minimum of 830,600 acres of known summer habitat within the covered lands; estimated using the methodology outlined in the modeling section;
- (3) There are a minimum of 466,500 acres of known swarming/staging habitat within the covered lands; estimated using the methodology outlined in the modeling section (156,400 linear and 325,900 storage fields, 15,800 acres of which are in both);

Covered Activities:

- (4) O&M activities within the existing ROW and storage fields would impact 0.07% or approximately 4,300 acres of the total suitable habitat acreage present within covered lands;
- (5) New pipeline construction would impact 2.3% or 86,200 acres of the total acreage of assumed suitable habitat present within the one-mile-wide corridor covered lands;
- (6) New construction within storage fields would impact 0.10% or 3,000 acres of assumed suitable habitat present within storage field county covered lands;
- (7) Clearing of forested habitat on existing pipeline facilities during O&M could occur at any time within the 50-year permit term (thereafter, the facilities area, including ROWs, would be maintained in a non-forested state for required safety patrols);
- (8) After clearing occurs for new construction projects, the pipeline would be maintained in a vegetative state unsuitable for roosting by NLEBs but potentially used as a travel corridor or for foraging;

Avoidance & Minimization Measures:

- (9) For the purpose of calculating a reasonable worst-case take of NLEBs, it is assumed that non-mandatory AMMs listed in the previous section will not be implemented;
- (10) No lactating females and immobile bats (i.e., pups) will be impacted due to implementation of AMMs;
- (11) No direct or indirect impacts to known or presumed NLEBs hibernacula will occur from covered activities due to implementation of AMMs;
- (12) No direct or indirect take would occur to wintering bats (in the hibernacula) with the implementation of the AMMs for this species;
- (13) Columbia will maintain and update known NLEB maternity colony and hibernacula location information annually to use in implementing the MSHCP;
- (14) Columbia will assume presence of NLEBs within identified suitable winter habitat a maximum of ten times – i.e., five linear (ROW) and five storage field county covered lands – throughout the life of the permit.

Species Biology:

- (15) NLEBs are evenly distributed in suitable habitat;
- (16) The range of maternity colony sizes observed for the NLEB is 7-100 adult females, although 30-60 may be more common (USFWS 2014). Columbia and the Service have assumed 45 adult females and their 45 pups occur per maternity colony within the covered lands;
- (17) Home range of a maternity colony is the area within a 1.5-mile radius (i.e., 4,524 acres) around documented roosts or within a 3-mile radius (i.e., 18,096

- acres) around capture location of a reproductive female or juvenile NLEB or a positive identification of NLEB from properly deployed acoustic devices (unless Columbia conducts further site specific studies);
- (18) 5% of disturbed adult bats would not escape from felled roost trees during implementation of covered activities between April 1 and November 14 (Belwood 2002);
 - (19) Fall swarming and spring staging habitat occurs within a 5-mile radius (i.e., 50,265 acres) of a hibernaculum;
 - (20) The NLCD classifications outlined in the swarming, staging, and summer habitat identification methodology are representative of suitable summer habitat for this species (refer to the modeling section); and
 - (21) The mean occupancy rate derived from recent surveys in Ohio, Indiana, West Virginia, and Virginia (0.372) is representative of the mean occupancy rate across the covered lands.

The calculation of incidental take was separated into the different types of covered lands and activities [i.e., Linear (ROW) vs. Storage Fields and O&M vs. New Construction] as these activities may impact NLEBs differently in these covered lands. A two-step process was used to calculate incidental take within each covered lands group. First, modeling results were used to calculate the number of NLEBs (i.e., maternity colonies or individuals) estimated to be present within the covered lands group. These estimates were then incorporated into a calculation of take that considered the assumptions provided above, and information provided in **Appendix A** (Annual Acreage Disturbance Estimates and the amount of suitable NLEB habitat available within the covered lands group) to quantify the reasonable worst-case take over the 50-year permit term.

MATERNITY COLONIES:

A. The following numbers are derived from the modeling discussed earlier in this chapter and are used below to quantify take within the linear (ROW) Covered Lands (in non-storage field counties):

- 3,767,200 acres of linear (ROW) covered lands in total modeled suitable NLEB summer habitat with a total of 36 estimated colonies.

It is difficult to approximate the number of colonies present within the linear (ROW) covered lands because (a) NLEBs, even when thought to be present, are difficult to capture using currently accepted survey techniques in portions of the range where NLEB are impacted by WNS; (b) survey efforts have not been consistent throughout the species' range; and (c) most captures result from surveys for other construction projects targeted for the Indiana bat and its habitat; therefore, a substantial amount of NLEB-specific habitat may be under sampled.

Using a modeling exercise (*see* the Modeling Section, above), the estimated maximum number of additional maternity colonies that may occur along the Columbia linear (ROW) covered lands could be 3,966 colonies. The maximum number of colonies was calculated by developing a set of grids of maternity colony home ranges

(i.e., 1.5-mile radius circles) throughout and adjacent to the linear (ROW) covered lands. The estimated 3,966 colonies are likely an overestimate because not all potential colonies are expected to be occupied based on survey data. A mean occupation ratio of 0.372 was calculated to adjust for the overestimate (*see* modeling section of 6.2.11.1). This adjustment factor was then applied to the number of modeled maternity colonies along the linear (ROW) covered lands to estimate that there would be 1,476 colonies along the linear (ROW) covered lands ($3,966 \times 0.372 = 1,476$). This number includes both colonies that would be centered within the linear ROW of the covered lands, and colonies that would be centered outside of the covered lands but close enough that their home ranges could be impacted by activities within the covered lands.

This is a reasonable estimate of the number of colonies that are likely to occur within the Columbia linear (ROW) covered lands and 1,476 total colonies will be used for the rest of the ROW calculations. A conservative approach has been used to estimate take throughout this analysis. For the purposes of the remaining calculation below, Columbia and the Service assume that each of the colonies would be impacted in some manner. It is important to note, however, that not all impacts within the covered lands will rise to the level of take. For instance, although some activities may temporarily disturb NLEBs, we do not anticipate that all such activities will cause such a significant disruption or annoyance as to cause injury or death. On the other hand, take of individual bats within a maternity colony is more likely to be as a result of harm or harassment than through direct mortality or injury. This is in part due to the nature of vegetation removal and the already-cleared condition of the existing ROW in which O&M activities will occur. And even then, not all bats within a maternity colony will necessarily be affected or taken in the same manner. These distinctions are more thoroughly discussed in Section 6.2.11.5.

1. O&M

Given the assumptions above, and information provided in **Appendix A** (Annual Acreage Disturbance Estimates and the amount of suitable Indiana bat habitat available within the covered lands), O&M activities that have been identified to potentially cause take of NLEB will only occur on up to 4,300 acres (*see* Assumption 4 above) of the overall 3,767,200 acres of linear (ROW) covered lands that are also suitable NLEB summer habitat over the 50-year permit term. Therefore, Columbia and the Service estimate a total of two colonies would be impacted and individuals within the colonies taken (i.e., harm, harass, kill, injure) by O&M activities within the existing ROW covered lands ($4,300 \text{ acres of O\&M impact} \div 3,767,200 \text{ acres of linear (ROW) covered lands in suitable NLEB summer habitat} = 0.114\%$; $0.00114 \times 1,476 \text{ colonies} = 1.7$ maternity colonies [rounded up to two] in which NLEBs may be harmed or harassed). Up to 180 individuals [i.e., 2 maternity colonies \times 90 (45 adult females + 45 pups = 90) = 180 individuals] within the colonies could be impacted or taken through harassment, or harm by O&M within the existing ROW covered lands.

2. New Construction

Given the assumptions above, information provided in **Appendix A** (Annual Acreage Disturbance Estimates and the amount of suitable NLEB habitat available within the covered lands), Columbia has determined that new construction (capital

expansion projects) activities that have been identified to potentially cause take of NLEBs will only occur on up to 86,200 acres (*see* Assumption 5 above) of linear (ROW) within the covered lands over the 50-year permit term. Therefore, Columbia and the Service estimate a total of 34 colonies would be impacted and some individuals within the colonies taken (i.e., harm or harass, killed, injured) by new construction within linear (ROW) covered lands (86,200 acres of new construction impact ÷ 3,767,200 acres of linear (ROW) covered lands in suitable NLEB summer habitat = 2.3%; $0.023 \times 1,476$ colonies = 33.7 maternity colonies [rounded up to 34] maternity colonies with individuals experiencing some form of take). A conservative approach has been used to estimate take throughout this analysis. Therefore, Columbia and the Service assume that each of these 34 colonies, would be affected and up to 3,060 individuals [i.e., 34 maternity colonies \times 90 (45 adult females + 45 pups = 90) = 3,060 individuals] within the colonies could experience in order of likelihood harassment, harm or lethal take by new construction within the linear (ROW) covered lands. Combined with the impacts to colonies from O&M activities, ROW activities could impact up to 36 colonies (2 O&M + 34 new construction) and up to 3,240 individuals (180 O&M + 3060 new construction).

B. The following numbers are derived from the modeling discussed earlier in this chapter:

- 3,048,900 acres of storage field covered lands in total modeled suitable NLEB habitat with a total of 371 estimated colonies.

A total of 4,187,926 acres exist within the 12 storage field counties and are considered covered lands. Using a modeling exercise (*see* the Modeling Section, above), Columbia estimated the maximum number of additional maternity colonies that may occur within the Columbia storage field covered lands to equal 995 colonies [number includes 503 colonies within 1.5 miles of a storage field county (not near a pipeline buffer) and 492 colonies within 1.5 miles of both a pipeline buffer and a SF county]. The maximum number of colonies was calculated by developing a set of grids of maternity colony home ranges (i.e., 1.5-mile radius circles) throughout and adjacent to the storage field covered lands. The rationale provided above for the ROW (non-storage field counties) generally applies to storage field counties as well – not all potential colonies are occupied. The mean occupation ratio of 0.372 was applied to the number of modeled maternity colonies along the storage field covered lands to estimate that there would be 371 additional colonies along the storage field covered lands ($995 \times 0.372 = 371$). This number includes both colonies that would be centered within the storage field covered lands, and colonies that would be centered outside of the covered lands but close enough that their home ranges could be impacted by activities within the covered lands. Since a conservative approach has been used to estimate take throughout this analysis, Columbia and the Service assume that each colony would be affected and individuals within the colonies could be impacted, including harassment, harm or lethal take, by new construction within the storage field covered lands.

1. O&M

While O&M activities specific to storage field operations may cause take of NLEBs (i.e., construction and operation of waste pits associated with well

reconditioning and abandonment), the majority of O&M activities anticipated to cause take are those that occur within the linear ROW, some of which cross storage field counties. Those impacts and resulting take were analyzed above. Because portions of the ROW are coextensive with the storage field counties, they are not double counted in this section. The take from the construction and operation of waste pits associated with reconditioning and abandonment has been accounted for in the storage field new construction covered lands analysis.

2. New Construction

Given the assumptions above, information provided in **Appendix A** (Annual Acreage Disturbance Estimates, and the amount of suitable NLEB habitat available within the covered lands), new construction (capital expansion projects) activities that have been identified to potentially cause take of NLEBs will only occur on up to 3,000 acres (*see* Assumption 6 above) of storage field counties within the covered lands over the 50-year permit term. For the purpose of this analysis, Columbia and the Service have assumed that all new construction will occur within suitable NLEB habitat.

Estimating the take for maternity colonies is not straightforward involving new construction in storage field covered lands. While the entire 3,000-acre expected area of construction could fit within a single maternity colony home range (a home range encompasses 4,524 acres), storage fields are constructed in a network, not in a single large patch. New storage field networks are made up of small patches distributed across the landscape. These networks have very small landscape footprints in acreage, but have a large extent because of the way the patches are distributed. The locations of new storage fields cannot be described in more specificity than to the county (for business and homeland security reasons), so they cannot be geographically modeled.

A model of a storage field network indicates a maximum worst-case scenario of 210 acres of disturbance within a single 1.5-mile radius home range (**Figure 6.2.11.4-1**). If storage fields were constructed as densely as possible, they would intersect at least 15 modeled colony home ranges (3,000 acres ÷ 210 acres per colony = 14.29 maternity colonies [rounded up to 15]). If storage field expansion activities are more dispersed, as many as 371 modeled maternity colonies could be impacted by storage field expansion on a significantly reduced scale. In other words, as the acreage of disturbance within a single 1.5-mile radius home range decreases, impacts to the maternity colonies, though greater in number, grow more diffuse. The impact of this take is discussed in the Take Analysis (*see* Section 6.2.11.5 below).

This wide range of potential take (from 15 to 371 maternity colonies) and construction amounts per colony (from 0.17-4.6%) cannot be resolved without describing in more detail the locations of storage field projects. However, the reasonable worst-case scenario would be the intensely developed network impacting 210 acres/colony. Therefore, take is calculated for new construction in storage field counties as 3,000 acres which represents impacts to 15 maternity colonies or up to 1,350 individuals [i.e., 15 maternity colonies x 90 (45 adult females + 45 pups = 90) = 1,350 individuals] within the colonies that could be affected, by tree removal resulting in harassment, harm or possible lethal take by new construction within the storage field covered lands.

SPRING STAGING/FALL SWARMING BATS:

A. The following numbers are derived from the modeling discussed earlier in this chapter and are used below to quantify take within the linear (ROW) covered lands (in non-storage field counties):

- 156,400 acres of linear (ROW) covered lands through known spring staging/fall swarming habitat for 74 known hibernacula.
- 690 acres of linear (ROW) covered lands through presumed spring staging/fall swarming habitat for 5 presumed hibernacula.

Similar to maternity colonies, Columbia and the Service are capable of reaching a supportable conclusion on an estimate of the number of NLEBs taken (i.e., killed, harmed, harassed) by covered activities within the linear (ROW) covered lands. The following discussion outlines the two step process used to calculate the reasonable worst-case scenario for take of NLEBs in spring staging/fall swarming habitat.

First, a reasonable worst-case scenario take of NLEBs was estimated, making the assumption that 100 NLEBs occupy the hibernaculum post-WNS. Once this reasonable worst-case scenario take was calculated, Columbia was then able to refine this estimate by incorporating the average percentage of the hibernacula's spring staging/fall swarming zone intersected by linear (ROW) and Storage Field covered lands to calculate the reasonable worst-case take for impacts to spring staging/fall swarming habitat.

1. O&M

Based on the results of modeling of spring staging/fall swarming impacts, the O&M of ROW covered lands may cause take of NLEBs within spring staging/fall swarming habitat of 74 hibernacula over the 50-year permit, which results in a maximum worst-case scenario of take of 7,400 NLEBs from O&M of ROW covered lands. Given the assumptions above, information provided in **Appendix A** (Annual Acreage Disturbance Estimates, and the amount of suitable NLEB habitat available within the covered lands), Columbia has estimated that O&M activities that have been identified to potentially cause take of NLEBs will occur on up to 4,300 acres (*see* Assumption 4 above) of suitable NLEB habitat over the 50-year permit term. For the purpose of this analysis, Columbia and the Service have assumed that O&M of existing ROW covered lands will occur once within the 156,400 acres (from above) of suitable NLEB spring staging/fall swarming habitat. Once this habitat has been cleared, the pipeline ROW would be maintained in a vegetative state unsuitable for roosting by NLEBs (*see* assumption 8 above). An additional step was added to account for the fact that only 4,300 of the 156,400 acres of suitable spring staging/fall swarming habitat would be impacted by construction within the existing ROW covered lands, reducing the estimate to 218 NLEBs ($4,300 \text{ acres} \div 156,400 \text{ acres} = 0.0275$; $0.0275 \times 7,400 \text{ bats} = 204 \text{ bats}$).

Once this reasonable worst-case scenario take was calculated, Columbia was then able to refine this estimate by incorporating the average percentage of the hibernacula's spring staging/fall swarming zone intersected by linear (ROW) and Storage Field covered lands to calculate the reasonable worst-case take for impacts to spring

staging/fall swarming habitat. Only 0.20% (the average percentage of known hibernaculum range covered by existing ROW, i.e. 103 acres per hibernaculum) of the spring staging/fall swarming habitat available to NLEBs at each hibernacula is likely to be impacted by O&M activities. Columbia and the Service used the assumption that NLEBs in spring staging/fall swarming habitat surrounding the hibernacula are evenly distributed throughout that habitat and used the average percentage of this habitat intersected by the covered lands to estimate the reasonable worst-case take of NLEBs from O&M activities in spring staging/fall swarming habitat intersecting existing ROW covered lands to be a total of four individuals over the 50-year permit term ($204 \text{ bats} \times 0.0020 = 0.42 \text{ bats}$ [rounded up to 1]).

2. New Construction

Based on the results of modeling of spring staging/fall swarming impacts, new construction within linear (ROW) covered lands could cause take of NLEBs within spring staging/fall swarming habitat of 74 known hibernacula over the 50-year permit term. Impacts could also occur to currently unknown swarming staging habitat at unknown hibernacula. Columbia additionally estimates five sites with potential to be hibernacula could be impacted by new construction activities (*see* AMM #2 in Section 6.2.11.3 and Assumption 14 above). Following the process outlined above, the maximum worst-case scenario of take from new construction in linear (ROW) covered lands would total 7,900 NLEBs (7,400 across 74 known hibernacula + 500 at 5 currently unknown presumed hibernacula).

Given the assumptions above, information provided in **Appendix A** (Annual Acreage Disturbance Estimates, and the amount of suitable NLEB habitat available within the covered lands), Columbia has estimated that new construction (capital expansion projects) activities that have been identified to potentially cause take of NLEBs will occur on up to 86,200 acres (*see* Assumption 5 above) of linear ROW within the covered lands over the 50-year permit term. For the purpose of this analysis, Columbia and the Service have assumed that all new construction will occur within suitable spring staging/fall swarming NLEB habitat. An additional step was added to account for the fact that only 86,200 of the 156,400 acres of suitable spring staging/fall swarming habitat would be impacted by new construction within the linear (ROW) covered lands, reducing the estimate to 4,355 NLEB ($86,200 \text{ acres} \div 156,400 \text{ acres} = 0.55$; $0.55 \times 7,900 \text{ bats} = 4,355 \text{ bats}$).

However, this is not a supportable conclusion of take because only 0.27% (the average percentage of known hibernaculum range covered by existing ROW, plus a 33% increase for the larger width of a new construction ROW, i.e. 138 acres per hibernaculum) of the spring staging/fall swarming habitat available to NLEBs at each hibernacula is likely to be impacted by new construction activities. Columbia and the Service used the assumption that NLEBs in spring staging/fall swarming habitat surrounding the hibernacula are evenly distributed throughout that habitat. Columbia and the Service estimate the reasonable worst-case take of NLEBs from new construction activities in spring staging/fall swarming habitat intersecting linear (ROW) covered lands to be a total of 12 individuals over the 50-year permit term ($4,355 \text{ bats} \times 0.0027 = 11.9 \text{ bats}$ [rounded up to 12]).

B. The following numbers are derived from the modeling discussed earlier in this chapter and are used below to quantify take within the Storage Field Counties:

- 325,900 acres of storage field counties covered lands through known spring staging/fall swarming habitat for 30 known hibernacula.
- 108,660 acres of storage field counties covered lands through presumed spring staging/fall swarming habitat for 5 presumed hibernacula.

1. O&M

While O&M activities specific to storage field operations may cause take of NLEBs (i.e., construction and operation of waste pits associated with well reconditioning and abandonment), the majority of O&M activities anticipated to cause take are those that occur within the linear ROW, some of which cross storage field counties. Those impacts and resulting take were analyzed above. Because portions of the ROW are coextensive with the storage field counties, they are not double counted in this section. The take from the construction and operation of waste pits associated with reconditioning and abandonment has been accounted for in the storage field new construction covered lands analysis.

2. New Construction

Based on the results of modeling of spring staging/fall swarming impacts, new construction within storage field covered lands could cause take of NLEBs at 30 hibernacula over the 50-year permit term. Impacts could also occur to currently unknown hibernacula. Columbia additionally estimates 5 sites with potential to be hibernacula could be impacted by new construction activities (*see* AMM #2 in Section 6.2.11.3 and Assumption 17 above). Following the process outlined above, the maximum worst-case scenario of take from new construction activities within storage field covered lands would total 3,500 NLEBs (3,000 across 30 known hibernacula + 500 at 5 currently unknown presumed hibernacula).

Given the assumptions above, and information provided in **Appendix A** (Annual Acreage Disturbance Estimates), Columbia has determined that new construction (capital expansion projects) activities that have been identified to potentially cause take of NLEBs will only occur on up to 3,000 acres (*see* Assumption 6 above) of storage field counties within the covered lands over the 50-year permit term. For the purpose of this analysis, Columbia and the Service have assumed that all storage field new construction will occur within suitable spring staging/fall swarming NLEB habitat. An additional step was added to account for the fact that only 3,000 of the 325,900 acres of suitable spring staging/fall swarming habitat would be impacted by new construction within the storage field covered lands, reducing the estimate to 33 NLEB ($3,000 \text{ acres} \div 325,900 \text{ acres} = 0.0092$; $0.0092 \times 3,500 \text{ bats} = 33 \text{ bats}$).

However, this is not a supportable conclusion of take because only 43.2% (the average percentage of known hibernaculum range covered by existing ROW, i.e. 21,732 acres per hibernaculum) of the spring staging/fall swarming habitat available to NLEBs at each hibernacula is likely to be impacted by new construction activities. Columbia and the Service used the assumption that NLEBs in spring staging/fall swarming habitat surrounding the hibernacula are evenly distributed throughout that habitat. Columbia

and the Service estimate the reasonable worst-case take of NLEBs from new construction activities in spring staging/fall swarming habitat intersecting storage field covered lands to be a total of 15 individuals over the 50-year permit term (33 bats x 0.432 = 14.27 bats [rounded up to 15]).

SUMMARY:

Through modeling, Columbia covered activities could result in impacts to known and potentially suitable summer habitat that could support up to 4,590 individuals within 51 maternity colonies (2 colonies for O&M, 34 colonies for ROW new construction, and 15 colonies for storage fields new construction). Similarly, Columbia covered activities could also impact spring staging/fall swarming habitat that could support up to 28 individuals (1 individual for O&M, 12 individuals for ROW new construction, and 15 individuals for storage fields new construction). Combined, this could support a total of 4,618 individuals. However, Columbia and the Service were unable to estimate with precision the actual number of individuals that will be taken as a result of Columbia covered activities. For this reason, Columbia and the Service used habitat as a surrogate to the number of individuals potentially taken. The maximum acreage of potentially suitable NLEB habitat that could be impacted over the life of the permit is 93,500 acres, and the estimates of take, through modeling, have been calculated as a subset of that total acreage.

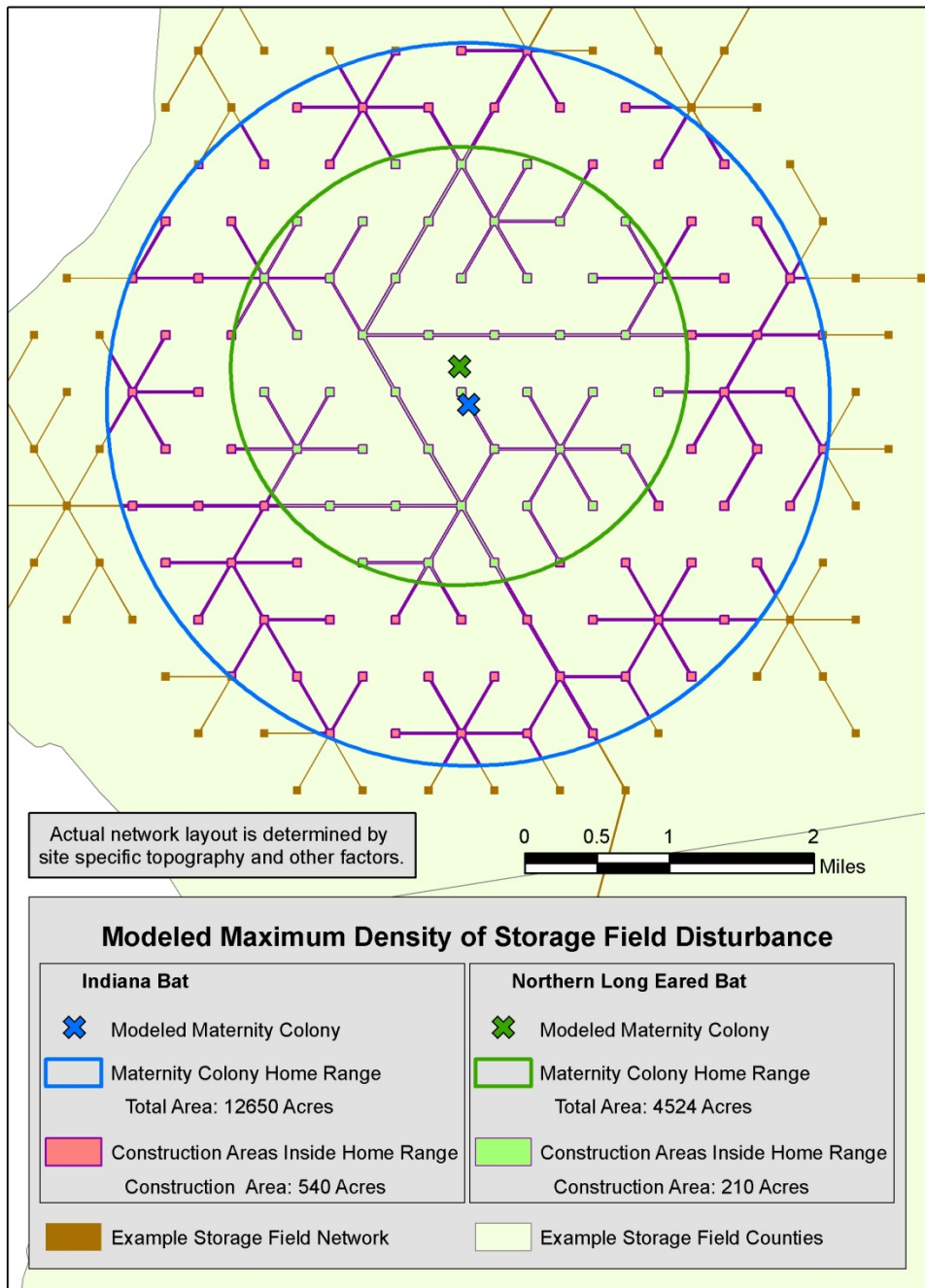


Figure 6.2.11.4-1 Modeled Maximum Density of Storage Field Disturbance

6.2.11.5 Impact of Take Analysis

Take is requested for a low, but immeasurable percentage of the 4,618 total NLEB individuals estimated to be present within no more than 93,500 acres of summer and/or spring staging/fall swarming habitat impacts over the life of the permit. As a reference for the impact of the take discussion to follow, a summary of the type of take anticipated within each habitat/specific life stage is provided in **Table 6.2.11.5-1**.

The take calculation above describes the reasonable worst-case estimate of take in individuals and also the maximum acreage of known and suitable NLEB habitat impacted by Columbia (estimated), in instances where impacts rise to the level of mortality, harm, or harassment. The take analysis builds on the take calculation by further explaining the anticipated impact this reasonable worst-case take is anticipated to have on NLEBs at the individual and population (i.e., maternity colony and spring staging/fall swarming group) level.

Individual Level

Because NLEB records occur broadly across the covered lands, nearly any action within suitable habitat has the potential to take individuals. Generally speaking, individual NLEBs must have adequate roosting, foraging, and commuting resources within their maternity colony home range and spring staging/fall swarming zone in order to successfully meet their life history requirements. Based on the effects analysis completed for the MSHCP, covered activities identified to cause take only included the clearing of roost trees in known and suitable summer habitat and spring staging/fall swarming habitat, as well as the construction of waste pits in storage field counties.

The scale of clearing associated with these covered activities range from 36 to 3,000 acres depending upon the type of covered lands and activities. A maximum worst-case scenario of 36 acres ($4,524 \text{ acres} \times 0.8\% = 36 \text{ acres}$) of total habitat within a maternity colony may be impacted from O&M or new construction within the linear (ROW) covered lands. Likewise, a maximum worst-case scenario of 121 acres ($50,265 \text{ acres} \times 0.24\% = 121 \text{ acres}$) of total habitat within a spring staging/fall swarming population may be impacted from O&M or new construction within the linear (ROW) covered lands.

³ The maximum acreage of an estimated home range for each maternity colony that may be taken by new construction of a linear (ROW) is 36.36 acres [length of the ROW through center of maternity colony home range is assumed to be 3.0 miles (1.5 mile radius x 2); width of ROW is assumed to be 100 feet; $3 \times 5,280 \text{ feet} = 15,840 \text{ feet}$; $15,840 \text{ feet} \times 100 \text{ feet} = 1,584,000 \text{ square feet}$; $1,584,000 \text{ sq. ft.} \div 43,560 \text{ sq. ft. per acre} = 36.36 \text{ acres}$]. This maximum acreage of take represents only 0.8% ($36.36 \text{ acres} \div 4,524 \text{ acres} = 0.00804 = 0.8\%$) of a maternity colony's home range.

⁴ The maximum acreage of an estimated swarming zone for each spring staging/fall swarming site that may be taken by new construction of a linear (ROW) is 121 acres [length of the ROW through center of spring staging/fall swarming zone is assumed to be 10 miles (5 mile radius x 2); width of ROW is assumed to be 100 feet; $10 \times 5,280 \text{ feet} = 52,800 \text{ feet}$; $52,800 \text{ feet} \times 100 \text{ feet} = 5,280,000 \text{ square feet}$; $5,280,000 \text{ sq. ft.} \div 43,560 \text{ sq. ft. per acre} = 121.21 \text{ acres}$]. This maximum acreage of take represents only 0.48% ($121.21 \text{ acres} \div 50,265 \text{ acres} = 0.002411 \times 100 = 0.24\%$) of a maternity colony's home range.

For storage field impacts within a summer maternity colony, an intensely developed network (**Figure 6.2.11.4-1**) of impacts to 210 acres of maternity colony habitat may occur from O&M or new construction. Although this estimate is used as the maximum worst-case scenario for the purpose of population level analysis of impact to the species, it is not expected that this level of impact (i.e., 210 acres) will occur within any given maternity colony home range. This estimate is based on the assumption that the impact to the entire network of well sites and transmission lines would occur within suitable summer habitat. Forested habitat (i.e., suitable summer habitat), at a landscape scale, is generally clustered within non-forested lands

Table 6.2.11.5-1 Table of NLEB Habitat/Specific Life Stage Types and Type of Take Expected within the Covered Lands

HABITAT/SPECIFIC LIFE STAGE TYPE	TYPE OF TAKE ⁵
Known Summer Habitat	Direct & Indirect
Suitable Summer Habitat	Direct & Indirect
Immobile NLEB (i.e., pups)	None
Known Spring Staging/Fall Swarming Habitat	Direct & Indirect
Presumed Spring Staging/Fall Swarming Habitat	Direct & Indirect
Known Winter Hibernacula Habitat	None
Presumed Winter Hibernacula Habitat	None

(e.g., residential properties, agricultural lands, pasture lands, commercial development, etc.). Thus, the likelihood that suitable summer habitat would be impacted is reduced because of the dispersed nature of this impact. Furthermore, the less suitable summer habitat present within a given maternity colony home range, the less likely it will be that the 210 acres of maximum impact would occur to that suitable summer habitat. In other words, a maternity colony home range largely dominated by forest (i.e., suitable summer habitat) might have 210 acres of impact to its summer habitat but the significance of that habitat would be reduced due to the large percentage of summer habitat remaining within the home range.

For storage field impacts within a spring staging/fall swarming population, an intensely developed network (**Figure 6.2.11.4-1**) of impacts to 2,333 acres (50,265 acres x 4.6% = 2,333 acres) of total habitat were calculated as the maximum worst-case impacts from new construction. It is highly unlikely that 2,333 acres of the total of 3,000 acres of impact planned through the permit term would occur within a single spring staging/fall swarming zone. The more likely scenario is that there will be much smaller scale impacts across several staging/swarming zones. Despite this, it is assumed that 2,333 acres or 4.6% of suitable spring staging/fall swarming habitat would

⁵ Direct take refers to take that occurs while NLEBs are present at the time of impact to habitat (i.e., occupied). Indirect take refers to take that occurs while Indiana bats are absent at the time of impact to habitat (i.e., unoccupied).

be removed as the maximum worst-case scenario for the purpose of population-level analysis of impact to the species. Given the type of impact from covered activities in combination with this small scale, the effects analysis determined that impacts to foraging and commuting habitat is insignificant to individual NLEBs.

As a result, individual NLEBs may experience impacts that range from minor nuisance (e.g., short-term nearby noise) to death (e.g., clearing of an occupied roost tree while bats are present and entrapment of bats in waste pits). Columbia has avoided direct take of lactating females and immobile pups throughout the covered lands (AMM#29 and Assumption 11). Death is likely to occur in both known and suitable habitat when roost trees may be occupied during clearing activities outside of the non-volant window. However, AMM #29 results in a significant reduction in the likelihood of mortality occurring because available data (Cope et al. 1974; Belwood 2002) suggest that most, if not all, healthy and volant individuals within felled roosts immediately flee to nearby escape roosts (Assumption 18⁶). In addition, most bats that remain in a fallen roost are juveniles, which could be rescued by their mothers (Belwood 2002). While the potential for mortality does exist within known spring staging/fall swarming habitat hibernacula, known and suitable summer habitat from tree clearing activities, and the operation of waste pits associated with well construction, reconditioning, and abandonment, the frequency in which it is expected to occur is low due to the small scale of the impact. Despite this, a low, but immeasurable amount of mortality is expected to occur to individuals over the 50-year permit term.

Clearing of known and suitable summer and/or spring staging/fall swarming habitat will displace all bats within the action area. This includes NLEBs, as well as all other species of bats that are present within the action area. These displaced bats are expected to move into the remaining suitable habitat present immediately adjacent to the action area. These bats are potentially harmed in the following ways: they are likely exposed to a higher level of predation during the move (Sparks et al. 2000; Sparks 2008), the escape/alternative roost might be less suitable, and time is expended for the colony to reassemble (Sparks 2003). The displaced bats also may need to increase energy expenditures since they may be required to increase commuting distances to traditional foraging areas, and/or expend additional energy seeking new foraging and roost sites. This increased energy expenditure is anticipated to “harm” and “harass” individuals by affecting fitness, nutrition, and reproductive success. However, NLEBs have been known to use dead and dying trees that sometimes fall; therefore, bats are likely adapted to punctuated movements and, overall, the effects on bats are likely temporary. In addition, interspecific and intraspecific competition between displaced bats and bats within adjacent undisturbed areas may significantly increase as the displaced bats attempt to locate new roosting and foraging areas.

Indirect take (i.e., unoccupied habitat impacts) could also result because NLEBs show fidelity to individual trees (Foster and Kurta 1999; Johnson et al. 2009) and roosting areas (Sasse and Perkins 1996; Partriquin et al. 2010; Perry 2011), within and among years. Thus, removing known and/or presumed occupied roosting habitat while

⁶ The referenced Cope et al. 1974 and Belwood 2002 studied felled Indiana bat roosts; however, we assume that the results would be similar for NLEB given their similar life history.

the bats are absent from their habitat still causes harassment when bats return to an altered summer and/or spring staging/fall swarming habitat. Individual bats returning to summer habitat will be forced to locate new roosts in the spring at a time when they are stressed from hibernation, migration, the increased energy costs of reproduction, and potentially WNS infection depending on their location. The impact is lessened because roost trees are ephemeral habitats (bats inherently must be prepared to deal with sudden loss of roosts), roost switching occurs every two to three days, and trees used by individual bats tend to be clustered in the environment making it less likely, given the small percentage of a bats home range (i.e., 0.8%) or staging/swarming zone (i.e., 0.24% or 4.6%) impacted, that large numbers of roosts would be removed. Indirect take from the operation of waste pits associated with well construction, reconditioning, and abandonment is possible if an individual bat drinking from the pit was not entrapped. Although we are not able to measure the amount of harm that is expected to occur due to the lack of knowledge, assessing the impact of this effect (e.g., bats are small and not usually observed or recovered when impacted by similar activities), Columbia and the Service anticipate harm may occur to those bats from the ingestion of waste fluids while cleaning themselves after their escape by affecting fitness and reproductive success. It is important to note that these pits are temporary features on the landscape used by Columbia during the construction, reconditioning, and abandonment of drilling well sites. Thus, long-term effects to individuals are not anticipated to occur.

Population-Level Impacts

As described above, individual NLEBs may experience decreased reproductive success and increased mortality as a result of Columbia's activities. Of importance here though, is how these potential adverse effects to individual bats affect the overall health and viability of a maternity colony and/or spring staging/fall swarming populations present within the covered lands. The covered lands of the Columbia MSHCP lie near the center of the NLEB's range and contain numerous hibernacula and forestlands known to contain and provide summer maternity and spring staging/fall swarming habitat for the species. The analysis that follows describes impact of the incidental take requested on NLEBs at the maternity colony and spring staging/fall swarming population levels.

Maternity Colony Populations within the Covered Lands

The available data are insufficient to determine the number of known maternity colonies that occur throughout the covered lands. Through modeling efforts, Columbia and the Service have estimated that a total of 1,476 maternity colonies may exist within the covered lands. Furthermore, there are estimated to be a total of 90 individuals (45 adult females and 45 pups) present within each of these maternity colonies. Of these 1,476 colonies, Columbia and the Service anticipate take in the form of mortality, harm, and harassment may occur at a low, but immeasurable level to 4,590 individuals within 51 colonies.

Spring Staging/Fall Swarming Populations around known and Presumed hibernacula within the Covered Lands

Approximately 95 hibernacula are known to lie within 5 miles of the covered lands. Of these hibernacula, at least 16 are located within the covered lands themselves (10 in Columbia identified storage field counties and 6 in the ROW covered lands corridor). Columbia's covered activities may result in impacts to spring staging/fall swarming habitat located within 5 miles of an unspecified number of the 95 known hibernacula. Columbia and the Service anticipate these impacts may result in the incidental taking of a low, but immeasurable percentage of 28 individual NLEBs present within the populations of these 95 spring staging/fall swarming sites in the form of mortality, harm, and harassment.

As stated previously, a reasonable worst-case scenario approach has been used to calculate the amount of take and analyze the impact of that take in both known and suitable summer and spring staging/fall swarming habitats. In using this approach, Columbia and the Service have operated under the assumption that all 93,500 acres of impact would occur in each of these habitat types independently. This approach results in a significant overestimation of the actual take incurred during implementation. However, without more information regarding the location of specific projects for the next 50 years, this conservative approach is reasonable to ensure that the mitigation program fully compensates for the impact of the take. Thus, the overall take is represented by no more than 93,500 acres of known or suitable summer and/or spring staging/fall swarming habitat impacts over the life of the permit.

Because the scale of impacts to a summer maternity colony or spring staging/fall swarming population is small compared to other actions on the landscape with significantly larger impact footprints, adverse effects at the population level from reduced colony cohesion, increased stress, or increased energy demands from searching for new roost areas are not expected. Similarly, decreased thermoregulatory efficiency is not expected or that these impacts will lead to reduced reproductive success at the population level. As summarized above, Columbia and the Service expect that minor, short term effects at the population level are possible because of the removal of roost trees and the operation of waste pits.

As explained in the individual level analysis, the risk of tree cutting and the operation of waste pits associated with well construction, reconditioning, and abandonment to bats varies depending upon the timing of the clearing activities within the occupied habitat. The use of these habitats by bats varies by season. For the purposes of completing the effects analysis, it is assumed NLEBs could be in spring staging habitat from April 1st to May 31st, known and suitable summer habitat from April 1st to August 15th and fall swarming habitat from August 15th to November 14th. There is some overlap in these time periods due to the variability in when NLEBs leave and arrive in their summer maternity and spring staging and fall swarming habitats as a result of significant climate differences from the northern and southern portions of this wide-ranging species.

Within spring staging habitat of hibernacula, cutting trees and the operation of waste pits associated with well construction, reconditioning, and abandonment while bats are emerging from hibernation and staging before migrating to summer habitats may increase the risk of affecting pregnant females. The death of a pregnant female would result in the take of two NLEBs (the adult female as well as her fetus); affecting

both the size and reproductive potential of the maternity colony to which she will migrate. This will increase the risk of affecting NLEBs within these populations. When a female fails to return to her hibernaculum, the size of the hibernating population is reduced. This is magnified by the loss of her unrealized reproductive potential (i.e., lost progeny that will never be part of or contribute to that hibernating population, or any other hibernating population).

A reduction in the numbers of bats present to swarm, mate, and cluster within a source hibernaculum may place the remaining bats at a physiological disadvantage. These remaining bats may be more susceptible to changes in temperature, rapid arousal, and extreme stress during hibernation, thus causing a reduction in survival or reproduction (Clawson et al. 1980).

Within summer habitat, the risk may be slightly less in April and early May, when the bats are migrating between their hibernacula and summer habitat. However, NLEBs have been documented to arrive in maternity areas as early as early April (USFWS 2014). Regardless, by mid-May they are usually established in their summer habitat. Cutting trees and operating waste pits associated with well construction, reconditioning, and abandonment in late April and May will increase the risk of affecting pregnant females. Injury to a pregnant female may result in injury to, or death through spontaneous abortion of her fetus, also resulting in a reduction of the colony's reproductive potential through loss of intra-season recruitment of her pup into the colony. Data regarding the year-to-year recruitment of female NLEBs into a maternity colony is lacking at the current time. Columbia has avoided any risk to lactating females and immobile pups during the nursing period of June 1 to August 1 by agreeing to not remove known or suitable summer habitat or operating waste pits associated with well construction, reconditioning, and abandonment in known habitat during this time (*see* AMMs #29 and #38). Cutting trees and the operation of waste pits associated with well construction, reconditioning, and abandonment in early to mid-August may increase the risk of affecting post-lactating females and newly volant juvenile bats, affecting both the size and reproductive potential of the colony in future years.

In summary, Columbia has agreed to avoid these population-level effects within known and suitable summer habitat during the time when lactating females and immobile pups are present. The death, harm, and harassment of NLEBs from clearing activities in occupied habitat outside of the non-volant period is likely to affect individuals, but we do not anticipate that these effects will result in population-level effects given the relatively small amount of NLEBs that may be killed in a felled tree and the small scale, low frequency, and dispersed nature in which these effects are expected to occur. It is unknown whether there are a minimum number of bats that are needed for a colony or staging/swarming population to be viable. However, the severity of these impacts would be minor at best given that a large percentage of the area encompassed by the population will be unaffected outside the impact area. Therefore, Columbia and the Service do not expect the adverse effects to individual bats will affect the overall health and viability of a maternity colony or spring staging/fall swarming populations present within the covered lands.

White-Nose Syndrome

WNS has spread rapidly throughout the Northeast – from just four wintering sites in New York in 2007 to more than 100 sites in twelve states [Connecticut, Massachusetts, New York, New Jersey, Pennsylvania, Vermont, West Virginia, New Hampshire, Virginia, Tennessee, Maryland, and Missouri] by April 2010. As of December 2014, bats with WNS were confirmed in 28 states and five Canadian providences, including 12 of the 14 states within the covered lands (exceptions are Mississippi and Louisiana). WNS has spread over 1,000 miles from the primary site of detection in NY, and it has expanded in all directions everywhere bats live.

Based on observations of continued mass-mortality at several sites, the loss of NLEBs is anticipated to continue in all regions currently affected. In addition, WNS will likely continue to radiate out to new sites; however the potential for climate, or some other environmental factor, to influence the spread of WNS, or the severity of its impact on affected bats, is unknown; however, in areas where WNS does spread, the Service expects that the total mortality rate will be similar. Of all of the bats species with known mortality from WNS, the NLEB has demonstrated the greatest declines based on winter count data.

In summary, population-level impacts from Columbia activities are not expected to significantly affect individual animals or habitat. Existing data (USFWS 2013) reveals that the populations of NLEB within WNS-affected states are declining due to a significant loss of bats from WNS. As stated above, NLEB populations are affected by WNS throughout the covered lands portion of its range; therefore, impacts associated with WNS are part of the baseline when considering the effects of Columbia activities. While a number of WNS-infected maternity colonies and spring staging/fall swarming populations could be impacted by Columbia covered activities (i.e., part of the baseline), Columbia and the Service do not expect that the adverse effects to individual bats will affect the overall health and viability of a maternity colony or spring staging/fall swarming populations present within the covered lands (*see* individual and population-level take analysis above). However, even minimal impacts to NLEBs in known and suitable summer and/or spring staging/fall swarming habitat may become important. Because it is not known how WNS will progress in the future (i.e., significant uncertainty), contingencies are explicitly identified in Chapter 10 (Assurances, Changed Circumstances, Disease, Section 10.3.6) that ensure population status, take from covered activities, and progression of WNS are evaluated annually.

6.2.11.6 Compensatory Mitigation

Implementation of Columbia's covered activities is anticipated to result in impacts to known and suitable summer habitat resulting in the incidental taking of a low but immeasurable percentage of 4,590 individuals within 51 NLEB maternity colonies. Similarly, Columbia's covered activities are anticipated to result in impacts to known and presumed spring staging/fall swarming habitat resulting in the incidental taking of an immeasurable percentage of 28 individual NLEBs. Thus, take is requested for a low, but immeasurable percentage of the 4,618 total NLEB individuals estimated to be present within no more than 93,500 acres of summer and/or spring staging/fall swarming habitat impacts over the life of the permit. Given the avoidance and

minimization measures developed for the MSHCP, take of NLEBs in winter hibernacula or take of the winter habitat is not anticipated. Columbia and the Service also do not anticipate take to occur to immobile NLEB (i.e., pups) within the covered lands (i.e., within known and suitable summer habitat) (AMM#29). Direct take is anticipated to occur in known and suitable summer habitat and known spring staging/fall swarming habitat of hibernacula. Most take is expected to be in the form of harassment but some death or injury of NLEB is anticipated.

Mitigation Package

The following mitigation measures are required to compensate for the take of NLEB. Where the term “protection” appears below, please refer to Section 6.2 for a further definition and the requirements for securing conservation of mitigation lands and other real property interests.

1. Linear impacts to summer habitat (up to 90,500 acres)

- Impacts anticipated to habitat and bats within 36 maternity colonies
- Reasonable estimate of impact to a colony = 36.36 acres
- $36.36 \text{ acres/colony} \times 36 \text{ colonies} = 1,309 \text{ acres}$ impacted over life of the permit

Mitigation Type

Protection (fee title or conservation easement) of summer habitat as mitigation for linear impacts to 36 maternity colonies using the ratios below.

Mitigation Ratios⁷

- Unoccupied (out-of-season) fall swarming - NO RATIO NEEDED - *see* Mitigation package item #3 below
- Occupied (in-season) fall swarming - NO RATIO NEEDED - *see* Mitigation package item #3 below
- Unoccupied (out-of-season) suitable summer (assumed or documented colony) (1.5:1)
- Occupied (in-season) known summer (documented only) (3:1)
- Occupied (in-season) suitable summer (assumed only) (2:1)

2. Storage field impacts to summer habitat (up to 3,000 acres)

- Impacts anticipated to bats and habitat within 15 maternity colonies
- Reasonable estimate of impact to a colony = 210 acres
- $210 \text{ acres/colony} \times 15 \text{ maternity colonies} = \underline{3,150}$ acres impacted over the life of the permit, however, Columbia has limited its actual clearing to 3,000 acres total.

⁷ In order to mitigate at the appropriate level, ratios will be applied by Columbia to ensure the mitigation is commensurate with the take expected during implementation. The selection of the ratio during implementation of the MSHCP is determined by establishing whether the take will occur in known or suitable habitat and while the habitat impacted would be occupied by NLEBs (i.e., direct take) or while habitat would be unoccupied by NLEBs (i.e., indirect take).

Mitigation Type

Protection (fee title or conservation easement) of maternity colony habitat as mitigation for storage field impacts to 15 maternity colonies using the ratios below.

Mitigation Ratios

- Unoccupied (out-of-season) fall swarming zone- NO RATIO NEEDED – *see* Mitigation package item #3 below
- Occupied (in-season) fall swarming– NO RATIO NEEDED – *see* Mitigation package item #3 below
- Unoccupied (out-of-season) suitable summer (assumed or documented) (2.5:1)
- Occupied (in-season) known summer (documented only) (4:1)
- Occupied (in-season) suitable summer (assumed only) (3:1)

3. Impacts to spring staging/fall swarming habitat (up to 93,500 acres)

- Linear and/or storage field impacts anticipated to habitat and bats near 79 documented or assumed hibernacula.

Protection includes the development and implementation of a Hibernaculum

Protection Plan to address threats (e.g., gating).

Mitigation Type

Protection of Hibernacula and associated habitat to compensate for all impacts to spring staging and fall swarming habitat.

Mitigation Amount

If all work is done out-of-season (Unoccupied) - protect one hibernaculum that either houses a minimum of 100 NLEBs at the time that mitigation occurs or a hibernacula that currently houses NLEBs and has been shown to historically provide habitat for ≥ 100 NLEBs pre-WNS. If these conditions cannot be met, protect one Service-approved hibernaculum that will fully mitigate for the amount of take.

If any activities also include in-season clearing (Occupied) - protect two hibernacula that either each house a minimum of 100 NLEBs or two hibernacula that currently house NLEB and have each been shown to historically provide habitat for ≥ 100 NLEBs pre-WNS. If these conditions cannot be met, protect two Service-approved hibernacula that will fully mitigate for the amount of take.

Total Maximum Mitigation

Spring Staging/Fall Swarming = 2 hibernacula projects = **252 Acres**

Gating estimate = \$5,000 (estimated)

Summer habitat (known and suitable) = **3,927 Acres**

Storage Field Impacts = **12,000 Acres**

Sum = 16,179 Acres over 50 years = 324 acres/year

Total Minimum Mitigation (estimated without use of non-mandatory AMMs)

Spring Staging/Fall Swarming = 1 hibernaculum project = **126 Acres**

Gating estimate = **\$2,500**

Summer habitat (known and suitable) = **1,964 Acres**

Storage Field = **7,500 Acres**

Sum = 9,590 Acres over 50 years = 192 acres/year

Summer Habitat Mitigation Sideboards:

- a. Mitigation projects will occur at sites that are known to be used by NLEBs at the time the project is selected (i.e., documented roost trees present) or assumed to have a very high likelihood of being used based on proximity to known roosting, foraging, and swarming sites (e.g., within 1.5 miles of known colonies or within 5 miles of hibernacula)
- b. Habitat mitigation projects will be no smaller than 50 acres in size. Mitigation funds will continue to accrue until this minimum project size can be accomplished unless projects are contiguous to other lands protected and managed for the NLEB.
- c. Projects will be prioritized where summer habitat is fragmented.
- d. Options include:
 - i. Protection of roosting or foraging habitat;
 - ii. Reforestation of corridors between known roosting and foraging areas; and
 - iii. Reforestation of woodlots (blocks of habitat).
- e. The covered activities' impact(s) to summer habitat should be divided into the actions or impact types described below and then quantified to yield the acreage of impact for each action. For impacts where suitable habitat is sparse,⁸ each suitable roost tree should be counted, and the number of suitable roost trees should be multiplied by 0.09 acres/tree to determine the acreage of suitable habitat loss (i.e., the single tree method). For impacts involving the loss or alteration of blocks of forested habitat, the acreage of the impact is determined by identifying the perimeter and area of the impact with Global Positioning System or Geographic Information System technology (i.e., the habitat block method).
- f. The actual mitigation costs to Columbia will vary with inflation, the price of land, and various mitigation transaction and project costs. To account for these fluctuations, Columbia will calculate its mitigation funding obligations on an annual basis using current land values specific to the region where the mitigation will occur, and representative of the habitat needed for mitigation.

Hibernaculum and Spring Staging/Fall Swarming Habitat Mitigation Sideboards:

- a. Columbia will prepare a hibernaculum protection plan that will determine the actual protection measures necessary to protect the hibernacula.

⁸ Sparse habitat is defined as areas containing widely spaced (i.e., greater than one crown width (35-foot radius) between the trees) or less than 20 trees \geq three inches dbh. An example of sparse habitat is a single tree fence row that is not connecting forested blocks.

- b. Protection will include both the hibernaculum itself (i.e., gate) and the surrounding habitat.
- c. For the purposes of calculating mitigation, it is estimated that a minimum of 0.25 mile around each hibernaculum must be protected which equals approximately **126 acres** per hibernaculum (assumes protection around one opening as the central point) plus gating. A portion (up to 25% of the 126 acres) of the acreage can be protected around a second, previously protected hibernacula if suitable acreage is not available at the first location.
- d. Implementation of this type of mitigation will be delayed until the Service can identify which hibernacula are appropriate for protection. This delay is due to impact WNS is having on bats in infected hibernacula and uncertainty with the range and speed in which this malady may spread in the future. The Service will evaluate the current status of WNS annually and determine when this portion of the package may be implemented.
- e. The focus of this mitigation will be on those hibernacula that are not already in public ownership or have no perpetual protective easements in place.

Mitigation Options that May Be Considered in the Future

While the mitigation package presented above fully compensates for the impact of the take, Columbia and the Service recognize that other mitigation options may in the future provide value to NLEBs; however, the options presented below have yet to be evaluated to determine if they would fully compensate for the impact of the take. Thus, future analysis would be necessary with the following options. The mitigation options provided below for the NLEB are not in any priority order.

These measures are not deemed acceptable mitigation at this time for various reasons including the availability of complete science to implement them. At the time of consideration, the Service and Columbia would determine whether a major amendment would be required before they could be implemented. The amount of mitigation required for these options would be determined as part of the amendment authorizing their use.

Future WNS Mitigation Option:

If and when suitable control options are available for WNS, Columbia could fund implementation of these measures. WNS research will not be funded with Columbia mitigation funds. Only those control options consistent with the National WNS Implementation Plan and agreed to by the Service would be considered for implementation as part of a mitigation project. The treatment of bats and/or their hibernacula are a few of the options that might be funded with Columbia mitigation funds. However, only those options that clearly compensate for the impact of the take requested in the MSHCP would be considered.

Future Hibernaculum Restoration Option:

If and when the Service is able to identify which hibernacula are appropriate for mitigation given the current uncertainty related to the range and speed in which WNS may spread in the future, Columbia could fund the restoration of a hibernaculum rather

than the protection of a hibernaculum (*see* #1 of mitigation package). This option would entail the restoration of winter habitat conditions in degraded caves and or mines that exhibit the potential for successful restoration.

- a. The goal of this mitigation should be to restore winter habitat conditions for NLEB hibernaculum as defined in the Habitat Considerations, Winter Habitat discussion above.
- b. A wide range of methods exist for implementing hibernacula restoration projects including but not limited to the following:
 1. construction of air dams (internal and external);
 2. sinkhole restoration;
 3. demolition and removal of man-made structures restricting airflow and/or bat movements;
 4. restoration of historic entrances; and
 5. closure of man-made entrances.

6.3 Effects on Critical Habitat

Critical habitat has not been proposed for the NLEB; therefore, no other changes to the original MSHCP are needed for this Amendment.

6.4 Overlap of Species Conservation Efforts

Given the covered lands footprint and the wide range of many of the species, there is considerable overlap among covered and non-covered species. **Table 6.4-1** lists MSHCP species that share the same area within covered lands (considering those species with species-specific AMMs). Two hundred thirty-six counties/parishes support more than one MSHCP species (including Interior least tern, Louisiana black bear, Virginia big-eared bat, Cracking pearlymussel, Oyster mussel, Cumberland Monkeyface mussel, Birdwing Pearlymussel, Cheat Mountain Salamander, and Gray bat, species for which take is not requested, but for which AMMs are proposed). Most of these (134 counties) support two species. Sixty five counties support 3 species. Thirty one counties support four species. Three counties support five species. Two counties supports six species and another supports seven.

Species overlap will provide opportunities for landscape-level conservation efforts. This is true for species (1) whose habitat requirements are the same (thus, the conservation measures are similar; e.g., multiple mollusks in the Duck River in Maury County, Tennessee) and (2) whose habitat requirements are distinct enough to avoid any conflicts between the conservation measures (e.g., conservation efforts for Indiana bat and sheepsnose mussel in Bath County, Kentucky). This overlap will facilitate efforts to coordinate and aggregate individual conservation activities on a broader geographic scale to maximize the benefits to the MSHCP species.

However, for some species this overlap will require careful consideration of AMMs with timing restrictions. Columbia has determined that, with proper project planning, the timing restrictions for the various species that might inhabit the same

geographic area can and will be met. In areas where the Indiana bat and NLEB co-occur, the Indiana bat AMMs take precedent and will be followed. The higher of the two species mitigation ratios will also be used if applicable. Only one potential AMM conflict occurs for any overlapping species and this is between Madison cave isopod and James Spiny mussel; the use of HDDs to cross the stream. However, given the karst terrain in the area where these species habitat's overlap (Rockbridge County, Virginia), it is highly unlikely that an HDD would be considered technically feasible. Thus, in Rockbridge County, Virginia streams will not be crossed using an HDD.

Table 6.4-1 Counties with Multiple MSHCP Species

State Name	County Name	Number of Species	Species
Delaware	New Castle	2	Bog Turtle, Northern Long Eared Bat
Indiana	DeKalb	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Elkhart	2	Indiana Bat, Northern Long Eared Bat
	Lake	2	Indiana Bat, Northern Long Eared Bat
	LaPorte	2	Indiana Bat, Northern Long Eared Bat
	Marshall	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Noble	2	Indiana Bat, Northern Long Eared Bat
	Porter	2	Indiana Bat, Northern Long Eared Bat
	St. Joseph	2	Indiana Bat, Northern Long Eared Bat
	Kentucky	Adair	3
Allen		4	Clubshell, Indiana Bat, Northern Long Eared Bat, Gray Bat
Barren		2	Indiana Bat, Northern Long Eared Bat
Bath		5	Clubshell, Indiana Bat, Northern Riffleshell, Sheepnose, Northern Long Eared Bat
Bourbon		2	Indiana Bat, Northern Long Eared Bat
Boyd		2	Indiana Bat, Northern Long Eared Bat
Bracken		4	Clubshell, Fanshell, Indiana Bat, Northern Long Eared Bat
Carter		3	Indiana Bat, Northern Long Eared Bat, Gray Bat
Casey		2	Indiana Bat, Northern Long Eared Bat
Clark		3	Indiana Bat, Northern Long Eared Bat, Gray Bat
Clay		2	Indiana Bat, Northern Long Eared Bat
Estill		3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
Fayette		3	Indiana Bat, Northern Long Eared Bat, Gray Bat
Floyd		2	Indiana Bat, Northern Long Eared Bat
Garrard		4	Indiana Bat, Sheepnose, Northern Long Eared Bat, Gray Bat
Greenup	4	Indiana Bat, Sheepnose, Northern Long Eared Bat, Gray Bat	

State Name	County Name	Number of Species	Species
	Jackson	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Johnson	2	Indiana Bat, Northern Long Eared Bat
	Knott	2	Indiana Bat, Northern Long Eared Bat
	Lawrence	2	Indiana Bat, Northern Long Eared Bat
	Lee	4	Indiana Bat, Northern Long Eared Bat, Gray Bat, Virginia Big Eared Bat
	Letcher	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Lewis	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Lincoln	2	Indiana Bat, Northern Long Eared Bat
	Madison	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Martin	2	Indiana Bat, Northern Long Eared Bat
	Mason	4	Clubshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Menifee	4	Indiana Bat, Northern Long Eared Bat, Gray Bat, Virginia Big Eared Bat
	Metcalfe	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Monroe	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Montgomery	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Morgan	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Nicholas	4	Fanshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Owsley	2	Indiana Bat, Northern Long Eared Bat
	Pendleton	6	Clubshell, Fanshell, Indiana Bat, Northern Riffleshell, Sheepnose, Northern Long Eared Bat
	Perry	2	Indiana Bat, Northern Long Eared Bat
	Pike	2	Indiana Bat, Northern Long Eared Bat
	Powell	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Robertson	4	Clubshell, Fanshell, Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
	Rowan	5	Indiana Bat, Northern Riffleshell, Sheepnose, Northern Long Eared Bat, Virginia Big Eared Bat
Louisiana	Avoyelles	2	Louisiana Black Bear, Northern Long Eared Bat
	East Carroll	3	Louisiana Black Bear, Northern Long Eared Bat, Interior Least Tern
	Madison	3	Louisiana Black Bear, Northern Long Eared Bat, Interior Least Tern
	Richland	2	Louisiana Black Bear, Northern Long Eared Bat
Maryland	Baltimore	2	Bog Turtle, Northern Long Eared Bat
	Cecil	2	Bog Turtle, Northern Long Eared Bat
	Garrett	2	Indiana Bat, Northern Long Eared Bat
	Harford	2	Bog Turtle, Northern Long Eared Bat
	Washington	2	Indiana Bat, Northern Long Eared Bat
Mississippi	Humphreys	3	Louisiana Black Bear, Sheepnose, Northern Long Eared Bat
	Issaquena	3	Louisiana Black Bear, Northern Long Eared Bat, Interior Least Tern
	Lafayette	2	American Burying Beetle, Northern Long Eared Bat
	Sharkey	2	Louisiana Black Bear, Northern Long Eared Bat
	Warren	3	Louisiana Black Bear, Northern Long Eared Bat, Interior Least Tern
	Washington	3	Louisiana Black Bear, Northern Long Eared Bat, Interior Least Tern
New Jersey	Gloucester	2	Bog Turtle, Northern Long Eared Bat
	Hunterdon	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat
	Morris	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat
	Salem	2	Bog Turtle, Northern Long Eared Bat
	Warren	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat
New York	Orange	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat
	Rockland	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
Ohio	Adams	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Allen	2	Indiana Bat, Northern Long Eared Bat
	Ashland	2	Indiana Bat, Northern Long Eared Bat
	Ashtabula	2	Indiana Bat, Northern Long Eared Bat
	Athens	4	American Burying Beetle, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Belmont	2	Indiana Bat, Northern Long Eared Bat
	Brown	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Butler	2	Indiana Bat, Northern Long Eared Bat
	Carroll	2	Indiana Bat, Northern Long Eared Bat
	Champaign	2	Indiana Bat, Northern Long Eared Bat
	Clark	2	Indiana Bat, Northern Long Eared Bat
	Clermont	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Clinton	2	Indiana Bat, Northern Long Eared Bat
	Columbiana	2	Indiana Bat, Northern Long Eared Bat
	Coshocton	5	Clubshell, Fanshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Crawford	2	Indiana Bat, Northern Long Eared Bat
	Cuyahoga	2	Indiana Bat, Northern Long Eared Bat
	Defiance	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Delaware	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Erie	2	Indiana Bat, Northern Long Eared Bat
	Fairfield	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Fayette	2	Indiana Bat, Northern Long Eared Bat
	Franklin	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Gallia	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Geauga	2	Indiana Bat, Northern Long Eared Bat
	Greene	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Guernsey	2	Indiana Bat, Northern Long Eared Bat
	Hancock	3	Clubshell, Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
	Hardin	2	Indiana Bat, Northern Long Eared Bat
	Harrison	2	Indiana Bat, Northern Long Eared Bat
	Henry	2	Indiana Bat, Northern Long Eared Bat
	Hocking	3	American Burying Beetle, Indiana Bat, Northern Long Eared Bat
	Holmes	2	Indiana Bat, Northern Long Eared Bat
	Huron	2	Indiana Bat, Northern Long Eared Bat
	Jackson	2	Indiana Bat, Northern Long Eared Bat
	Jefferson	2	Indiana Bat, Northern Long Eared Bat
	Knox	2	Indiana Bat, Northern Long Eared Bat
	Lawrence	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Licking	2	Indiana Bat, Northern Long Eared Bat
	Logan	2	Indiana Bat, Northern Long Eared Bat
	Lorain	2	Indiana Bat, Northern Long Eared Bat
	Lucas	2	Indiana Bat, Northern Long Eared Bat
	Madison	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Mahoning	2	Indiana Bat, Northern Long Eared Bat
	Marion	2	Indiana Bat, Northern Long Eared Bat
	Medina	2	Indiana Bat, Northern Long Eared Bat
	Meigs	4	Fanshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Monroe	2	Indiana Bat, Northern Long Eared Bat
	Montgomery	2	Indiana Bat, Northern Long Eared Bat
	Morgan	4	Fanshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Morrow	2	Indiana Bat, Northern Long Eared Bat
	Muskingum	3	Fanshell, Indiana Bat, Northern Long Eared Bat
	Noble	2	Indiana Bat, Northern Long Eared Bat
	Ottawa	2	Indiana Bat, Northern Long Eared Bat
	Paulding	2	Indiana Bat, Northern Long Eared Bat
	Perry	2	Indiana Bat, Northern Long Eared Bat
	Pickaway	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Putnam	2	Indiana Bat, Northern Long Eared Bat
	Richland	2	Indiana Bat, Northern Long Eared Bat
	Ross	2	Indiana Bat, Northern Long Eared Bat
	Sandusky	2	Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
	Scioto	3	Indiana Bat, Sheepnose, Northern Long Eared Bat
	Seneca	2	Indiana Bat, Northern Long Eared Bat
	Stark	2	Indiana Bat, Northern Long Eared Bat
	Trumbull	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Tuscarawas	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Union	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Vinton	3	American Burying Beetle, Indiana Bat, Northern Long Eared Bat
	Warren	2	Indiana Bat, Northern Long Eared Bat
	Washington	4	Fanshell, Indiana Bat, Sheepnose, Northern Long Eared Bat
	Wayne	2	Indiana Bat, Northern Long Eared Bat
	Wood	2	Indiana Bat, Northern Long Eared Bat
	Wyandot	2	Indiana Bat, Northern Long Eared Bat
Pennsylvania	Adams	2	Bog Turtle, Northern Long Eared Bat
	Armstrong	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Bucks	2	Bog Turtle, Northern Long Eared Bat
	Centre	2	Indiana Bat, Northern Long Eared Bat
	Chester	2	Bog Turtle, Northern Long Eared Bat
	Clarion	3	Clubshell, Northern Riffleshell, Northern Long Eared Bat
	Cumberland	2	Bog Turtle, Northern Long Eared Bat
	Delaware	2	Bog Turtle, Northern Long Eared Bat
	Fayette	2	Indiana Bat, Northern Long Eared Bat
	Lancaster	2	Bog Turtle, Northern Long Eared Bat
	Lawrence	2	Indiana Bat, Northern Long Eared Bat
	Lehigh	2	Bog Turtle, Northern Long Eared Bat
	Monroe	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat
	Montgomery	2	Bog Turtle, Northern Long Eared Bat
	Northampton	2	Bog Turtle, Northern Long Eared Bat
	Somerset	2	Indiana Bat, Northern Long Eared Bat
	York	3	Bog Turtle, Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
Tennessee	Davidson	3	Nashville Crayfish, Northern Long Eared Bat, Gray Bat
	Hardin	6	Clubshell, Fanshell, Indiana Bat, Northern Long Eared Bat, Cracking Pearlymussel, Gray Bat
	Lewis	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	McNairy	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Macon	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Maury	7	Indiana Bat, Northern Long Eared Bat, Birdwing Pearlymussel, Cracking Pearlymussel, Cumberland Monkeyface Pearlymussel, Gray Bat, Oyster mussel
	Sumner	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Trousdale	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
	Wayne	4	Indiana Bat, Northern Long Eared Bat, Cracking Pearlymussel, Gray Bat
	Williamson	4	Indiana Bat, Nashville Crayfish, Northern Long Eared Bat, Gray Bat
	Wilson	3	Indiana Bat, Northern Long Eared Bat, Gray Bat
Virginia	Albemarle	3	Indiana Bat, James Spiny Mussel, Northern Long Eared Bat
	Alleghany	3	Indiana Bat, James Spiny Mussel, Northern Long Eared Bat
	Augusta	4	Indiana Bat, Madison Cave Isopod, Northern Long Eared Bat, Virginia Big Eared Bat
	Botetourt	3	Indiana Bat, James Spiny Mussel, Northern Long Eared Bat
	Clarke	3	Indiana Bat, Madison Cave Isopod, Northern Long Eared Bat
	Frederick	2	Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
	Giles	4	Indiana Bat, James Spiny Mussel, Northern Long Eared Bat, Virginia Big Eared Bat
	Goochland	2	James Spiny Mussel, Northern Long Eared Bat
	Greene	3	Indiana Bat, James Spiny Mussel, Northern Long Eared Bat
	Madison	2	Indiana Bat, Northern Long Eared Bat
	Page	2	Indiana Bat, Northern Long Eared Bat
	Powhatan	2	James Spiny Mussel, Northern Long Eared Bat
	Rockbridge	4	Indiana Bat, James Spiny Mussel, Madison Cave Isopod, Northern Long Eared Bat
	Rockingham	4	Indiana Bat, Madison Cave Isopod, Northern Long Eared Bat, Virginia Big Eared Bat
	Shenandoah	2	Indiana Bat, Northern Long Eared Bat
	Warren	3	Indiana Bat, Madison Cave Isopod, Northern Long Eared Bat
	Lexington	2	Indiana Bat, Northern Long Eared Bat
	Waynesboro	2	Indiana Bat, Northern Long Eared Bat
West Virginia	Boone	2	Indiana Bat, Northern Long Eared Bat
	Braxton	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Brooke	2	Indiana Bat, Northern Long Eared Bat
	Cabell	2	Indiana Bat, Northern Long Eared Bat
	Calhoun	2	Indiana Bat, Northern Long Eared Bat
	Clay	4	Clubshell, Indiana Bat, Northern Riffleshell, Northern Long Eared Bat
	Doddridge	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Gilmer	2	Indiana Bat, Northern Long Eared Bat
	Grant	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Greenbrier	2	Indiana Bat, Northern Long Eared Bat
	Hampshire	2	Indiana Bat, Northern Long Eared Bat
	Hancock	2	Indiana Bat, Northern Long Eared Bat
	Hardy	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat

State Name	County Name	Number of Species	Species
	Harrison	2	Indiana Bat, Northern Long Eared Bat
	Jackson	3	Fanshell, Indiana Bat, Northern Long Eared Bat
	Kanawha	4	Clubshell, Fanshell, Indiana Bat, Northern Long Eared Bat
	Lewis	3	Clubshell, Indiana Bat, Northern Long Eared Bat
	Lincoln	2	Indiana Bat, Northern Long Eared Bat
	Logan	2	Indiana Bat, Northern Long Eared Bat
	McDowell	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Marion	2	Indiana Bat, Northern Long Eared Bat
	Marshall	2	Indiana Bat, Northern Long Eared Bat
	Mason	2	Indiana Bat, Northern Long Eared Bat
	Mercer	2	Indiana Bat, Northern Long Eared Bat
	Mineral	2	Indiana Bat, Northern Long Eared Bat
	Mingo	2	Indiana Bat, Northern Long Eared Bat
	Monongalia	2	Indiana Bat, Northern Long Eared Bat
	Monroe	2	Indiana Bat, Northern Long Eared Bat
	Ohio	2	Indiana Bat, Northern Long Eared Bat
	Pendleton	4	Indiana Bat, Northern Long Eared Bat, Cheat Mountain Salamander, Virginia Big Eared Bat
	Pocahontas	2	Indiana Bat, Northern Long Eared Bat
	Preston	3	Indiana Bat, Northern Long Eared Bat, Virginia Big Eared Bat
	Putnam	2	Indiana Bat, Northern Long Eared Bat
	Raleigh	2	Indiana Bat, Northern Long Eared Bat
	Randolph	4	Indiana Bat, Northern Long Eared Bat, Cheat Mountain Salamander, Virginia Big Eared Bat
	Roane	2	Indiana Bat, Northern Long Eared Bat
	Summers	2	Indiana Bat, Northern Long Eared Bat
	Tucker	4	Indiana Bat, Northern Long Eared Bat, Cheat Mountain Salamander, Virginia Big Eared Bat
	Tyler	2	Indiana Bat, Northern Long Eared Bat
	Upshur	2	Indiana Bat, Northern Long Eared Bat
	Wayne	2	Indiana Bat, Northern Long Eared Bat
	Webster	2	Indiana Bat, Northern Long Eared Bat

State Name	County Name	Number of Species	Species
	Wetzel	2	Indiana Bat, Northern Long Eared Bat
	Wirt	2	Indiana Bat, Northern Long Eared Bat
	Wood	2	Indiana Bat, Northern Long Eared Bat
	Wyoming	2	Indiana Bat, Northern Long Eared Bat

7.0 Monitoring, Reporting, and Adaptive Management

7.1 Introduction

No changes to the original MSHCP are needed for this Amendment.

7.2 General Requirements

No changes to the original MSHCP are needed for this Amendment.

7.3 Compliance and Implementation Monitoring

No changes to the original MSHCP are needed for this Amendment.

7.3.1 Prior Notification

No changes to the original MSHCP are needed for this Amendment.

7.4 Effects and Effectiveness Monitoring

No changes to the introductory paragraphs for this section of the original MSHCP are needed for this Amendment.

7.4.1 Indiana and Northern Long-eared Bat Effectiveness Monitoring

The NLEB has been added to the heading for section 7.4.1 and the effectiveness monitoring requirements in the original MSHCP for Indiana bat will also apply to NLEB. In addition, under the title “Direct and Indirect Effects” at the end of the section include: “The removal of known NLEB maternity colony or suitable summer habitat within the covered lands of the MSHCP from April 1 to May 31 and August 2 to October 15 (NLEB AMM #27) will require effectiveness monitoring strategies to determine the correct NLEB mitigation ratio.

No other changes to the original MSHCP are needed for this Amendment.

7.5 Integration of Monitoring and Adaptive Management

No changes to the original MSHCP are needed for this Amendment.

7.6 Adaptive Management

The only change needed to this section of the original MSCHP is the addition of section 7.6.4.7 as described below.

7.6.1 Overview of Adaptive Management

No changes to the original MSHCP are needed for this Amendment.

7.6.2 Goals of Adaptive Management

No changes to the original MSHCP are needed for this Amendment.

7.6.3 Applying and Implementing Adaptive Management

No changes to the original MSHCP are needed for this Amendment.

7.6.4 Species-specific Adaptive Management Strategies

7.6.4.1 Nashville Crayfish

No changes to the original MSHCP are needed for this Amendment.

7.6.4.2 Bog Turtle

No changes to the original MSHCP are needed for this Amendment.

7.6.4.3 Indiana Bat

No changes to the original MSHCP are needed for this Amendment.

7.6.4.4. Clubshell, Fanshell, Northern Riffleshell, James spinymussel and Sheepnose Mussels

No changes to the original MSHCP are needed for this Amendment.

7.6.4.5 American Burying Beetle

No changes to the original MSHCP are needed for this Amendment.

7.6.4.6 Madison Cave Isopod

No changes to the original MSHCP are needed for this Amendment.

7.6.4.7 Northern Long-eared Bat

7.6.4.7.1 Avoidance and Minimization Measures

The following text will be added to the new section 7.6.4.7.1: “Except for AMM#27, the adaptive management requirements in the original MSHCP for Indiana bat also apply to NLEB.”

7.6.4.7.2 Mitigation

The following text will be added to the new section 7.6.4.7.2: “The adaptive management requirements for winter habitat mitigation in the original MSHCP for Indiana bat also apply to NLEB.”

7.6.5 Feedback Mechanism and Implementation

No changes to the original MSHCP are needed for this Amendment.

7.7 Reports

No changes to the original MSHCP are needed for this Amendment.

7.8 Maintaining the MSHCP as a Living Document

7.8.1 New Information Regarding Newly Listed Species

No changes to the original MSHCP are needed for this Amendment.

7.8.2 Maintaining Current Data for MSHCP Species

No changes to the original MSHCP are needed for this Amendment.

8.0 Funding Assurances

8.1 Introduction

All costs of implementing the MSHCP will be assured through NiSource’s credit facility, or, as necessary, through a letter of credit as described in the original MSHCP. No changes to the original MSHCP are needed for this Amendment.

8.2 Costs to Implement MSHCP Amendment

No changes to the original MSHCP are needed for this Amendment.

8.2.1 Administrative Costs

No changes to the original MSHCP are needed for this Amendment.

8.2.2 Mitigation Costs

Under section 8.2.2 in paragraph 5, the following sentence reads as such in the original MSHCP: “As shown, NiSource expects that the total Project-Specific mitigation funding over the life of the permit would range from \$0 to \$27,848,800.” That sentence will be changed as follows: “As shown, Columbia expects that the total Project-Specific mitigation funding over the life of the permit would range from \$0 to \$40,212,346.” Columbia has also added NLEB information to Tables 8.2.2-1 and 8.2.2-2. No additional changes to the original MSHCP are needed for this Amendment.

8.2.3 MSHCP Amendment Project Costs

No changes to the original MSHCP are needed for this Amendment.

8.2.4 Adaptive Management

No changes to the original MSHCP are needed for this Amendment.

8.2.5 Changed Circumstances

No changes to the original MSHCP are needed for this Amendment.

8.3 Columbia Pipeline Group Funding

No changes to the original MSHCP are needed for this Amendment.

8.4 Funding Assurances

No changes to the original MSHCP are needed for this Amendment.

8.4.1 National Fish and Wildlife Foundation (NFWF) Mitigation and Reserve Accounts

No changes to the original MSHCP are needed for this Amendment.

8.4.2 Columbia Credit Facility; Letter of Credit

No changes to the original MSHCP are needed for this Amendment.

Table 8.2.2-1 Cost and Funding Schedule for Aggregate/O&M Mitigation Projects

Species	Mitigation ^b	Aggregate or O&M Mitigation Cost by Year ^a						
		2011	2012	2013	2014	2015	2016	2017
Indiana bat	None	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bog turtle	restore up to 20 habitat sites (funding for 13 known sites shown)	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$50,000
Madison cave isopod	None	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Clubshell	streambank conservation easement (8.1 ac)	\$2,314	\$2,314	\$2,314	\$2,314	\$2,314	\$2,314	\$2,314
Northern riffleshell	streambank conservation easement (6.1 ac)	\$1,743	\$1,743	\$1,743	\$1,743	\$1,743	\$1,743	\$1,743
Fanshell	streambank conservation easement (11.1 ac)	\$3,171	\$3,171	\$3,171	\$3,171	\$3,171	\$3,171	\$3,171
James spiny mussel	streambank conservation easement/restoration ^c (1.5 ac)	\$429	\$429	\$429	\$429	\$429	\$429	\$429
Sheepnose	streambank conservation easement (15.1 ac)	\$4,314	\$4,314	\$4,314	\$4,314	\$4,314	\$4,314	\$4,314
Nashville crayfish	streambank conservation easement (0.4 ac)	\$114	\$114	\$114	\$114	\$114	\$114	\$114
American burying beetle	Propagation and release	\$0	\$15,000	\$0	\$0	\$0	\$0	\$0
NLEB	None	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total		\$112,085	\$127,085	\$112,085	\$112,085	\$112,085	\$112,085	\$112,085

a. Funding to be provided by January 15th of specified year.

b. Acquisition of conservation easements valued at \$2,000/acre. Actual costs may vary. However, in 2009 Columbia acquired such easements for less than \$1,000 per acre.

c. Streambank restoration and tree planting valued at \$500/acre per discussion with Service staff. Actual costs may vary.

Table 8.2.2-2 Cost and Funding Schedule for Project Specific Mitigation Projects

Species	Project Specific Mitigation Total (50 years)^a	Estimated Total Cost Range for 50 Year ITP Duration^b
Indiana bat	Conserve 8,907 to 10,960 ac of suitable Indiana bat (including 1 hibernacula)	\$0 - \$20,000,000 ^c
Bog turtle	Restore and protect 5 habitat sites	\$0 - \$250,000
Madison cave isopod	Conserve/restore karst surface features near 2 known isopod occurrences	\$0 - \$100,000
Clubshell	streambank conservation easement and restoration (187.5 ac protect, 187.5 ac protect/restore)	\$0 - \$843,750 ^d
Northern riffleshell	streambank conservation easement and restoration (442.2 ac protect, 442.2 ac protect/restore)	\$0 - \$1,989,900 ^d
Fanshell	streambank conservation easement and restoration (477.9 ac protect, 477.9 ac protect/restore)	\$0 - \$2,150,550 ^d
James spiny mussel	streambank conservation easement and restoration (57.6 ac protect, 19.2 ac protect/restore)	\$0 - \$316,800 ^e
Sheepnose	streambank conservation easement and restoration (486.4 ac protect, 486.4 ac protect/restore)	\$0 - \$2,188,800 ^d
Nashville crayfish	streambank conservation easement and restoration (2.0 ac protect, 2.0 ac protect/restore)	\$0 - \$9,000 ^d
American burying beetle	None	\$0
NLEB	Conserve 9,590 to 13,179 ac of suitable NLEB habitat (including 2 hibernacula)	\$0 - \$32,363,546 ^c
Total		\$0 to \$40,212,346^f

a. Mitigation projects listed represent only one of several options for each species. Other mitigation alternatives are presented in Section 6.2.

b. Range represents reasonable worst-case scenario as used to calculate total amount of requested take (see Chapter 6). Columbia anticipates total cost to trend towards the lower end of range through the use of non-mandatory AMMs, avoidance through enhanced project planning, and due to the conservative approach used to calculate the effect of potential activities.

c. Acquisition of conservation easements valued at \$2,000/acre. Actual costs may vary. However, in 2009 Columbia acquired such easements for less than \$1,000 per acre.

d. Acquisition of conservation easements valued at \$2,000/acre. Actual costs may vary. However, in 2009 Columbia acquired such easements for less than \$1,000 per acre. Streambank restoration and tree planting valued at \$500/acre per discussion with Service staff.

e. Acquisition of conservation easements valued at \$4,000/acre. Streambank restoration and tree planting valued at \$500/acre per discussion with Service staff. Actual costs may vary.

f. Although the costs would total \$60,212,346, a total of \$40,212,346 is shown as Columbia fully expects that the \$20,000,000 mitigation cost for Indiana bat will be fully covered by duplicative mitigation costs for NLEB.

9.0 Amendment Process

No changes to the original MSHCP are needed for this Amendment.

9.1 Administrative Changes

No changes to the original MSHCP are needed for this Amendment.

9.2 Minor Amendments

No changes to the original MSHCP are needed for this Amendment.

9.3 Major Amendments

No changes to the original MSHCP are needed for this Amendment.

9.4 Treatment of Changes Resulting from Adaptive Management or Changed Circumstances

No changes to the original MSHCP are needed for this Amendment.

10.0 Assurances

10.1 Introduction

No changes to the original MSHCP are needed for this Amendment.

10.2 Federal “No Surprises” Assurances

No changes to the original MSHCP are needed for this Amendment.

10.2.1 Changed Circumstances

No changes to the original MSHCP are needed for this Amendment.

10.2.2 Unforeseen Circumstances

The following language will be added to the end of this section prior to the beginning of section 10.3: “For the purposes of the NLEB amendment only, Columbia will forgo “No Surprises” assurances for the **NLEB only** beginning five years from the date of the amendment. This means that at the end of the five-year period, any circumstances unforeseen at approval of the amendment become Columbia’s responsibility. The Service can require additional commitment of land, water, or financial compensation with respect to the NLEB, and additional restrictions on the use of land, water, or other natural resources beyond those specified in the HCP may be imposed without the consent Columbia.

Forgoing No Surprises assurances after five years of implementing the amendment is intended to address the high degree of uncertainty in assumptions for this amendment. These include the near-term status of the species resulting from the ongoing spread and declines with regard to WNS and the relatively high degree of uncertainty in the take analysis. At the end of the five-year period, Columbia and the Service will conduct a review of the NLEB amendment to determine if any changes are needed to the NLEB portions of the MSHCP, including but not limited to the AMMs, take analysis, impact of the take, mitigation, monitoring, or adaptive management. This review will be subject to approval by the Service as follows:

1. Columbia will provide a written analysis of MSHCP implementation for the NLEB. This report will include any recommendations for changing the NLEB portions of the MSHCP as a result of changes in the assumptions and analysis of the NLEB.
2. The Service will review the current status of the NLEB and determine if any changes are needed to the NLEB portions of the MSHCP or the NLEB portions of the permit.
3. Columbia will convene a meeting with the Service to review the NLEB portions of the MSHCP and MSHCP implementation for the NLEB.
4. The Service will assure that the operating NLEB conservation program that Columbia has implemented in the first five years of the permit amendment has been adequately implemented.
5. Columbia will implement any revised MSHCP requirements and/or permit amendments that the Service deems necessary following its review of the NLEB amendment. In the event that Columbia is unable or unwilling to accept such changes to its MSHCP and permit, it will surrender the NLEB take authorization for the permit.

Following the NLEB five-year review and any necessary amendments or changes (if applicable), Columbia will be afforded “No Surprises” assurances for the NLEB until “No Surprises” assurances are removed for the entire permit at the 25th year of the permit term.

No additional changes to the original MSHCP are needed for this Amendment.

10.3 Circumstances Addressed in the MSHCP Amendment

Throughout all of section 10.3 and its subheadings, all changed circumstances for the Indiana bat in the original MSHCP also apply to the NLEB. This includes climate change (section 10.3.1, Indiana bat heading), Drought (section 10.3.2, Indiana bat heading), Floods (section 10.3.3, Indiana bat heading), Fire (section 10.3.4, Indiana bat heading), Tornados (section 10.3.5, Indiana bat heading), Disease (section 10.3.6, Indiana bat heading), Invasive Species (section 10.3.7, Indiana bat heading). The triggers and responses for the Indiana bat are appropriate for the NLEB, and the NLEB will be added to every mention of Indiana bat throughout these sections. In addition, the changed circumstances for newly identified species occurrences/range expansion/contraction and species listing/delisting (sections 10.3.8 and 10.3.9) also apply to the NLEB.

In addition, the following language will be added to Section 10.3.9 under the subheading “MSHCP Species”:

“In October 2013, the Service proposed listing the northern long-eared bat as an endangered species under the ESA. The Service’s final determination will be made no later than April 2, 2015. There are four possible determinations from that process: listing is not warranted, listing is warranted as endangered, listing is warranted as threatened, or listing is warranted as threatened with a 4(d) rule. If the Service determines that listing the NLEB is not warranted, and the decision occurs before an amended ITP is issued, Columbia will withdraw its application for this amendment request. If the Service lists the NLEB as endangered or threatened, Columbia will implement the revised MSHCP and amended ITP. However, if the Service determines that the NLEB is threatened and adopts a 4(d) rule, this Amendment does not preclude Columbia from requesting another amendment to align the MSHCP and associated ITP with the final 4(d) rule.

On January 15, 2015, the Service proposed a rule under section 4(d) of the ESA for the NLEB that could be implemented in the event the NLEB is listed as threatened. Under the proposed 4(d) rule, the Service proposes that take that is incidental to certain activities, as long as those activities are conducted in accordance with specified conservation measures, will not be prohibited under section 9 of the ESA. For areas of the country affected by white-nose syndrome, which includes the entire NiSource Covered Lands, those activities would include: forest management practices; maintenance and limited expansion of transportation and utility rights-of-way; removal of trees and brush to maintain prairie habitat; limited tree removal projects, provided these activities protect known maternity roosts and hibernacula; removal of hazardous trees; removal of NLEBs from human dwellings; and research-related activities. The specified conservation measures include:

- (i) Occur more than 0.25 mile (0.4 km) from a known, occupied hibernaculum;
- (ii) Avoid cutting or destroying known, occupied maternity roost trees during the pup season (June 1–July 31); and

(iii) Avoid clear-cuts within 0.25 (0.4 km) mile of known, occupied maternity roost trees during the pup season (June 1–July 31).

Several Columbia activities (e.g., rights-of-way maintenance, upgrade and replacement of pipelines, relocations, and routine expansions) addressed in the revised MSHCP, and for which incidental take of the NLEB is requested, may be covered by a final 4(d) rule. However, given the uncertainty in the listing decision, and whether the proposed 4(d) rule will be adopted, Columbia decided to revise the MSHCP and request that the ITP be amended to include the NLEB.

In the proposed 4(d) rule, the Service has suggested that the conservation measures described above are “necessary and advisable for the conservation and management of the northern long-eared bat”, and has concluded that the activities, when conducted in accordance with the specified conservation measures, will provide “protection for the northern long-eared bat during its most sensitive life stages”. Take that is incidental to these activities, when conducted in accordance with the specified conservation measures, would not be prohibited under section 9 of the ESA.

Should Columbia decide to align the MSHCP and ITP with a future 4(d) rule for the NLEB, it would request a minor amendment that satisfies the provisions of 50 C.F.R. § 13.23, as well as Service regulations, policies, and procedures for minor amendments, which are reflected in section 9.2 of the MSHCP.

Such a request would include a written notice to the Service that includes a description of the proposed minor amendment, an analysis of the potential environmental effects, and an explanation of how the potential environmental effects conform to, and are not different from, those described in the revised MSHCP. The Service will provide Columbia with a written explanation for its decision within 90 days from the time of the request.

With regard to potential environmental effects, the following Columbia activities could adversely impact the NLEB in the states and counties listed in section 6.2.11.1: tree clearing, tree side-trimming, access road maintenance and construction, well plugging, presence of the pipeline corridor, construction and maintenance of waste pits, and herbicide application. Take of NLEBs may occur as a result of habitat loss and degradation as a result of these activities, with an understanding that the direct loss of some individuals is unavoidable. The revised MSHCP identifies conservation measures that Columbia will implement to avoid, minimize, and mitigate potential impacts to NLEBs from these activities (see section 6.2.11.3). Should the proposed 4(d) rule become final, Columbia may have the option to modify and/or eliminate certain avoidance, minimization, and mitigation measures specific to tree clearing and tree-side trimming, since take that is incidental to these activities, as long as the activities are conducted in accordance with the conservation measures in the proposed 4(d) rule, will not be prohibited.”

No additional changes to the original MSHCP are needed for this Amendment.

11.0 Alternatives to Take

11.1 Introduction

No changes to the original MSHCP are needed for this Amendment.

11.2 No-Action Alternative

No changes to the original MSHCP are needed for this Amendment.

11.3 Covered Lands Alternatives

No changes to the original MSHCP are needed for this Amendment.

11.3.1 Existing Rights-of-Way and Fee-Title Properties Alternative

No changes to the original MSHCP are needed for this Amendment.

11.3.2 300-Foot-Wide Corridor Alternative

No changes to the original MSHCP are needed for this Amendment.

11.3.3 Corridor Greater Than One Mile Alternative

No changes to the original MSHCP are needed for this Amendment.

11.4 All AMMs Alternative

No changes to the original MSHCP are needed for this Amendment.

12.0 List of Preparers

NiSource

Rick Hall, Jr.	Principal, Natural Resource Sustainability
Natalie Conlon	Environmental Coordinator 3
Farrah Lowe	VP Safety, Training & Natural Resource Mtg
Jon Adamson	Manager, Natural Resource Permitting
Jerry Castillo	Director, Land & NRP Projects
Chris Llewellyn	NRP Analyst, Natural Resource Permitting
Margaret Rice	AGC & Director Env Policy & Permitting
Sasha Reyes	Senior Counsel

Holland & Hart LLP

Sandra Snodgrass	Outside counsel
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13.0 References Cited

The following references are included in this amendment. No additional changes are needed to the original MSHCP.

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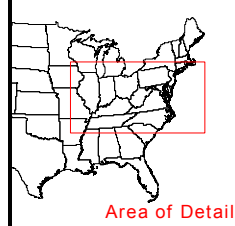
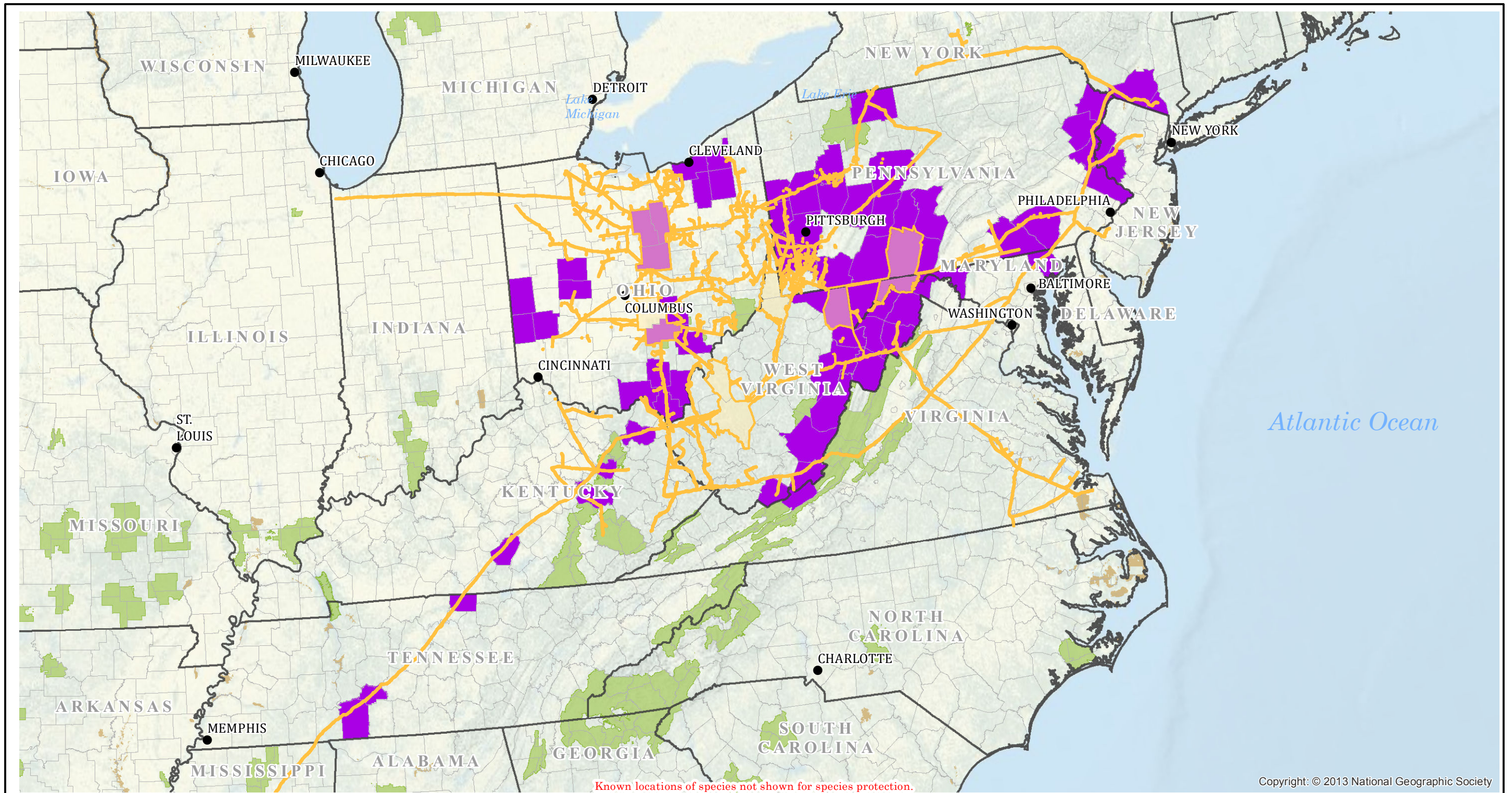
APPENDIX G
TAKE SPECIES MAPS

LIST OF ATTACHMENTS

- *Figure 6.2.1.3-1 Potential Occurrence of Indiana Bat Within Covered Lands
- *Figure 6.2.1.3-2 Potential Occurrence of Indiana Bat Within Covered Lands
- *Figure 6.2.2.3-1 Bog Turtle Suitable Habitat Within the NiSource Covered Lands
- *Figure 6.2.2.3-2 Bog Turtle Suitable Habitat Within the NiSource Covered Lands
- *Figure 6.2.3.3-1 Potential Occurrence of Madison Cave Isopod Within Covered Lands
- *Figure 6.2.4.3-1 Potential Occurrence of the Clubshell Mussel Within Covered Lands
- *Figure 6.2.5.3-1 Potential Occurrence of the Northern Riffleshell Mussel Within Covered Lands
- *Figure 6.2.6.3-1 Potential Occurrence of the Fanshell Mussel Within Covered Lands
- *Figure 6.2.7.3-1 Potential Occurrence of the James Spiny mussel Within Covered Lands
- *Figure 6.2.8.3-1 Potential Occurrence of the Sheepnose Mussel Within Covered Lands
- *Figure 6.2.9.3-1 Potential Occurrence of the Nashville Crayfish Within Covered Lands
- *Figure 6.2.10.3-1 Potential Occurrence of the American Burying Beetle Within Covered Lands
- Figure 6.2.11.3-1 Potential Occurrence of Northern Long-eared Bat Within Covered Lands
- Figure 6.2.11.3-2 Potential Occurrence of Northern Long-eared Bat Within Covered Lands

* No changes to the original MSHCP are needed for this Amendment.

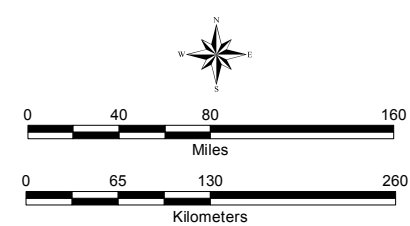
Figure 6.2.11.3-1
Potential Occurrence of Northern Long-eared Bat Within Covered Lands



- Counties with Covered Lands Areas Near Northern Long-Eared Bat Hibernacula
- Covered Lands

LEGEND

- U.S. Forest Service Lands
- National Wildlife Refuge Managed Lands
- NGS USA Topographic Maps



NiSource MSHCP Project

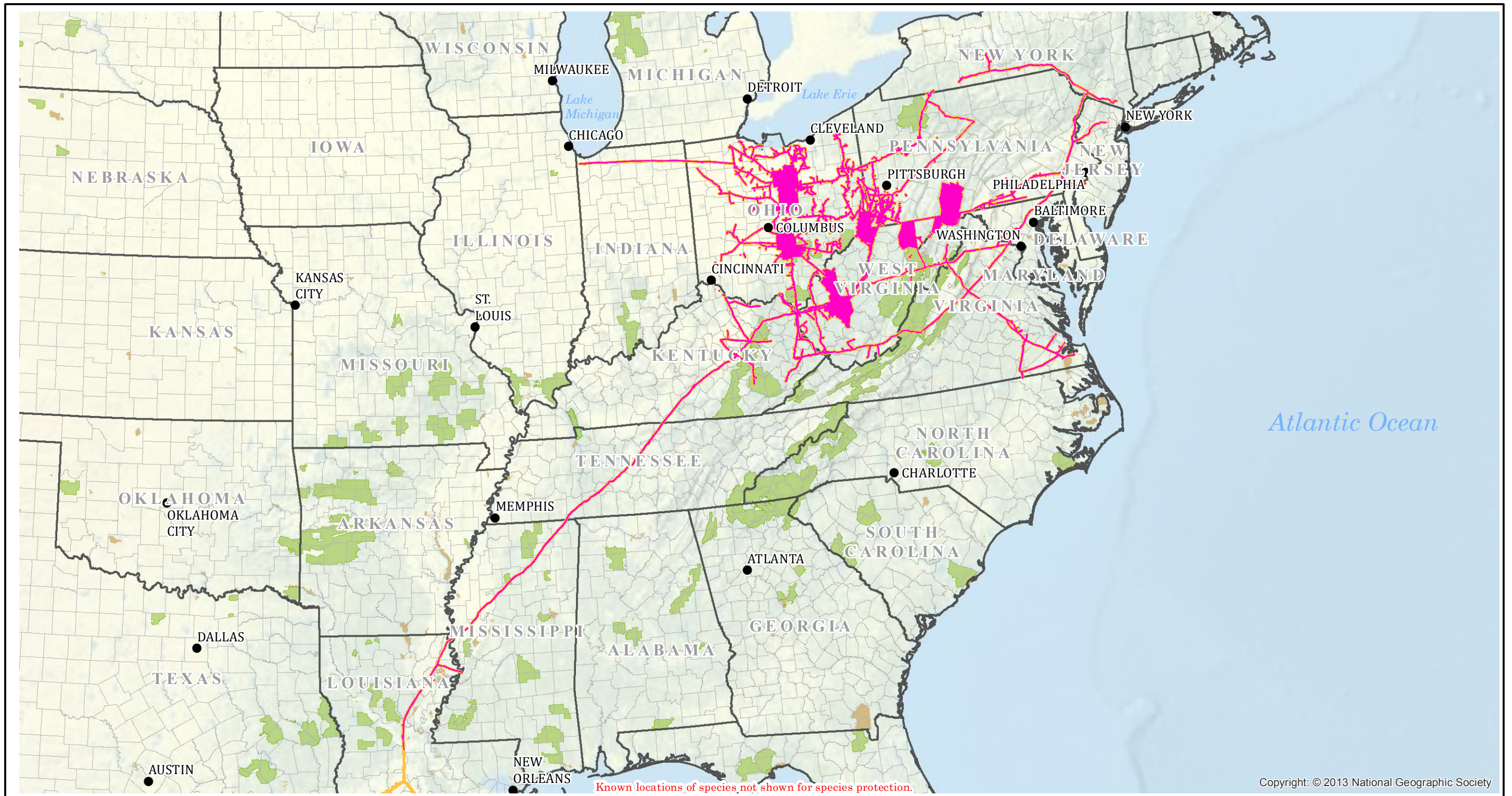


Potential Occurrence Of Northern Long-Eared Bat Within The Covered Lands

Maps produced by:
US Fish & Wildlife Service

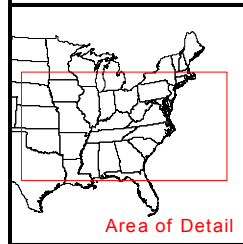
February, 2015

Figure 6.2.11.3-2
Potential Occurrence of Northern Long-eared Bat Within Covered Lands



Known locations of species not shown for species protection.

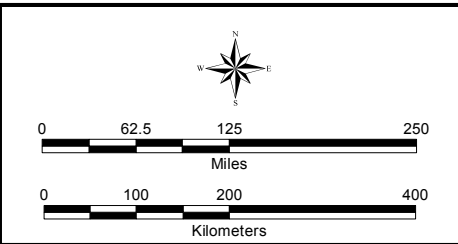
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LEGEND

- █ Northern Long Eared Bat Habitat Within Covered Lands
- █ Covered Lands
- █ U.S. Forest Service Lands
- █ National Wildlife Refuge Managed Lands

NGS USA Topographic Maps



NiSource MSHCP Project

Potential Occurrence Of Northern Long-Eared Bat Within The Covered Lands

Maps produced by:
US Fish & Wildlife Service

February, 2015

APPENDIX L

SURVEY AND OTHER PROTOCOLS

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*No changes to original MSHCP are needed for this Amendment

Attachment L-25

Northern Long-eared Bat Habitat Assessment Protocols

Attachment L-26

Determination of Potential Winter Habitat for Northern Long-eared Bats

Columbia personnel or its consultants will determine whether potentially-suitable winter habitat exists within the project area by conducting “Winter Habitat Assessments” as described below. The results of these assessments will be recorded and documented in Columbia’s annual compliance report. Results will be valid for two years and can be completed anytime of year. The Winter Habitat Assessment Protocols are:

- i. Examine identified potential winter habitat for the following characteristics:
 1. The openings should be at least one foot in diameter or larger.
 2. The passage should continue beyond the dark zone and not have an obvious end within 40 feet of entrance (Note: This may not be verifiable by surveyor due to safety concerns).
 3. Entrances that are flooded or prone to flooding (i.e., debris on ceiling), collapsed, or otherwise inaccessible to bats will be excluded.
 4. Openings that have occurred recently (i.e., within the past 12 months) due to creation or subsidence will be excluded. However, a written description and photographs of the opening must be included in the pre-survey report.

Attachment L-27

Northern Long-eared Bat Survey Protocols

The current “2014 Range-wide Indiana Bat Summer Survey Guidelines” provided on the Service’s Indiana bat website:

<http://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2014IBatSummerSurveyGuidelines13Jan2014.pdf>

or future versions of superseding Service-approved guidelines will be applied.

APPENDIX M
THREATS ANALYSIS TABLES

Threats Analysis Tables are provided in the following attachments:

Table 6.2.11.1-1 Northern Long-eared Bat Threats Analysis Table

Table 6.2.11.1-1 Northern Long-eared Bat Threats Analysis Table

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
Operation & Maintenance	Facilities - vehicles, foot traffic, noise, communication facilities	increased human activity/disturbance	increased daytime arousal	human presence	all life stages, (not hibernation)	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, nor would it impact foraging bats or bats using travel corridors; NOTE vehicle impacts for all O&M subactivities are evaluated here (i.e., vehicle impacts will not be considered under the remaining O&M subactivities)
Operation & Maintenance	Vegetation Management - mowing	loss or alteration of forested habitat; increased human activity/disturbance;	decreased foraging & travel efficiency; increased predation	alteration of spring-summer-fall travel corridors; vegetation removal	all life stages, (not hibernation)	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, nor would it impact foraging bats or bats using travel corridors.
Operation & Maintenance	Vegetation Management - chainsaw and tree clearing	loss or alteration of forested habitat;	alteration of travel corridors, summer roosting/foraging habitat, & staging/swarming habitat; increased arousal, daytime disturbance, roost abandonment, increased predation due to daytime activity	vegetation removal; human disturbance	all life stages, (not hibernation)	Kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	AMMs minimize potential effects; vegetation alterations to travel corridors and foraging habitat should be extremely small; Noise and activity levels are anticipated to be so low as to not cause bats to flush from adjacent roost trees;
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	chemical contamination; vegetation loss	lethal or sublethal exposure to toxins; alteration of travel corridors, summer roosting/foraging habitat, & staging/swarming habitat;	contamination of water & vegetation; loss of herbaceous vegetation	unlikely				NLAA	implementation of AMM 12 makes potential impacts to hibernating bats extremely unlikely to occur; the amount of area to be treated that could be bat roosting, foraging, or travelling habitat is very small, making potential exposure extremely unlikely to occur
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	human activity & disturbance; obstructed cave entrances or vents	loss or alteration of hibernation conditions; hibernacula no longer suitable; daytime arousal	alteration of water or air flow in/out of hibernacula; human presence	all life stages; spring-fall	none expected			NLAA	AMMs avoid potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees;
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	human activity & disturbance; smoke disturbance	smoke inhalation during hibernation; increased arousal, daytime disturbance, roost abandonment, increased predation due to daytime activity	smoke in hibernacula or roosting habitat	all life stages; all seasons	none expected			NLAA	The harassment and resultant flushing of bats from smoke caused by burning brush piles in summer is insignificant because the effects are difficult to detect and measure; AMMs will prevent smoke from entering hibernacula in the winter
Operation & Maintenance	Vegetation Management - tree side trimming by bucket truck or helicopter	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting/foraging habitat, & staging/swarming habitat; increased arousal, daytime disturbance, roost abandonment, increased predation due to daytime activity	vegetation removal; human disturbance	unlikely	kill, harm, harass	breeding, sheltering	numbers, reproduction	NLAA	AMMs minimize potential effects; vegetation alterations to travel corridors and foraging habitat should be extremely small; Noise and activity levels are anticipated to be so low as to not cause bats to flush from adjacent roost trees; Although some roosting habitat may be taken during side trimming during the winter, we do not expect indirect effects to occur because the majority of the tree and therefore roosting habitat will not be removed. Thus, the effects are insignificant.

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human disturbance	unlikely	none expected			NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on bat or their habitat; ROW repairs occur in areas of soil erosion where roost trees are unlikely to occur.
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - hand, mechanical	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human disturbance	unlikely	none expected			NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on bats or their habitat; ROW repairs occur in areas of soil erosion where roost trees are unlikely to occur.
Operation & Maintenance	ROW repair, regrading, revegetation - in stream stabilization and/or fill	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human disturbance	unlikely	none expected			NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on bat or their habitat.
Operation & Maintenance	Access Road Maintenance - grading, graveling	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human disturbance	unlikely	kill, harm, harass	breeding, sheltering	numbers, reproduction	NLAA	AMMs minimize potential effects; vegetation alterations to travel corridors and foraging habitat should be extremely small; Noise and activity levels are anticipated to be so low as to not cause bats to flush from adjacent roost trees; Although some roosting habitat may be taken during side trimming during the winter, we do not expect indirect effects to occur because the majority of the tree and therefore roosting habitat will not be removed. Thus, the effects are insignificant.
Operation & Maintenance	Access Road Maintenance - culvert replacement	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human presence	all life stages	none expected			NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on bat or their habitat.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - Off ROW Clearing	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	AMMs minimize potential effects; vegetation alterations to travel corridors and foraging habitat should be extremely small; Noise and activity levels are anticipated to be so low as to not cause bats to flush from adjacent roost trees;
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	human disturbance	increased daytime arousal	human presence	all life stages	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, nor would it impact foraging bats or bats using travel corridors.
Operation & Maintenance	Pipeline Abandonment - in place	human disturbance	increased daytime arousal	human presence	all life stages	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, nor would it impact foraging bats or bats using travel corridors.
Operation & Maintenance	Pipeline Abandonment - removal	human disturbance	increased daytime arousal	human presence	all life stages	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, nor would it impact foraging bats or bats using travel corridors.

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
New Disturbance - Construction	Grading, erosion control devices	alteration of water flow; vegetation removal; human activity	altered water flow & humidity in hibernacula	altered water flow	all life stages; all seasons	none expected			NLAA	Noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; AMMs prevent discharge of a significant amount of water into the recharge area of known hibernacula potentially flooding hibernating bats
New Disturbance - Construction	Trenching (digging, blasting, dewatering, open trench, sedimentation)	human activity; ground disturbance; instream & riparian disturbance; temporary dewatering	decreased aquatic invertebrates; daytime arousal	instream sedimentation & water flow disruption; human presence & noise	all life stages; all seasons	none expected			NLAA	AMMs limit potential impacts to hibernacula by restricting blasting within 1/2 mile of hibernacula; ECS requirements limit loss of aquatic invertebrates so that any loss of bat forage is insignificant
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, padding and backfilling	human activity	daytime arousal	human presence & noise	all life stages; spring-fall	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees,
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), existing line	withdrawal/discharge of water into aquatic habitats; human activity	decreased aquatic invertebrates; daytime arousal	water alterations; human presence & noise	all life stages; all seasons	none expected			NLAA	AMMs prevent discharge of a significant amount of water into the recharge area of known hibernacula potentially flooding hibernating bats; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, ECS requirements limit loss of aquatic invertebrates so that any loss of bat forage is insignificant
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), new line	withdrawal/discharge of water into aquatic habitats; human activity	decreased aquatic invertebrates; daytime arousal	water alterations; human presence & noise	all life stages; all seasons	none expected			NLAA	AMMs prevent discharge of a significant amount of water into the recharge area of known hibernacula potentially flooding hibernating bats; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees, ECS requirements limit loss of aquatic invertebrates so that any loss of bat forage is insignificant
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	human activity & disturbance; obstructed cave entrances or vents	loss or alteration of hibernation conditions; daytime arousal	alteration of water or air flow in/out of caves; human presence	all life stages; all seasons				NLAA	AMMs avoid potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees;
New Disturbance - Construction	Compression Facility, noise	noise disturbance	daytime arousal	human presence	all life stages; spring-fall	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees
New Disturbance - Construction	Communication Facility - guy lines, noise, lights	human activity and facilities	daytime arousal	human presence	all life stages; spring-fall	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - <u>grading, graveling</u>	alteration of surface water flow; vegetation removal; human activity	altered water flow & humidity in hibernacula; alteration of summer roosting habitat, & staging/swarming habitat; daytime arousal	removal of forested habitat; altered surface water flow into caves; human presence	all life stages;	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	AMMs limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; The flushing of bats from roost trees as they are being cut during daylight hours would increase the likelihood that the bats would become prey for predators.

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - <u>culvert installation</u>	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal	vegetation removal; human presence	all life stages	none expected			NLAA	The small area and level of impact from these activities on bat forested habitat is not expected to have noticeable or measurable impacts on bat or their habitat.
New Disturbance - Construction	Stream Crossings, wet ditch	tree removal; loss or alteration of forested habitat; human disturbance; instream & riparian disturbance;	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal; decreased aquatic invertebrates;	vegetation removal; instream sedimentation & water flow disruption; human presence & noise	all life stages; all seasons	none expected			NLAA	AMMs will limit blasting activity so that karst features will not be altered or destroyed; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Stream Crossings, dry ditch	tree removal; loss or alteration of forested habitat; human disturbance; instream & riparian disturbance;	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal; decreased aquatic invertebrates;	vegetation removal; instream sedimentation & water flow disruption; human presence & noise	all life stages	none expected			NLAA	AMMs will limit blasting activity so that karst features will not be altered or destroyed; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Stream Crossings, steel dam & culvert	tree removal; loss or alteration of forested habitat; human disturbance; instream & riparian disturbance;	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal; decreased aquatic invertebrates;	vegetation removal; instream sedimentation & water flow disruption; human presence & noise	all life stages	none expected			NLAA	AMMs will limit blasting activity so that karst features will not be altered or destroyed; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Stream Crossings, dam & pump	tree removal; loss or alteration of forested habitat; human disturbance; instream & riparian disturbance;	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal; decreased aquatic invertebrates;	vegetation removal; instream sedimentation & water flow disruption; human presence & noise	all life stages	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Stream Crossings, Horizontal Directional Drill (HDD)	alteration of surface water flow; vegetation removal; human activity; instream & riparian disturbance	alteration of summer roosting habitat, & staging/swarming habitat; increased daytime arousal; decreased aquatic invertebrates;	vegetation removal; instream drilling fluids; human presence & noise	all life stages;	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
New Disturbance - Construction	Stream Equipment Crossing Structures	instream & riparian disturbance; human activity	increased daytime arousal; decreased aquatic invertebrates;	instream sedimentation & changes in waterflow; human presence & noise	all life stages;	none expected			NLAA	It is extremely unlikely that this activity would result in a modification to recharge areas of cave streams and other karst features that are hydrologically connected to known hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to stream biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - clearing	clearing of forested habitat; human activity & disturbance	alteration of summer roosting habitat, & staging/swarming habitat; daytime arousal	vegetation removal; human presence	all life stages; spring-fall	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	noise created from clearing of ROW is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; The flushing of bats from roost trees as they are being cut during daylight hours would increase the likelihood that the bats would become prey for predators.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - tree side trimming	No side trimming occurs for new construction.							NE	
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - grading, trenching, regrading	alteration of surface water flow; vegetation removal; human activity; wetland disturbance	flooding hibernacula; decreased aquatic invertebrates; alteration of staging/swarming habitat; daytime arousal	removal of wetland vegetation; water disruption; alteration of water or air flow in/out of caves; human presence & noise	all life stages; all seasons	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to wetland biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - pipe stringing	human activity	daytime arousal	human presence & noise	all life stages; spring-fall	none expected			NLAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees,
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - HDD	alteration of surface water flow; vegetation removal; human activity; wetland disturbance	flooding hibernacula; decreased aquatic invertebrates; alteration of staging/swarming habitat; daytime arousal	removal of wetland vegetation; water disruption; drilling fluids in wetland; increased water flow into caves; human presence & noise	all life stages;	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to wetland biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - Horizontal bore	alteration of surface water flow; vegetation removal; human activity; wetland disturbance	flooding hibernacula; decreased aquatic invertebrates; alteration of staging/swarming habitat; daytime arousal	removal of wetland vegetation; water disruption; drilling fluids in wetland; increased water flow into caves; human presence & noise	all life stages;	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to wetland biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage

Pipeline Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
New Disturbance - Construction	Storage wells - clearing and drilling	alteration of surface water flow; vegetation removal; clearing of forested habitat; human activity;	flooding hibernacula; decreased aquatic invertebrates; alteration of summer & staging/swarming habitat; daytime arousal	removal of vegetation; water disruption; increased water flow into caves; human presence & noise	all life stages;	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	AMMs will limit potential impacts to hibernacula (potential impacts are from drilling only); Noise created from chainsaw clearing of ROW is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees.; Although drilling noise is significant (<75 db), we expect the effects to be insignificant because the noise levels would not reach the scale where take occurs;
New Disturbance - Construction	Storage wells - reconditioning	alteration of surface water flow; vegetation removal; human activity;	flooding hibernacula; decreased aquatic invertebrates; alteration of staging/swarming habitat; daytime arousal	removal of vegetation; water disruption; increased water flow into caves; human presence & noise	all life stages;	none expected			NLAA	AMMs will limit potential impacts to hibernacula; noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees; impacts to wetland biota would be temporary and limited & localized and not expected to cause any noticeable decrease in bat forage
New Disturbance - Construction	Storage wells - waste pits	chemical contamination; vegetation removal; human activity	exposure to toxins; alteration of summer & staging/swarming habitat; daytime arousal	removal of vegetation; use of contaminated water or prey;	all life stages;	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	noise created from this activity is anticipated to be insignificant and would not result in the flushing of bats from adjacent roost trees